Web Application Frameworks

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Web Application Frameworks

- A **Web Application Framework** (WAF) or **Web Framework** (WF) is a software framework that is designed to support the development of web applications including web services, web resources, and web APIs.
- This framework provides a standard way to build and deploy web applications on the World Wide Web.

Web Application Frameworks

- **Aim : To automate the overhead associated with common activities performed in web development.**
- **For example, many web frameworks provide libraries for database access, templating frameworks, and session management, and they often promote code reuse.**

Web Application Frameworks

Web Application Architecture

- The web application architecture describes the interactions between applications, databases, and middleware systems on the web.
- It ensures that multiple applications work simultaneously.
- As soon as the user hits the go button after typing a URL in the address bar of a web browser, it requests for that particular web address. The server sends files to the browser as a response to the request made. The browser then executes those files to show the requested page.

Web Application Architecture

- Finally, the user is able to interact with the website. The most important thing to note here is the code parsed by the web browser.
- A web app works in a similar way.
- This code might or might not have specific instructions that tell the browser how to respond with respect to the different types of user inputs.

Web Application Architecture

- Hence, a web application architecture has to include all the sub-components as well as the external applications interchanges for the entire software application.
- A web application architecture has to deal with efficiency, reliability, scalability, security, and robustness.

How Web Application Works?

- With any typical web application, there are two different codes (sub-programs) running side-by-side.
- These are:

  [1] Client-side Code - The code that is in the browser and responds to some user input.

  [2] Server-side Code - The code that is on the server and responds to the HTTP requests.

Web Application Architecture

- A web developer (team) developing the web application decides as to what the code on the server will do with respect to the code in the browser.
- For writing server-side code, C#, Java, JavaScript, Python, PHP, Ruby, etc. are used.
- Any code that is able to respond to HTTP requests has the ability to run on a server.

Web Application Architecture

- The server-side code is responsible for creating the page that the user requested as well as storing different types of data, including user profiles and user input. It is never seen by the end-user.
- A combination of CSS, HTML, and JavaScript is used for writing the client-side code.
- This code is parsed by the web browser. Unlike the server-side code, client-side code can be seen as well as modified by the user. It reacts to user input.

HTML, CSS and JavaScript

- **HTML provides the basic structure of sites, which is enhanced and modified by other technologies like CSS and JavaScript.**
- **CSS is used to control presentation, formatting, and layout.**
- **JavaScript is used to control the behavior of different elements.**

HTML5

- HTML5 is the latest and most enhanced version of HTML.
- Technically, HTML (HyperText Markup Language) is not a programming language, but rather a markup language.
- HTML5 is a cooperation between the World Wide Web Consortium (W3C) and the Web Hypertext Application Technology Working Group (WHATWG).

Features of HTML5

New Semantic Elements

- These are like <header>, <footer>, and <section>.

Canvas

- This supports a two-dimensional drawing surface that you can program with JavaScript.

Audio & Video

- You can embed audio or video on your webpages without resorting to third-party plugins.

Forms 2.0

- Improvements to HTML web forms where new attributes have been introduced for <input> tag.

Persistent Local Storage

- To achieve without resorting to third-party plugins.

WebSocket

- A next-generation bidirectional communication technology for web applications.

Server-Sent Events

- HTML5 introduces events which flow from web server to the web browsers and they are called Server-Sent Events (SSE).

Geolocation

- Now visitors can choose to share their physical location with your web application.

Microdata

- This lets you create your own vocabularies beyond HTML5 and extend your web pages with custom semantics.

Drag and drop

- Drag and drop the items from one location to another location on the same webpage.

HTML5 document

- **Following tags have been introduced for better structure:**

Header
- This tag represents the header of a section.

Footer
- This tag represents a footer for a section and can contain information about the author, copyright information, et cetera.

Nav
- This tag represents a section of the document intended for navigation.

Aside
- This tag represents a piece of content that is only slightly related to the rest of the page.

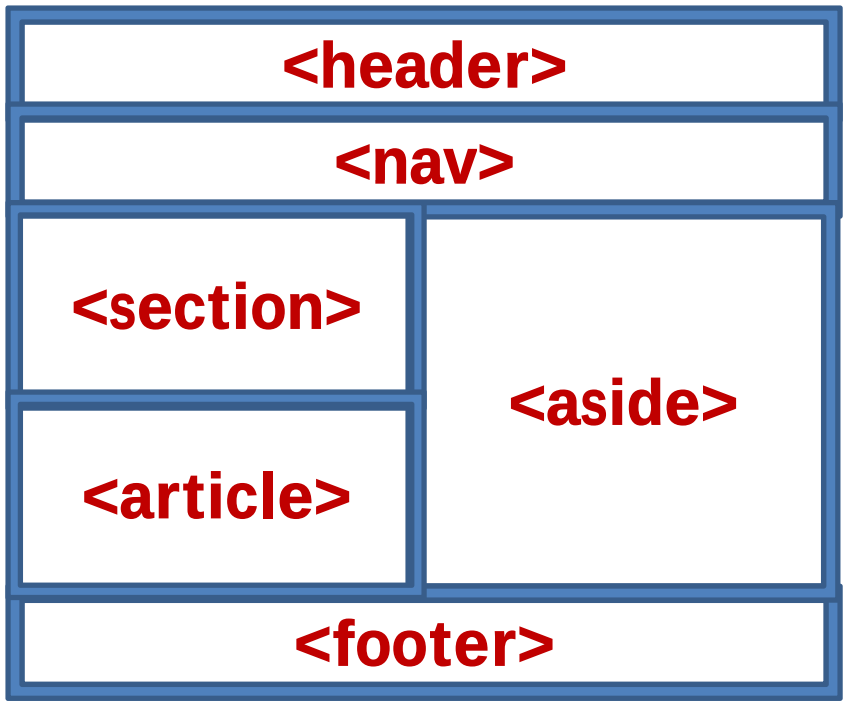
Section
- This tag represents a generic document or application section. It can be used together with h1-h6 to indicate the document structure.

Article
- This tag represents an independent piece of content of a document, such as a blog entry or newspaper article.

Dialog
- This tag can be used to mark up a conversation.

Figure
- This tag can be used to associate a caption together with some embedded content, such as a graphic or video.

HTML5 semantic element layout



HTML5 - semantic elements

HTML code using semantic elements

```
<header></header>
 <section>
    <article>
          <figure>
             <img>
             <figcaption></figcaption>
          </figure>
       </article>
</section>
<footer></footer>
```

HTML code using non-semantic elements

```
<div id="header"></div>
<div class="section">
    <div class="article">
        <div class="figure"> <img>
            <div class="figcaption"></div>
        </div>
    </div>
</div>
<div id="footer"></div>
```

Cascading Style Sheet (CSS)

- CSS is a language that describes the style of an HTML document.
- A Style Sheet is simply a text file that contains one or more rules that determine— through properties and values — how certain elements in your Web page should be displayed.
- CSS stands for Cascading Style Sheets.
- Styles are normally stored in Style Sheets.
- External style sheets can save a lot of work.
- External style sheets are stored in CSS files.
- Multiple style definitions will cascade into one.

Ways to define Styles

- Exter
- Interr
- Inline

External style sheet

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

Internal style sheet

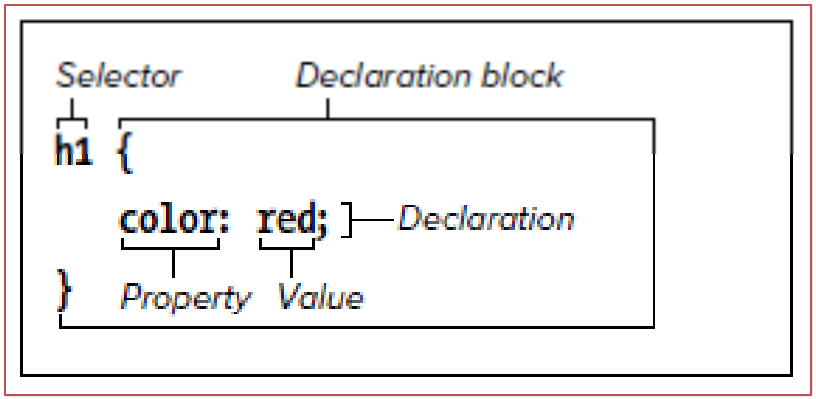
```
<head>
<style type="text/css">
hr {color: sienna}
p {margin-left: 20px}
</style>
</head>
```

Inline style

```
<p style="color: sienna; margin-left: 20px"> This is a paragraph </p>
```

CSS Style rule

- Each style rule in a style sheet has two main parts: the selector, which determines which elements are affected, and the declaration block, made up of one or more property/value pairs (each constitutes a declaration), which specifies just what should be done.

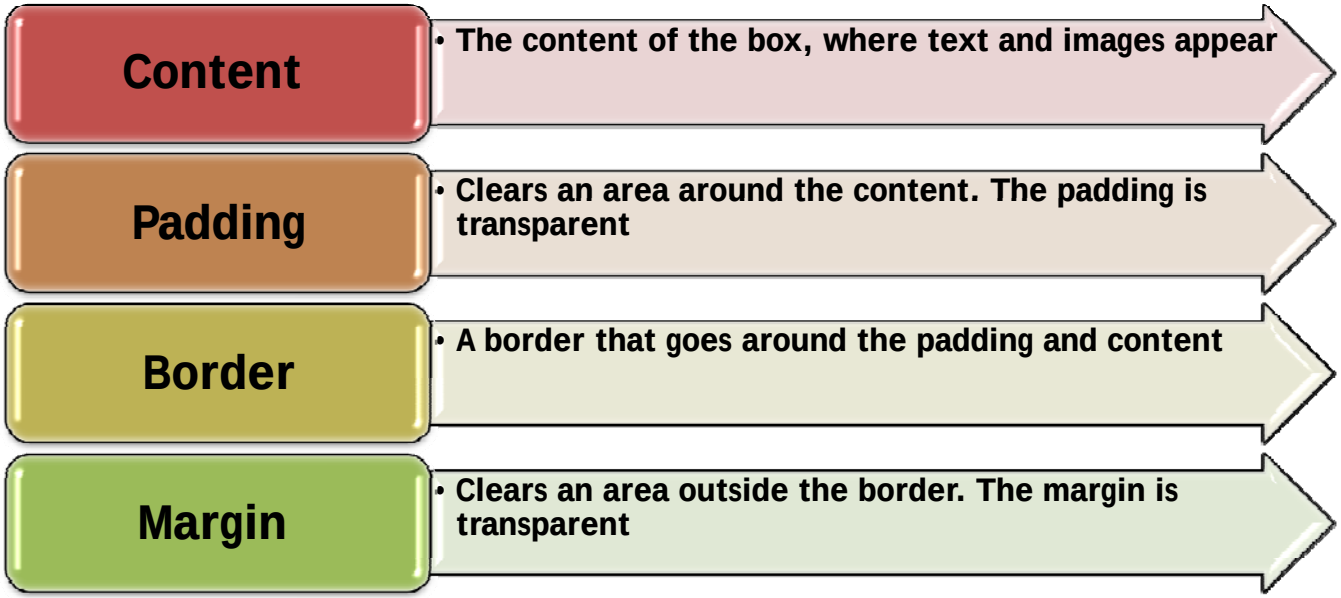


CSS Box Model

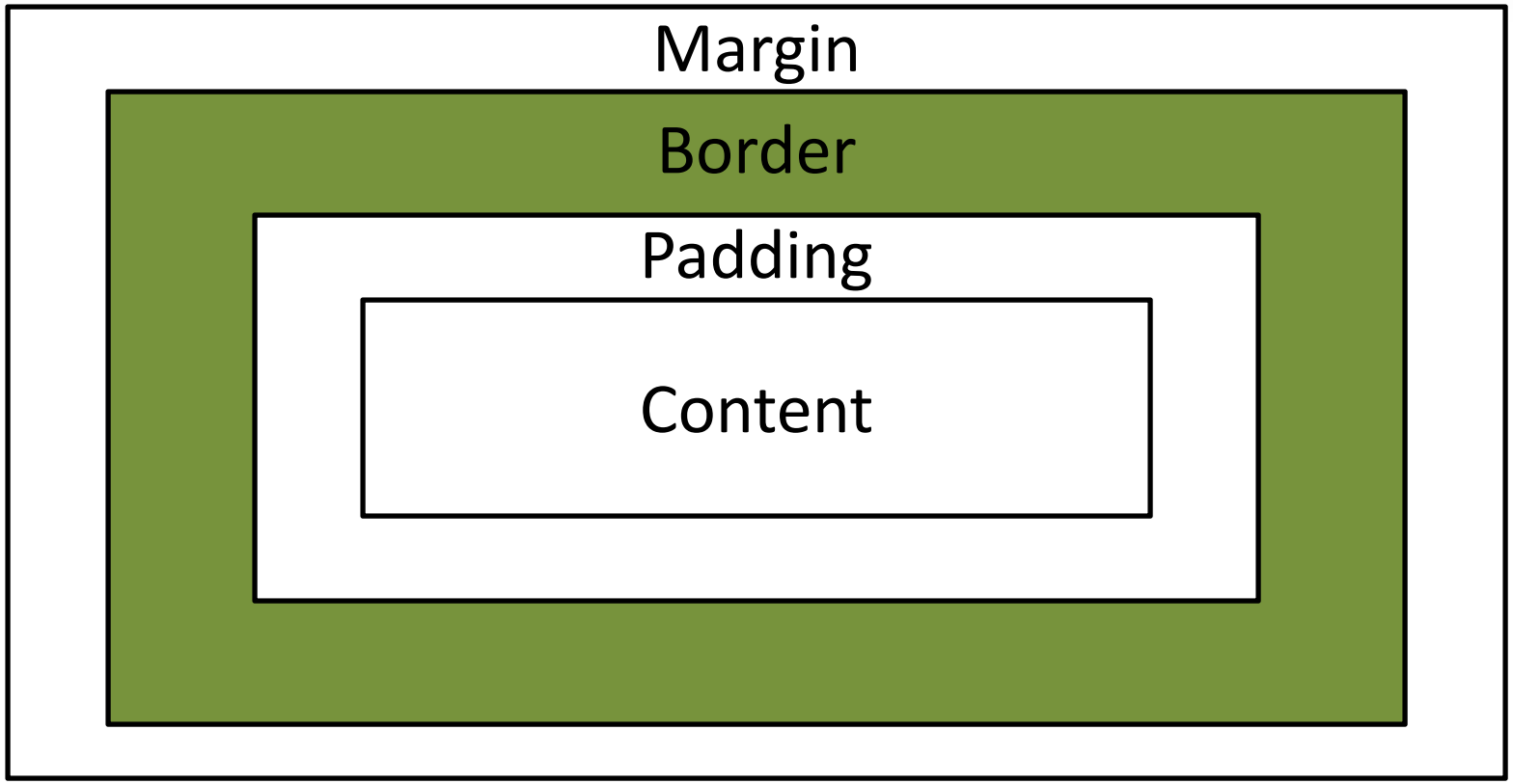
- CSS box model is a container which contains multiple properties including borders, margin, padding and the content itself.
- It is used to create the design and layout of web pages.
- It can be used as a toolkit for customizing the layout of different elements.
- The web browser renders every element as a rectangular box according to the CSS box model.
- The CSS box model is essentially a box that wraps around every HTML element.

CSS Box Model

- Box-Model has multiple properties in CSS. Some of them are given below:



CSS Box Model



Selector

- Type selector:
  - Element type, such as body, p, hr, etc.
  - Multiple element types using the same style are separated by comma
    - h1, h2, h3, h4, h5, h6 {background-color:purple}

- ID selector:
  - #p1, #s1 {background-color: blue}
  - …
  - …
  - id values are case-sensitive

Selector

- Class selector:
  - .myitalic {font-style: italic}
  - .myred {color: red}
  - …
  - class values are case sensitive
  - multiple classes can be applied, separated by space
  - All but a few elements, such as html, head, and elements that appear as content of head, have the class attribute

Selector

- ID and class selectors can be prefixed by an element type name
  - p.right {text-align: right}
  - p#left {text-align: left}
  - ...
  - ...

CSS3 Modules

- Box Model
- Selectors
- Backgrounds and Borders
- Text
- Effects2D/3D
- Transformations
- Animations
- Multiple Column Layout
- User Interface
- Speech module
- Hyperlink Presentation