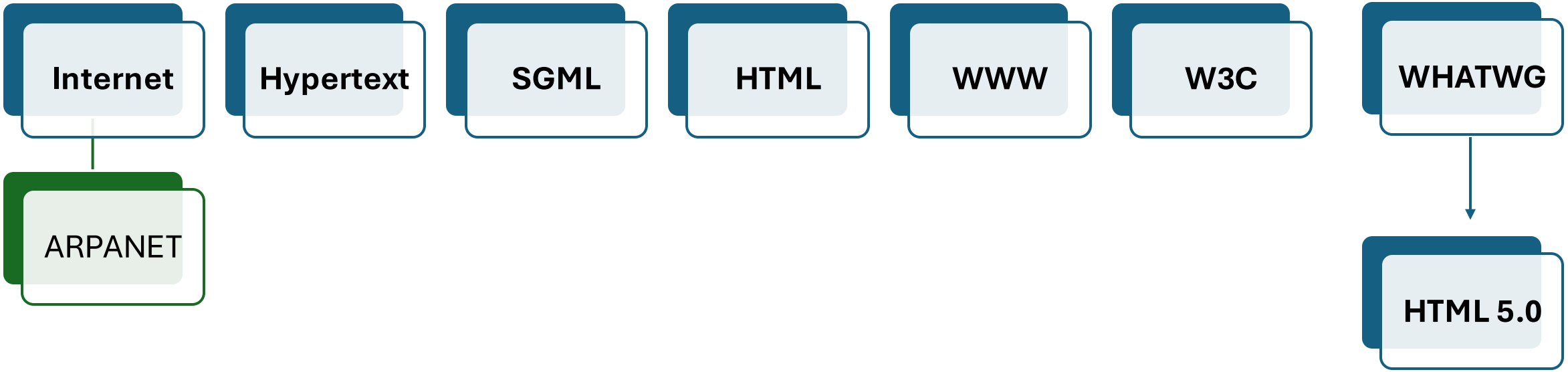
Full Stack Web Development

by Dr Piyush Bagla

Why HTML 5.0 ?


Internet
ARPANET
Hypertext
SGML
HTML
WWW
W3C
WHATWG
HTML 5.0

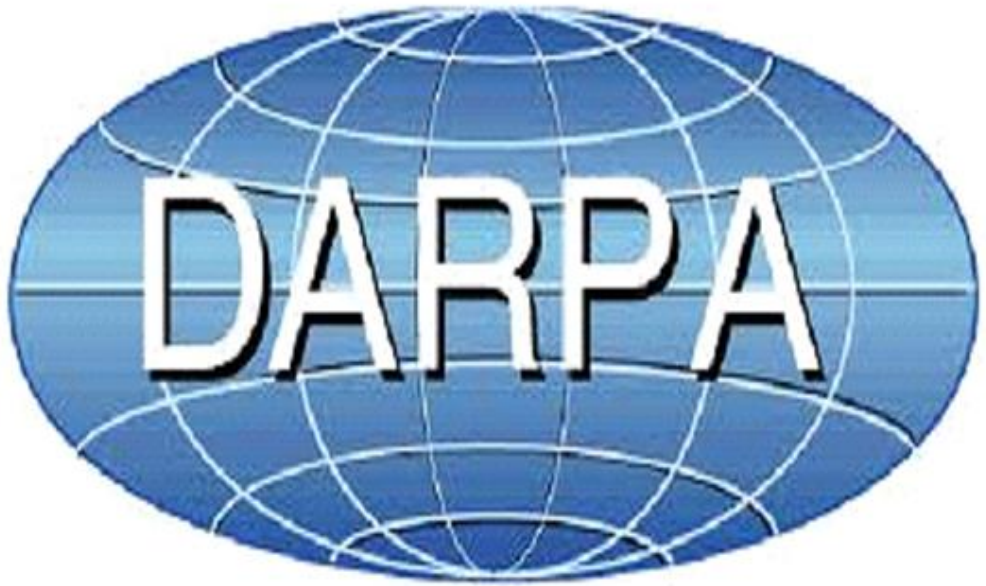
Internet

- The Internet is a global network of interconnected computer networks that communicate using standardized protocols.

- The Internet provides the infrastructure for transmitting data between devices and networks worldwide.

- The WWW operates on top of the Internet, leveraging its infrastructure to connect web servers and clients, enabling the exchange of hypertext documents (web pages) between users and servers.

History of Internet



History of Internet

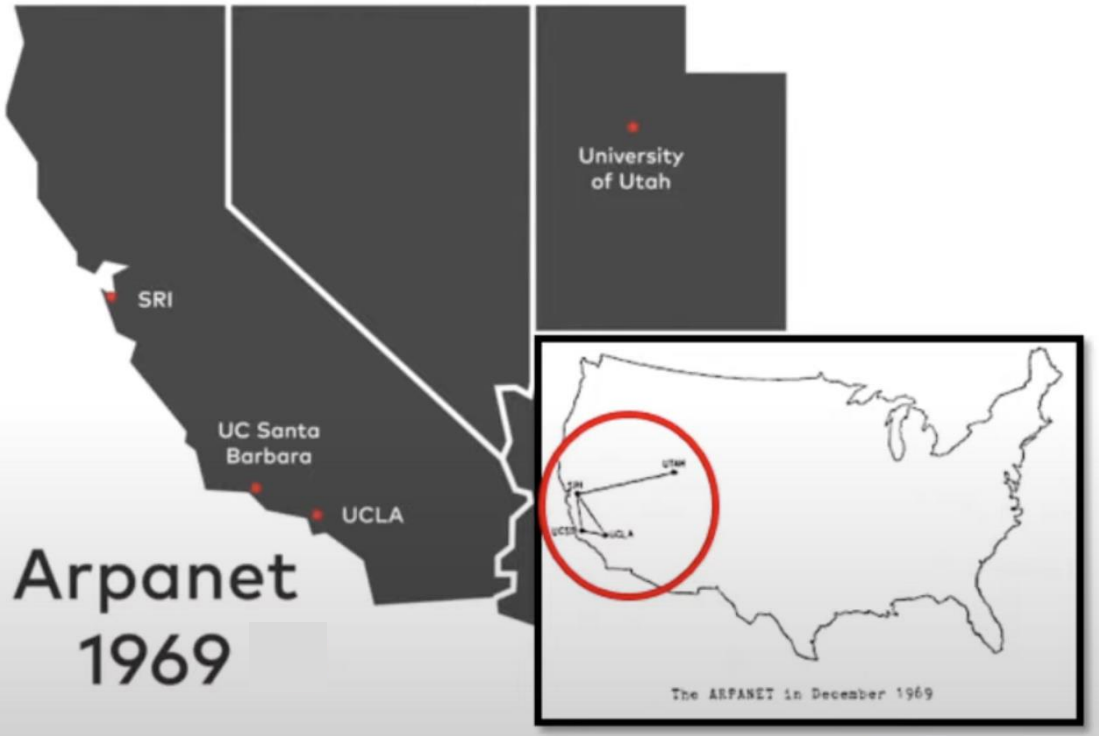
mid 1960s

The **Advanced Research Projects Agency (ARPA)** in the Department of Defense (DOD) was interested in finding a way to connect computers together.

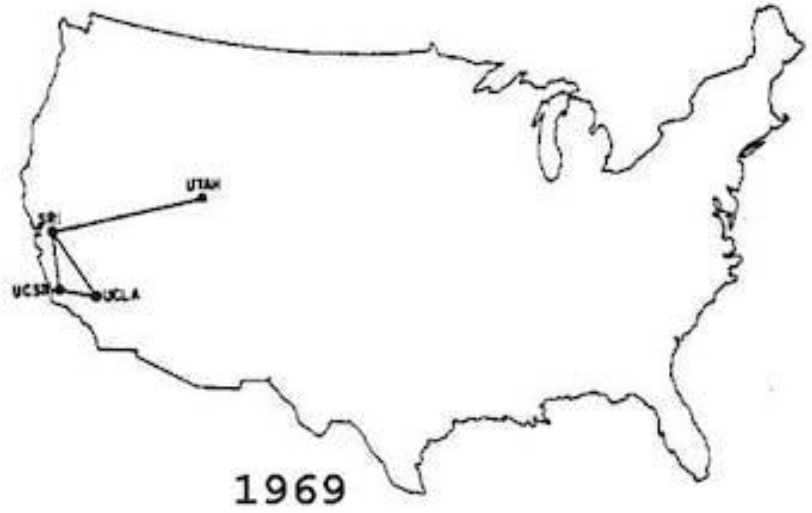
So that the researchers they funded could share their findings, thereby reducing costs and eliminating duplication of effort.

by 1969

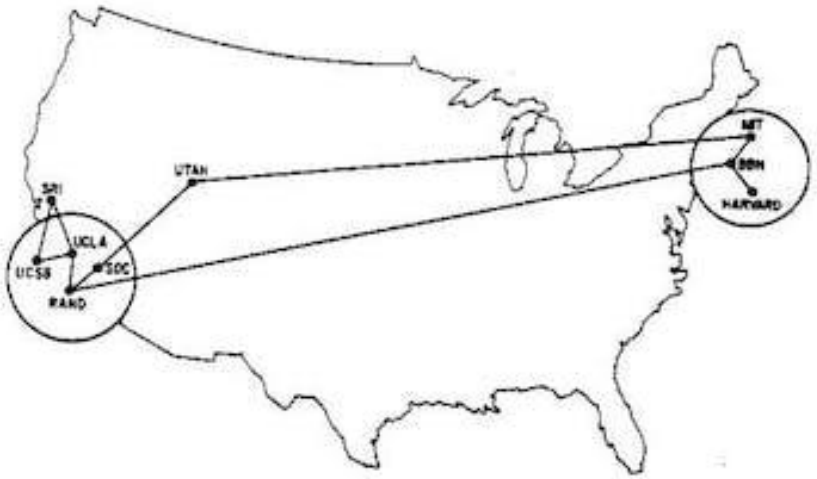
Four nodes, at the University of California at Los Angeles (UCLA), the University of California at Santa Barbara (UCSB), Stanford Research Institute (SRI), and the University of Utah, were connected.



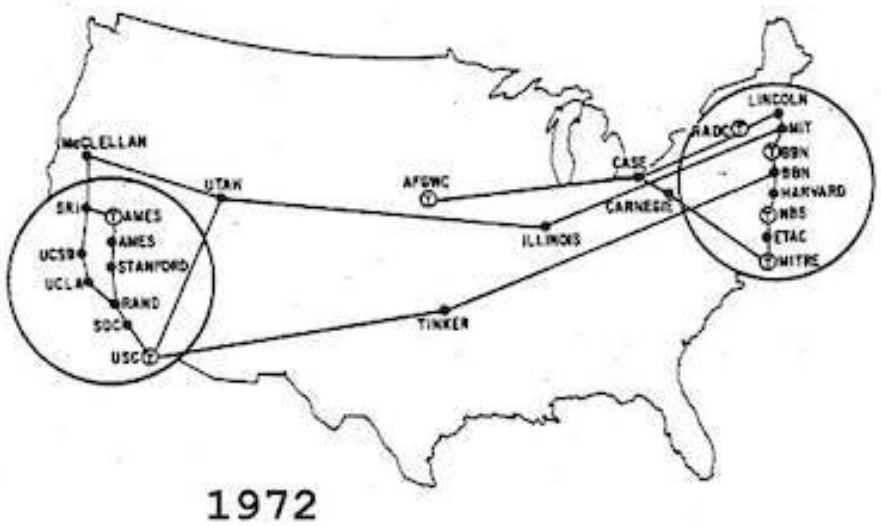
ARPANET



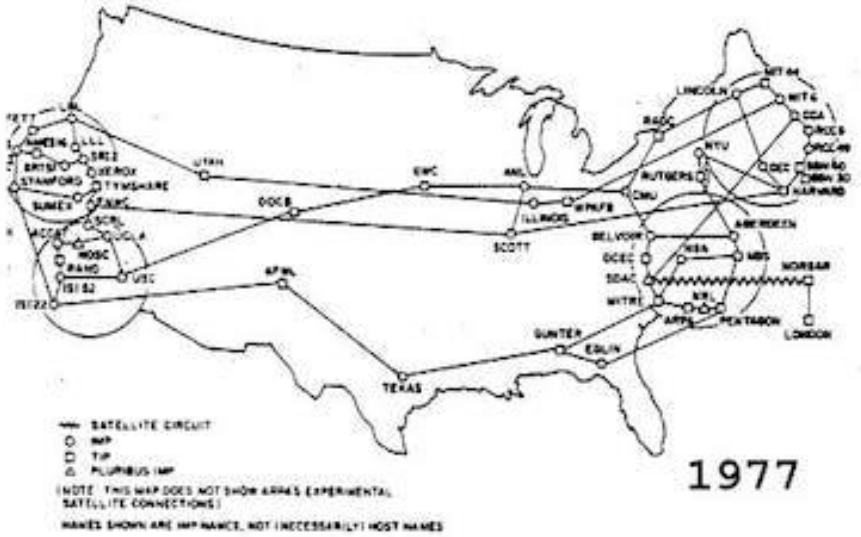
1969



1970



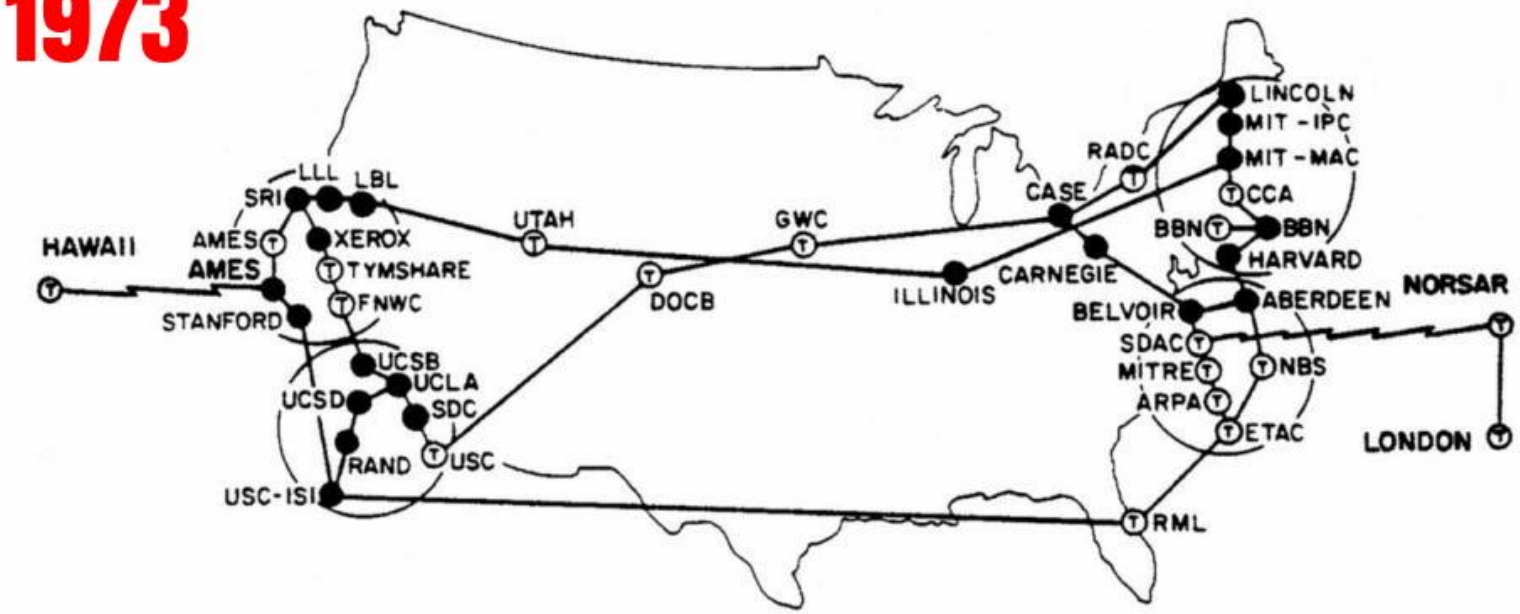
1972



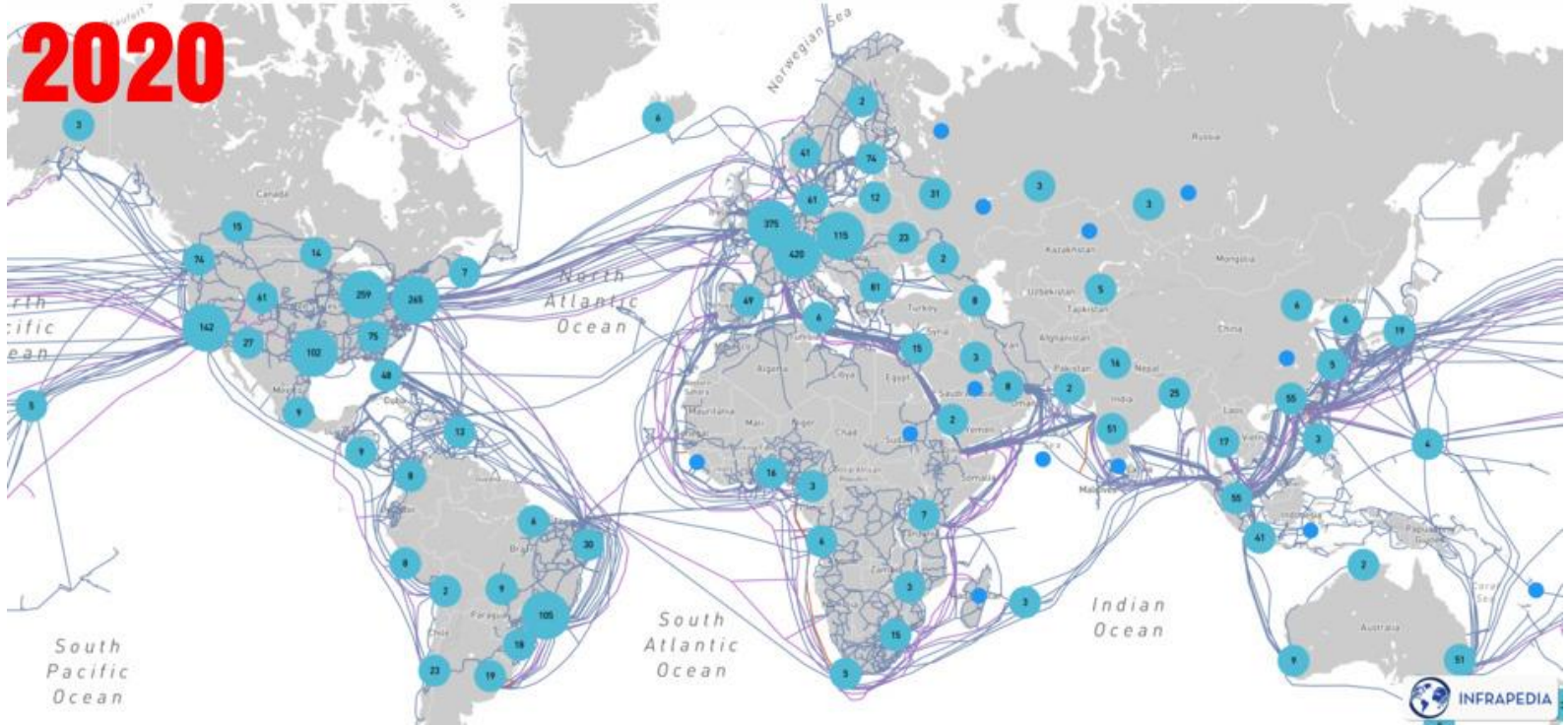
1977


Honolulu
MOFF
LBL
LLL
SRI
XEROX
TYMS
FNWS
USCB
UCLA
SDC
USC
USC-IS
RAND
USDC
STAN
HAWAII
AMES
AMES
UTAH
GWC
DOCB
AFWL
ILL
PURDUE
URPAT
CASE
RADC
RML
LINCOLN
MIT IPC
MIT MAC
CCA
BBN
BBN
NCC
HARVARD
CARNEGIE
RUTGERS
ABERDEEN
BELVOIR
SDAC
MITRE
ARPA
NBS
ETAC
Kjeller
NORSAR
UCL
"TIP" - Kan tilknyttes vertsmaskiner og terminaler
"IMP" Kan tilknyttes vertsmaskiner

1973


LLL
LBL
SRI
AMES
XEROX
HAWAII
AMES
TYMSHARE
FNWC
STANFORD
UCSB
UCLA
UCSD
SDC
RAND
USC
USC-ISI
UTAH
GWC
DOCB
ILLINOIS
CASE
RADC
CARNEGIE
LINCOLN
MIT - IPC
MIT - MAC
CCA
BBN
BBN
HARVARD
BELVOIR
ABERDEEN
NORSAR
SDAC
MITRE
NBS
ARPA
ETAC
LONDON
RML

2020


North Atlantic Ocean
South Pacific Ocean
South Atlantic Ocean
Indian Ocean
INFRAPEDIA

Hypertext

- Hypertext is a concept of organizing and linking text documents electronically, allowing users to navigate between related pieces of information through hyperlinks.

- Hypertext enables non-linear navigation, where users can jump from one document to another by clicking on hyperlinks embedded within the text.

SGML

- SGML stands for Standard Generalized Markup Language. It's used for defining the structure and attributes of documents.

- SGML serves as a framework for defining other markup languages and has been influential in developing various document formats and standards.

- SGML allows users to define the hierarchical structure of documents, specify elements and attributes, and establish relationships between different parts of the document. SGML-aware software can then process these documents to extract, manipulate, or present the information contained within them.

SGML Application Areas

In the publishing industry, SGML has been used to define the structure of technical documentation, such as user manuals for complex machinery or equipment.

The aerospace industry has extensively used SGML for creating structured documentation, such as aircraft maintenance manuals.

In the healthcare industry, SGML could be used to define the structure of electronic medical records (EMRs)

HTML

- HTML provided a standardized markup language specifically designed for creating hypertext documents for the World Wide Web.

- HTML provides a standardized way to structure and format hypertext documents for the web, using tags to define elements such as headings, paragraphs, images, and hyperlinks.

- HTML tags allow content creators to embed hyperlinks within web pages, enabling users to navigate between different documents on the web.

World Wide Web

- The WWW is a system of interlinked hypertext documents accessed via the Internet.

- The WWW was invented by Tim Berners-Lee in 1989 as a decentralized system for sharing and accessing hypertext documents (web pages) globally.

- Hyperlinks within web pages allow users to navigate between different documents on the web, creating a network of interconnected information.

Link Between Them

- Hypertext laid the conceptual groundwork for linking text documents electronically, enabling non-linear navigation between related pieces of information.

- HTML provided the language and structure for creating hypertext documents within the framework of the WWW, allowing content creators to embed hyperlinks within web pages.

- The WWW combined hypertext with standardized protocols like HTTP (Hypertext Transfer Protocol) and URLs (Uniform Resource Locators) to create a decentralized system for sharing and accessing hypertext documents (web pages) via the Internet.

- The Internet provides the underlying infrastructure for transmitting data between devices and networks, enabling the exchange of hypertext documents between users and servers worldwide.

W3C

-The consortium formed in 1994 by Tim and it focused on establishing foundational standards for the web, including HTML, HTTP, and URLs

-This included specifications for markup languages (HTML, XML), style sheet languages (CSS), document object models (DOM), and web accessibility guidelines (WCAG).

- The W3C's work helped establish a common framework for web development and ensured the compatibility of web technologies across different platforms and devices.

WHATWG

Why was WHATWG Created?

Web Hypertext Application Technology Working Group

In the early 2000s, **W3C** was focusing on **XML-based standards (XHTML)** instead of improving HTML. Many developers and browser vendors (like Mozilla, Apple, and Opera) disagreed with this approach because:

✓ XHTML was **too strict** and **hard to implement**.

✓ The web was evolving **toward dynamic applications**, and W3C wasn't keeping up.

✓ **Browser vendors** wanted to improve HTML in a **more practical and faster way**.

To address this, **WHATWG was formed in 2004** by engineers from **Apple, Mozilla, and Opera** to focus on **real-world web development needs** rather than academic theories.

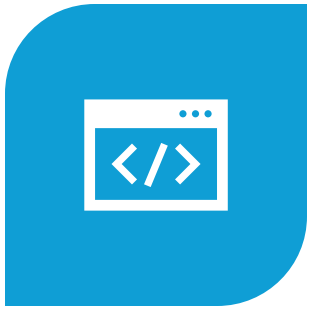
Real World Analogy

INTERNET = THE HIGHWAY SYSTEM 🛣️

(CONNECTS EVERYTHING)

WWW = THE SHOPPING MALL 🏬

(WEBSITES YOU VISIT)



HTML = THE BLUEPRINT OF EACH SHOP 📐

(STRUCTURE OF WEB PAGES)

BROWSER = YOUR CAR 🚗 (HOW YOU ACCESS WEBSITES)

HTML 5.0 Predecessors

HTML Version	Development Body	Year Published
HTML 1.0	Tim Berners-Lee at CERN	1991
HTML 2.0	Internet Engineering Task Force	1995
HTML 3.2	W3C	1997
HTML 4.01	W3C	1999
XHTML	W3C	2000
HTML5	W3C (initially) & WHATWG (main)	2014
HTML Living Standard	WHATWG	2017

Comparison of HTML 5 Elements with previous versions

HTML Version	Elements Added
HTML 1.0	It was the initial version that laid the groundwork for subsequent versions to build upon.
HTML 2.0	<img>, <form>, <input>, <textarea>, <select>, <button>, , , , <table>, <tr>, <td>, <th>
HTML 3.2	<embed>, <iframe>, <font>
HTML 4.01	<meta>, <link>, <script>, ,
XHTML 1.0	Same elements as HTML 4.01 but reformulated in XML syntax
HTML5	<header>, <nav>, <section>, <article>, <aside>, <footer>, <audio>, <video>, <canvas>, <svg>, <details>, <summary>, <progress>, <meter>, <datalist>, <output>, <time>, <mark>, <meter>, <progress>, <ruby>, <rt>, <rp>, and many more

Feature	HTML (Previous Versions)	HTML5
Doctype Declaration	Various doctypes for HTML 4.01, XHTML 1.0, etc. <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN" "http://www.w3.org/TR/html4/strict.dtd">	Simplified to <!DOCTYPE html> for HTML5 <!DOCTYPE HTML>
Structural Elements	Limited semantic elements (, , <table>, etc.)	Rich set of semantic elements (<header>, <nav>, <section>, <footer>, etc.)
Multimedia Support	Rely on third-party plugins like Flash or Silverlight	Native <audio> and <video> elements
Canvas	Not available	<canvas> element for dynamic graphics
Forms Enhancements	Limited input types and attributes, rely on JavaScript for validation	New input types (email, url, date, number, etc.) and form validation attributes (required, pattern, etc.)

Feature	HTML (Previous Versions)	HTML5
Geolocation	Not available	Geolocation API for retrieving user's location
Drag and Drop	Not available	Native Drag and Drop API for dragging and dropping elements
Local Storage	Rely on JavaScript cookies (eg. Lang of webpage)	localStorage and sessionStorage APIs for client-side storage
Web Workers	Not available	Web Workers API for running scripts in background threads (eg. Image processing)

Feature	HTML (Previous Versions)	HTML5
Semantic Markup	Limited semantic markup for accessibility and SEO	Extensive use of semantic elements for improved accessibility and SEO
Video and Audio	Rely on third-party plugins like Flash or Silverlight	Native support for embedding video and audio content
Mobile Support	Limited support for mobile devices	Improved support for mobile devices and responsive design
Compatibility	Varies across browsers and platforms	Improved cross-browser compatibility and standardized features

Semantics in HTML

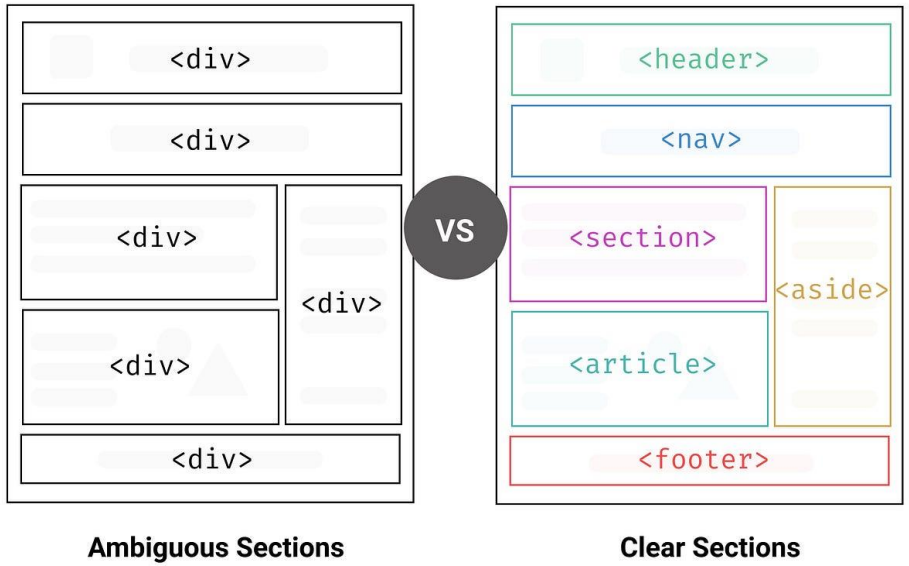
- A semantic element clearly describes its meaning to both the browser and the developer.
- They are also called structural elements.
- In HTML, there are some semantic elements that can be used to define different parts of a web page.
- Examples of **semantic** elements: <form>, <table>, and <article> - Clearly define its content.

<section> is used for grouping related content, while <article> is used for stand-alone, independent content items that can be syndicated or shared separately.

Semantic Elements in HTML

- Many websites contain HTML code like   to indicate navigation, header, and footer.
- In HTML, some semantic elements can be used to define different parts of a web page:

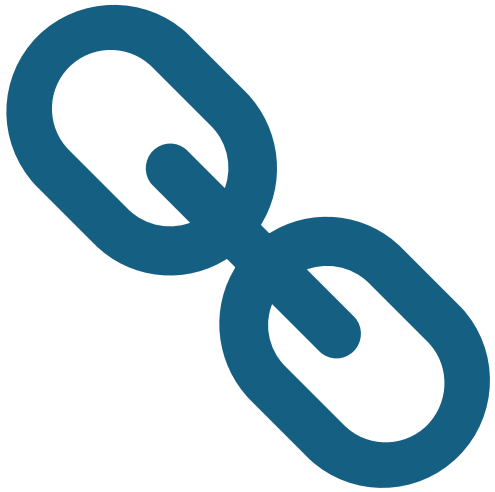
- <footer>
- <header>
- <main>
- <mark>
- <nav>
- <article>
- <aside>
- <details>
- <figcaption>
- <figure>
- <section>
- <summary>
- <time>



HTML Links

- Use the <a> element to define a link
- Use the href attribute to define the link address
- Use the target attribute to define where to open the linked document
- Use the <img> element (inside <a>) to use an image as a link
- Use the mailto: scheme inside the href attribute to create a link that opens the user's email program

HTML Links
Bookmarks



- Jump to Chapter 4

.
.
.
.
.

- <h2 id="C4">Chapter 4</h2>
- This chapter explains ba bla bla

HTML Links

Absolute vs Relative URL

There are two ways to specify the URL in the src attribute:

- **1. Absolute URL** - Links to an external image that is hosted on another website.
Example: src="https://www.w3schools.com/images/img_girl.jpg".

Notes: External images might be under copyright. If you do not get permission to use it, you may be in violation of copyright laws. In addition, you cannot control external images; it can suddenly be removed or changed.

- **2. Relative URL** - Links to an image that is hosted within the website. Here, the URL does not include the domain name.
  - If the URL begins without a slash, it will be relative to the current page.
    - Example: src="img_girl.jpg".
  - If the URL begins with a slash, it will be relative to the domain.
    - Example: src="/images/img_girl.jpg".

Tip: It is almost always best to use relative URLs. They will not break if you change the domain.

HTML Images and Icon

Image

- Basic tag and attributes
- Image Map
- The Picture Element

Icon

Step 1 – Copy the style link from any website (which provides this functionality) inside the head section

Example - **Font Awesome CDN**

Step 2 – Copy the desired icon link inside the body section

Example – **Font Awesome Icon**

HTML Images and Icon

Image Map

An image map is an image with clickable areas.

```
<img src="workplace.jpg" alt="Workplace" usemap="
#workmap">

<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="C
offee" href="coffee.htm">
</map>
```

The coordinates 34,44 is located 34 pixels from the left margin and 44 pixels from the top

The coordinates 270,350 is located 270 pixels from the left margin and 350 pixels from the top

credit w3schools

The coordinates 34,44 is located 34 pixels from the left margin and 44 pixels from the top

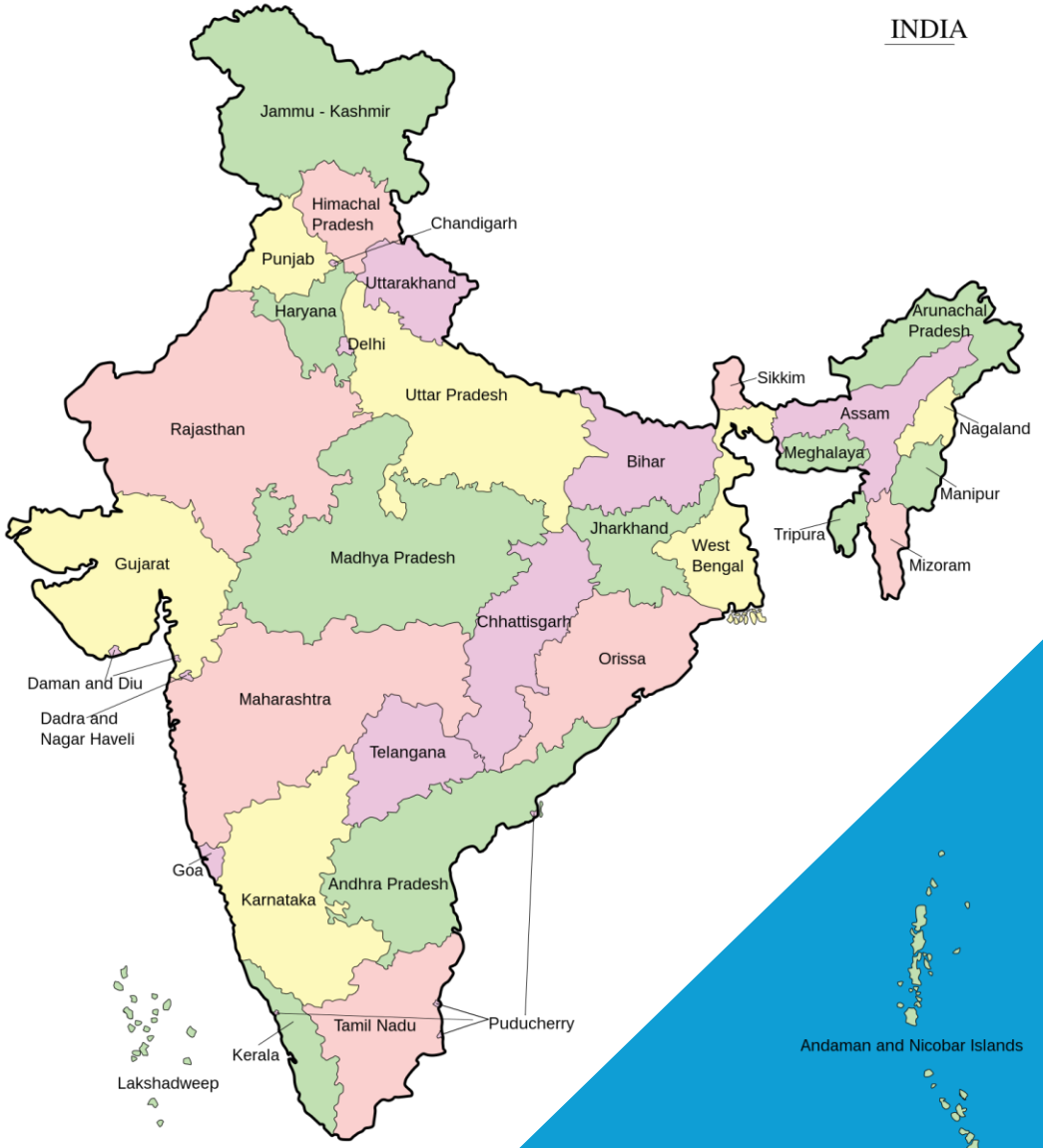
The coordinates 270,350 is located 270 pixels from the left margin and 350 pixels from the top

credit w3schools

HTML Images and Icon

Image Map

An image map is an image with clickable areas.



HTML Images and Icon

The Picture Element

The HTML <picture> element allows you to display different pictures for different devices or screen sizes.

```
<picture>
  <source media="(min-width:
650px)" srcset="img_food.jpg">
  <source media="(min-width:
465px)" srcset="img_car.jpg">
  <img src="img_girl.jpg">
</picture>
```

HTML List

- Unordered
  - type
    - circle
    - Square
    - Disc
    - none
- Ordered
  - type
    - 1,2,3
    - a,b,c
    - A,B, C
    - i, ii, iii
    - I, II, III,
- Description
- Nested List

Unordered

- List item
- List item
- List item
- List item

Ordered

1. 1st item
2. 2nd item
3. 3rd item
4. 4th item

Description

List item title

- list item description

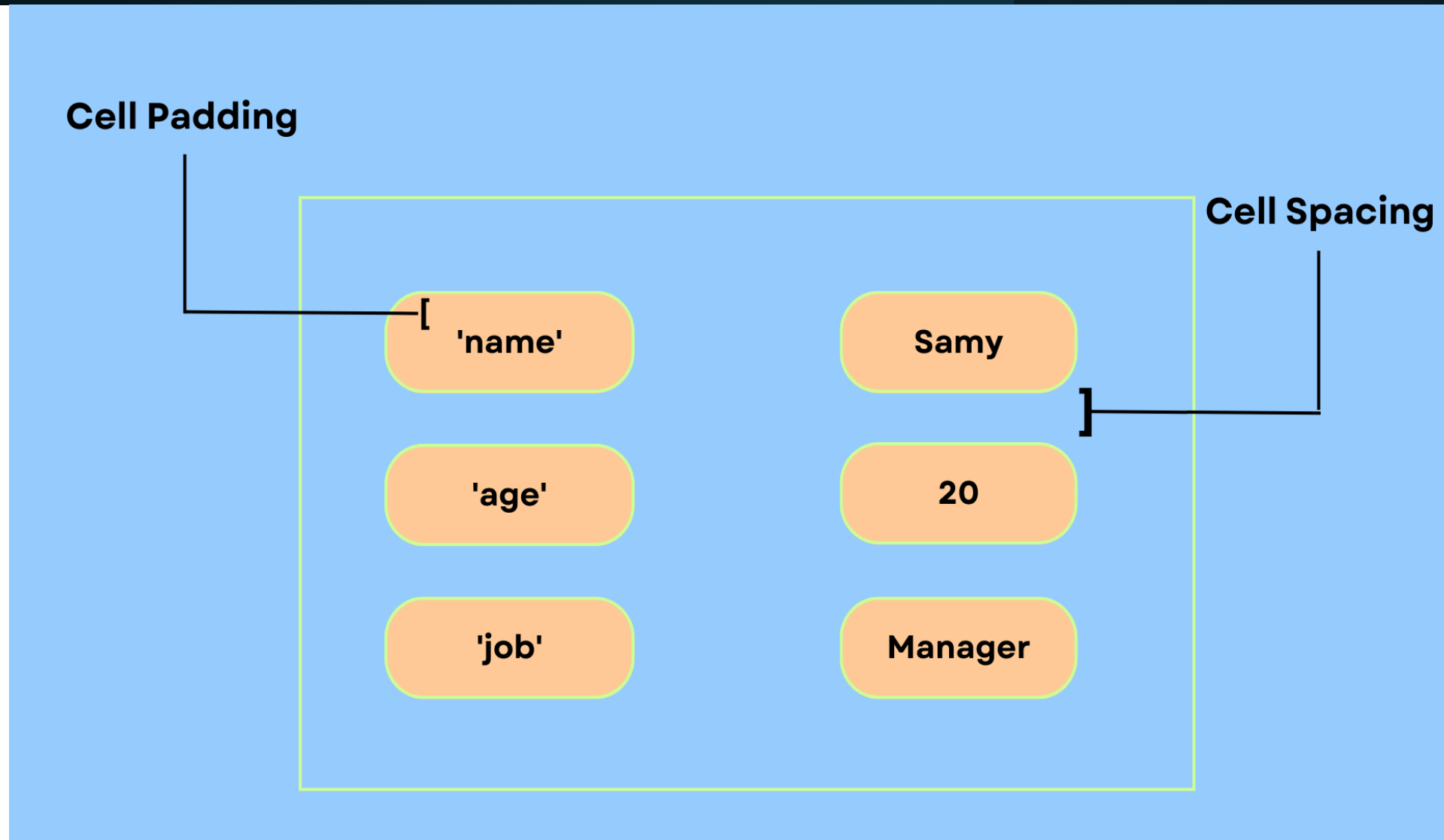
List item title

- list item description

List item title

- list item description

HTML Table



HTML Table

Simple table

Sr. No	Roll No.	Name
1	101	ABC
2	102	XYZ

Table with colspan

Name	Phone.	
ABC	123	789
XYZ	345	654

Table with Rowspan

Name	ABC
Phone No.	123
	345

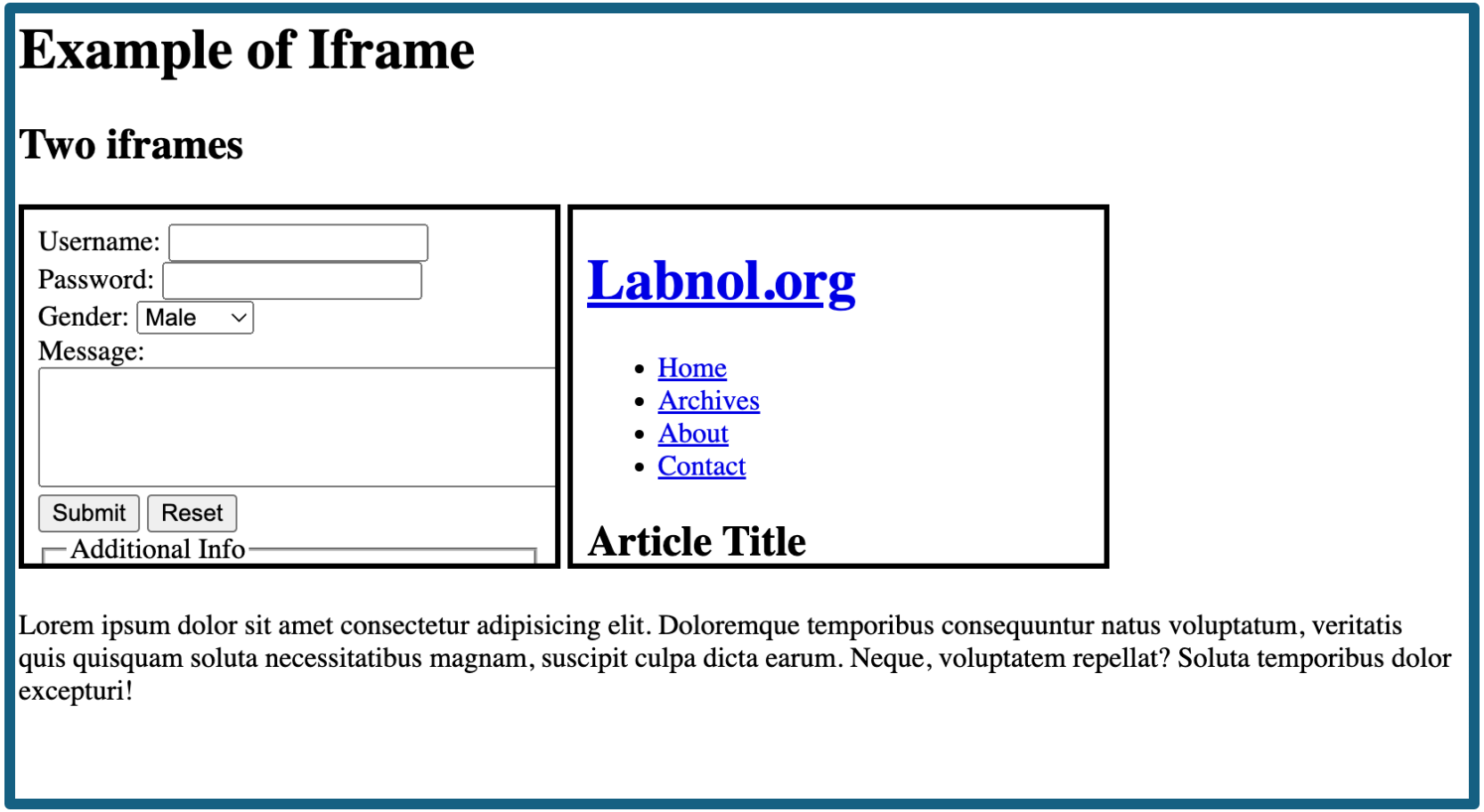
HTML Table

TIME TABLE

Day/Period	I 9:30-10:20	II 10:20-11:10	III 11:10-12:00	12:00-12:40	IV 12:40-1:30	V 1:30-2:20	VI 2:20-3:10	VII 3:10-4:00
Monday	Eng	Mat	Che	LUNCH	LAB			Phy
Tuesday	LAB				Eng	Che	Mat	SPORTS
Wednesday	Mat	phy	Eng		Che	LIBRARY		
Thursday	Phy	Eng	Che		LAB			Mat
Friday	LAB				Mat	Che	Eng	Phy
Saturday	Eng	Che	Mat		SEMINAR			SPORTS

iFrame in HTML

HTML element used to embed another document within the current HTML document. It allows you to display content from another source, such as a web page, PDF document, video, or interactive application, within the context of your own web page.



Block level and Inline elements

- A block-level element always starts on a new line, and the browsers automatically add some space (a margin) before and after the element.
- A block-level element always takes up the full width available (stretches out to the left and right as far as it can)

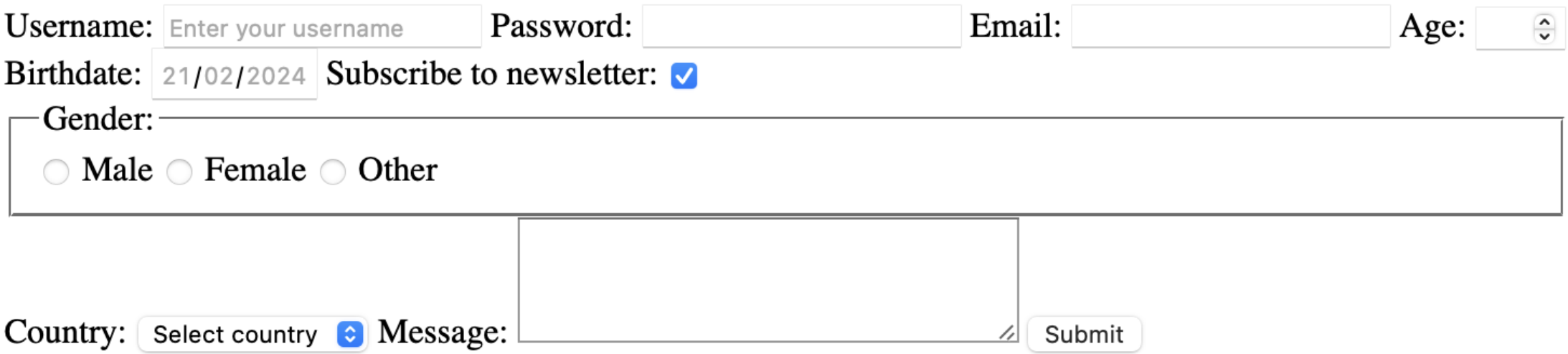
Eg. <p>, , <ul>, <form> etc

Note: The element is often used as a container for other HTML elements.

- An inline element does not start on a new line.
- An inline element only takes up as much width as necessary.

Eg. , <img>, <a> etc

HTML Form


Username:
Enter your username
Password:
Email:
Age:
Birthdate:
21/02/2024
Subscribe to newsletter:
Gender:
Male
Female
Other
Country:
Select country
Message:
Submit

Get vs POST

GET:

•Appends the form data to the URL in name/value pairs
•NEVER use GET to send sensitive data! (the submitted form data is visible in the URL!)
•The length of a URL is limited (2048 characters)
•Useful for form submissions where a user wants to bookmark the result
•GET is good for non-secure data, like query strings in Google

POST:

•Appends the form data inside the body of the HTTP request (the submitted form data is not shown in the URL)
•POST has no size limitations and can be used to send large amounts of data.
•Form submissions with POST cannot be bookmarked.

Accessibility in HTML5

Accessibility in HTML5 refers to the practice of designing and coding web content in a way that ensures it is accessible (a good way to navigate and interact) to all users, including those with disabilities.

- Semantic HTML Elements
- Alternative Text
- Keyboard Navigation
- Create Good Link Text
- Form attributes

etc

The W3C Markup Validation Service

A *valid* Web page is not necessarily a good web page, but an *invalid* Web page has little chance of being a good web page.

https://validator.w3.org

The W3C CSS Validation Service

Note: If you want to validate your CSS style sheet embedded in an (X)HTML document, you should first check that the (X)HTML you use is valid.

https://jigsaw.w3.org/css-validator/

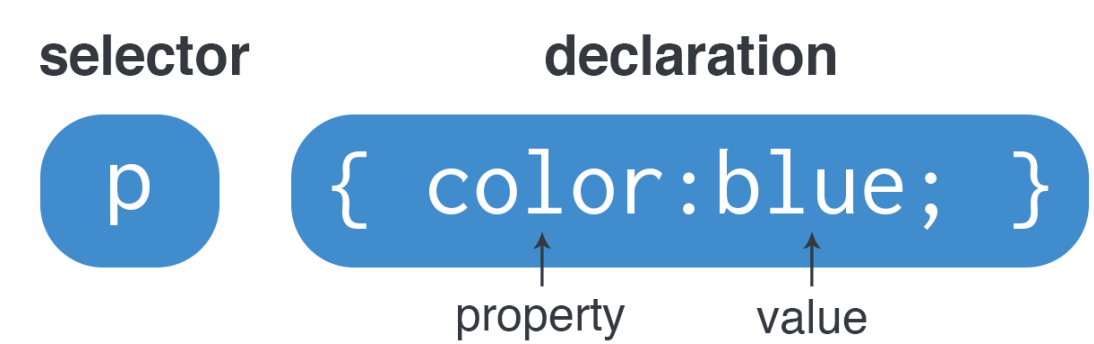
HTML | CSS | Javascript

1. HTML to define the basic structure of web pages.

2. CSS to specify the layout of web pages.

3. JavaScript to program the behavior of web pages

CSS (Cascading Style Sheets)



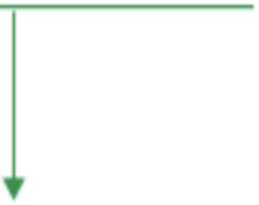

```
p
{
   color: blue;
}
```

Types of CSS or Ways to Insert CSS

- External CSS
- Internal CSS
- Inline CSS

Inline CSS

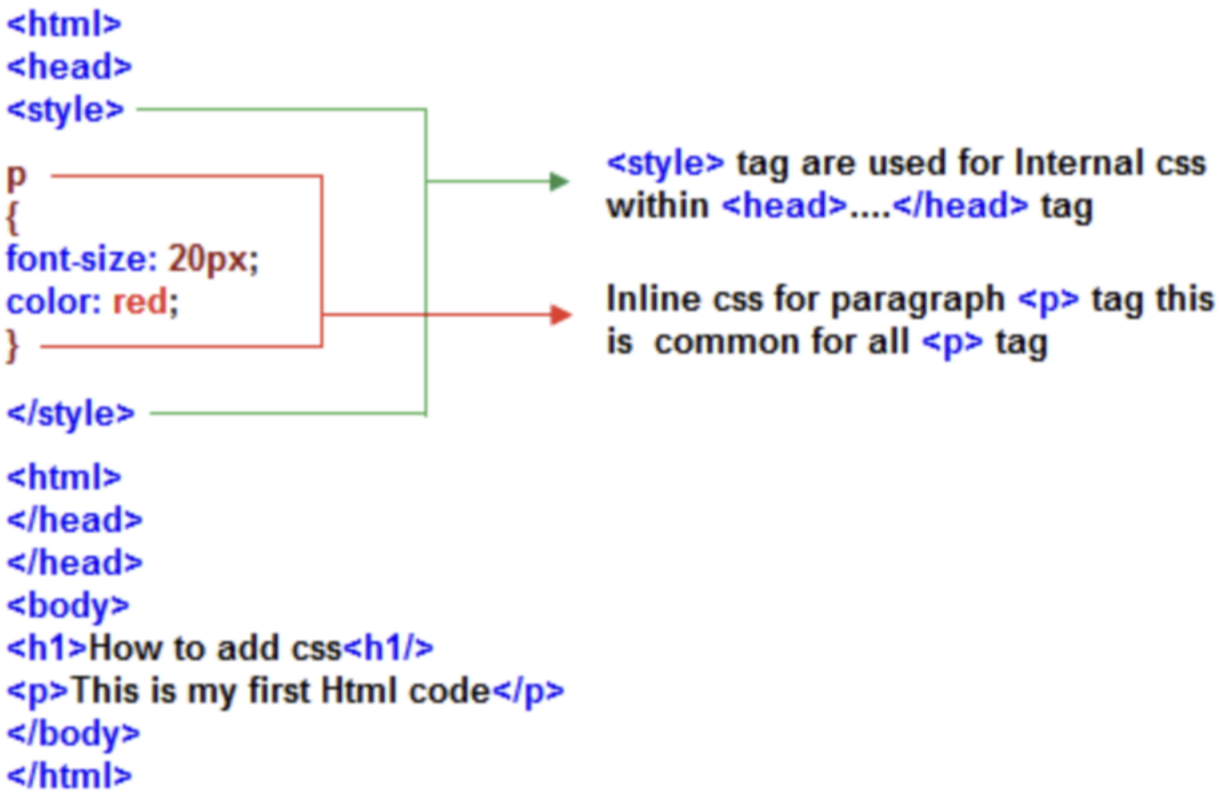
```
<html>
<head>
<body>
<h1>How to add CSS</h1>
<p style="font-size:20px; color:red">This is paragraph</p>

</body>
</html>
```



Inline CSS for <p> tag

Here we apply CSS on that line where html element (<p>) are use so this type of css is called Inline css

Internal CSS



External CSS

mystyle.css

```
<style>
p
{
margin-left: 20px;
color: yellow;
}
body
{
background-color: #000000;
}
</style>
```

Here we first create two files one for css which is mystyle.css and another for html homepage.html

homepage.html

```
<html>
<head>
<link rel="stylesheet" type="text/css" href="mystyle.css">
</head>
<body>
<h1>How to add css<h1/>
<p>This is my first code</p>
</body>
</html>
```

add css pag
on html pag

HTML and CSS Comments

HTML

```
<!-- These paragraphs will be red -->
```

CSS

```
/*These paragraphs will be red */
```

CSS Selectors

CSS selectors are used to select the HTML elements you want to style.

CSS selectors are divided into five categories:

- **Simple** selectors (select elements based on name, id, class, universal)
- **Combinator** selectors (select elements based on a specific relationship between them)
- **Pseudo-class** selectors (select elements based on a certain state)
- **Pseudo-elements** selectors (select and style a part of an element)
- **Attribute** selectors (select elements based on an attribute or attribute value)

1. **Simple** selectors (tag name)

```
p {
  text-align: center;
  color: red;
}
```

Single Selector

```
p,h1 {
  text-align: center;
  color: red;
}
```

Group Selector

ID selector

- The id attribute is used to specify a unique id for an HTML element
- The value of the id attribute must be unique within the HTML document
- The id attribute is used by CSS and JavaScript to style/select a specific element
- The value of the id attribute is case-sensitive
- The id attribute is also used to create HTML bookmarks
- JavaScript can access an element with a specific id with the getElementById() method

Class selector

- The HTML class attribute specifies one or more class names for an element
- Classes are used by CSS and JavaScript to select and access specific elements
- The class attribute can be used on any HTML element
- The class name is case-sensitive
- Different HTML elements can point to the same class name
- JavaScript can access elements with a specific class name with the getElementsByClassName() method

Universal selector

Select all HTML elements on the page.

```
* {
  text-align: center;
  color: blue;
}
```

2. **Combinator** selectors

There are four different combinators in CSS:

- Descendant Combinator(space)
- Child Combinator(>)
- Next Sibling Combinator(+)
- Subsequent-sibling Combinator(~)

3. Pseudo-class selectors

A pseudo-class is used to define a special state of an element.

Syntax

```
selector:pseudo-class {
  property: value;
}
```

```
/* unvisited link */
a:link {
  color: #FF0000;
}

/* visited link */
a:visited {
  color: #00FF00;
}
```

```
div:hover p {
  display: block;
}
```

4. Pseudo-element selectors

A CSS pseudo-element is used to style specified parts of an element.

Syntax

```
selector::pseudo-element {
  property: value;
}
```

```
p::first-line {
  color: #ff0000;
  font-variant: small-
caps;
}
```

```
p::first-letter {
  color: #ff0000;
  font-variant: small-
caps;
}
```

5. Attribute selectors

It is possible to style HTML elements that have specific attributes or attribute values.

```
a[target] {
  background-color: yellow;
}
```

```
a[target="_blank"] {
  background-color: yellow;
}
```

CSS Colors

There are four common ways to apply colors

1. Direct Color Name

```
<h1 style="color:Red;">Hello World</h1>
```

2. RGB (Red, Green, Blue)

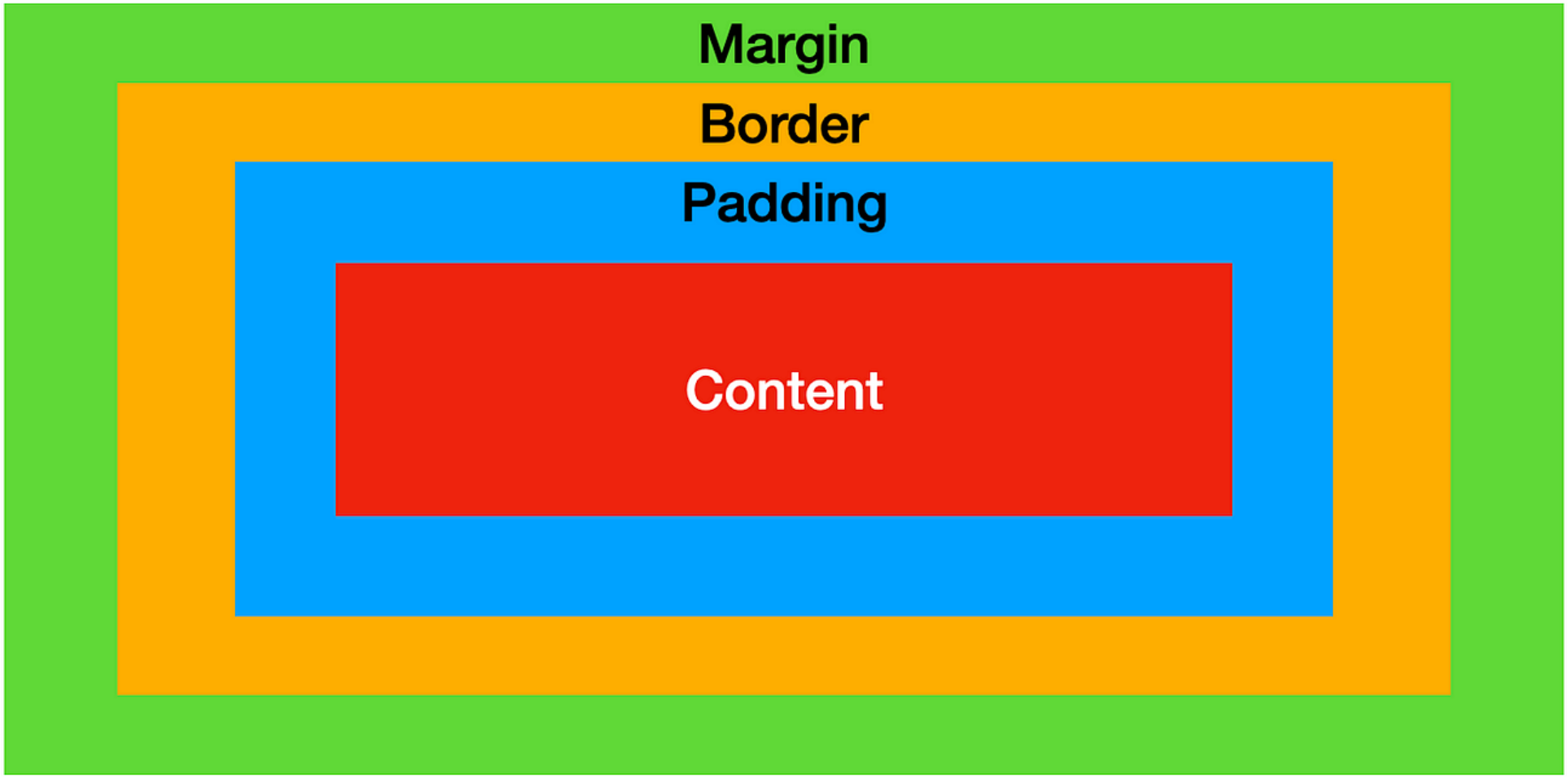
```
rgb(255,255,255)
```

3. HEX

```
#RRGGBB, #ff6678
```

4. HSL (hue, saturation, and lightness) **`hsl(0, 100%, 50%)`**
   - Hue is a degree on the color wheel from 0 to 360. 0 is red, 120 is green, and 240 is blue.
   - Saturation is a percentage value. 0% means a shade of gray, and 100% is the full color.
   - Lightness is also a percentage. 0% is black, 50% is neither light or dark, 100% is white

CSS Box Model



CSS Box Model

All HTML elements can be considered as boxes.

Width and Height of an Element

Note: When you set the width and height properties of an element with CSS, you just set the width and height of the **content area**.

- To calculate the total width and height of an element, you must also include the padding and borders.

Note: The margin property also affects the total space that the box will take up on the page, but the margin is not included in the actual size of the box. The box's total width and height stops at the border.

CSS Fonts

The shorthand **font** property, combines several font-related properties into one. The order of the values in the shorthand font property is as follows:

1.font-style: Specifies the font style (e.g., italic).
2.font-variant: Specifies the font variant (e.g., small-caps).
3.font-weight: Specifies the font weight (e.g., bold).
4.font-size/line-height: Specifies the font size and optional line height (e.g., 12px/30px).
5.font-family: Specifies the font family (e.g., Georgia, serif).

Note: The font-size and font-family values are required. If one of the other values is missing, their default value are used.

Bootstrap

- Bootstrap is a free front-end framework for faster and easier web development.
- Bootstrap includes HTML and CSS based design templates for typography, forms, buttons, tables, navigation, modals, image carousels and many other, as well as optional JavaScript plugins.
- Bootstrap also gives you the ability to easily create responsive designs.

Bootstrap Versions

- **Bootstrap 5** (released 2021) is the newest version with new components, faster stylesheet and more responsiveness. However, Internet Explorer 11 and down is not supported.
- Previous versions are Bootstrap 3 & 4.
- Bootstrap 5 has switched to vanilla JavaScript instead of jQuery.

Where to Get Bootstrap 5?

There are two ways to start using Bootstrap 5 on your own website.

- Include Bootstrap 5 from a CDN.
- Download Bootstrap 5 from www.getbootstrap.com

Advantage of Bootstrap 5 from CDN

- Many users already have downloaded Bootstrap 5 from jsDelivr when visiting another site. As a result, it will be loaded from cache when they visit your site, which leads to faster loading time.

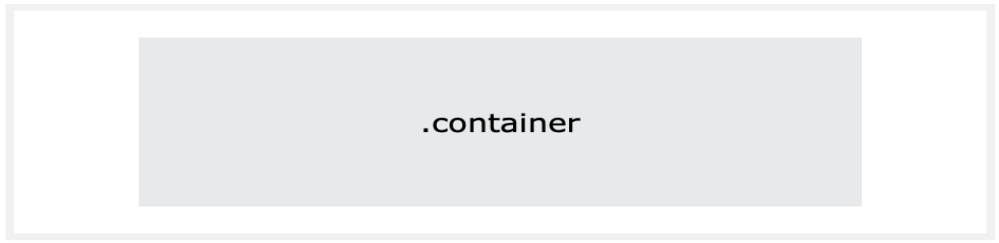
- Also, most CDN's will make sure that once a user requests a file from it, it will be served from the server closest to them, which also leads to faster loading time.

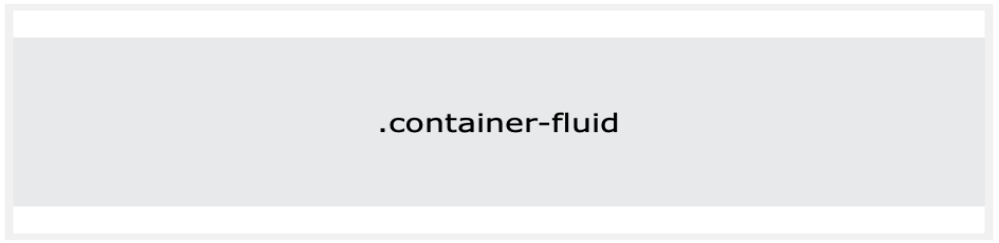
Bootstrap 5 Containers

Containers are used to pad the content inside of them, and there are two container classes available:

1. The **.container** class provides a responsive **fixed-width container.**

2. The **.container-fluid** class provides a **full-width container**, spanning the entire width of the viewport.





Grid System

It consists of a series of rows and columns organized into a grid, which provides a structured way to arrange content on a web page.

Here are the key components of the grid system in Bootstrap:

- **Container**: The outermost element that wraps all the rows and columns. It provides a fixed-width container for your content. Bootstrap offers two types of containers: **.container** for fixed-width containers and .**container-fluid** for full-width containers.
- **Row**:
- **Column**: Columns are the building blocks of the grid system. They are placed inside rows and are used to divide the horizontal space within a row. Bootstrap provides a set of predefined column classes, such as .col-, .col-sm-, .col-md-, .col-lg-, and .col-xl-, which define the width of the column at different breakpoints.

Grid System