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CSCI 111: Web Programming and Problem Solving

Lecture 2: Basics of HTML

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Outline

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Part I How does the web work

- IP addresses and Domain names
- DNS and getting domain
- Client-Server Model
- Websites and their architecture
- HTML, CSS, JavaScript

Part II HTML

- History of HTML
- What is HTML
- HTML document
- HTML elements
- HTML attributes
- Document Object Model
- HTML content Model
- Some HTML tags
- Escape characters
- Useful HTML Resources

Part I

How does the web work

IP addresses

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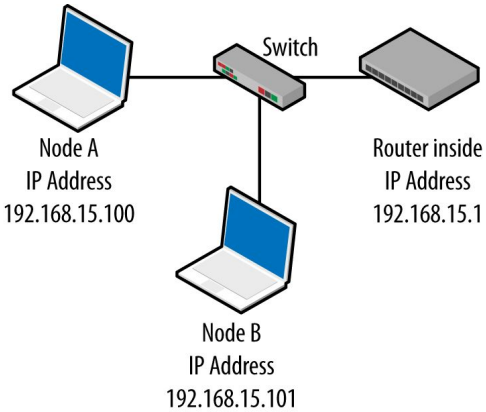
An **Internet Protocol (IP)** address is a unique identifier of a particular device on the Internet network

- PC, mobile, router, smart watch, TV
- Example: 178.91.253.180 [Format is A.B.C.D]

- IP addresses are mathematically produced and allocated by the **Internet Assigned Numbers Authority (IANA)**

- **Types** of IP addresses:
  - public/private (global/local)
  - static/dynamic



Domain Names

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A **domain name** (or domain) is a text string (name) that's associated with an IP address on the Internet.

- It is a unique name
- Easy to remember for human
- Example: nu.edu.kz, google.com

Types of Domain names:

- Root domain (top-level) – .com, .org, .kz, .ru,
- Subdomains (other levels) – google.com, nu.edu.kz, library.nu.edu.kz

Domain Name System

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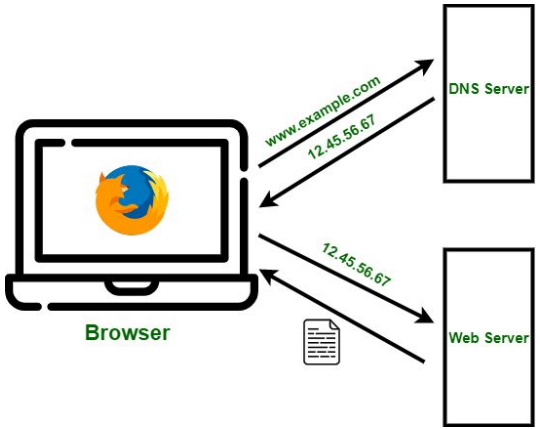
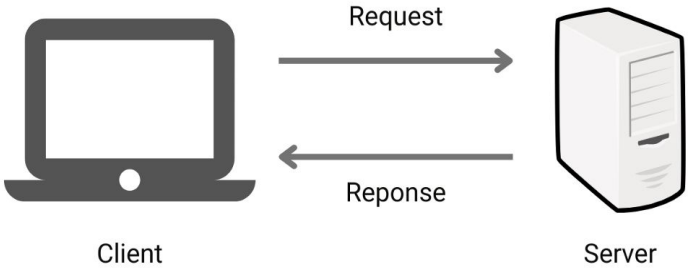
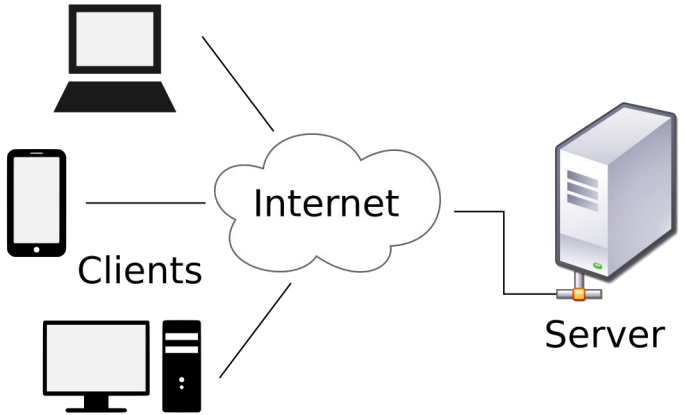
The Domain Name System (DNS) is the hierarchical and decentralized naming system (database) used to identify computers reachable through the Internet or other Internet Protocol (IP) networks. [Wikipedia]

- DNS is a “phonebook” or ”librarian” that converts domain names to IP addresses
  - nu.edu.kz --> 178.91.253.180
- There are WHOIS services to lookup domains
  - godaddy.com, hoster.kz, domaintoipconverter.com
- The browser does a domain lookup for you



Client-Server Model





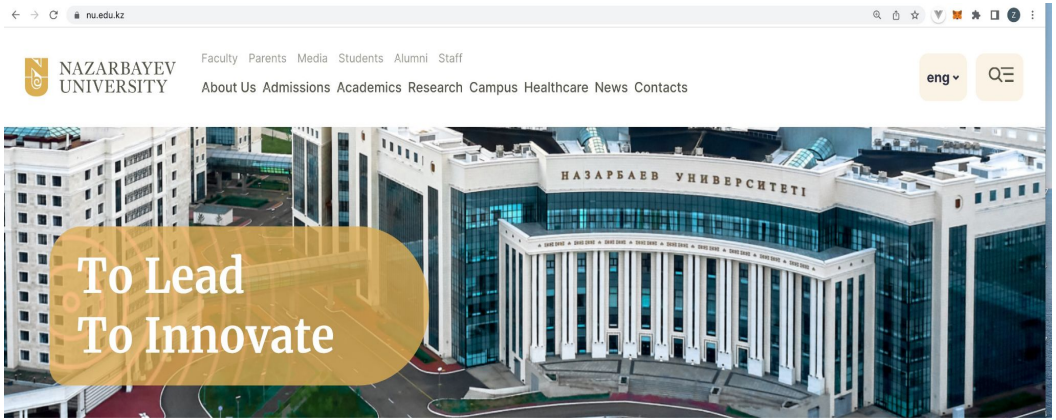
Websites

- A **website** is a collection of web pages and related content that is identified by a common domain name and published on at least one web server with an IP address.

Domain: nu.edu.kz

IP address: 178.91.253.180
Web pages and their URLs:

- About Us - https://nu.edu.kz/about)
- Admission - https://nu.edu.kz/admissions
- Academics - https://nu.edu.kz/academics
- etc.



Website Architecture

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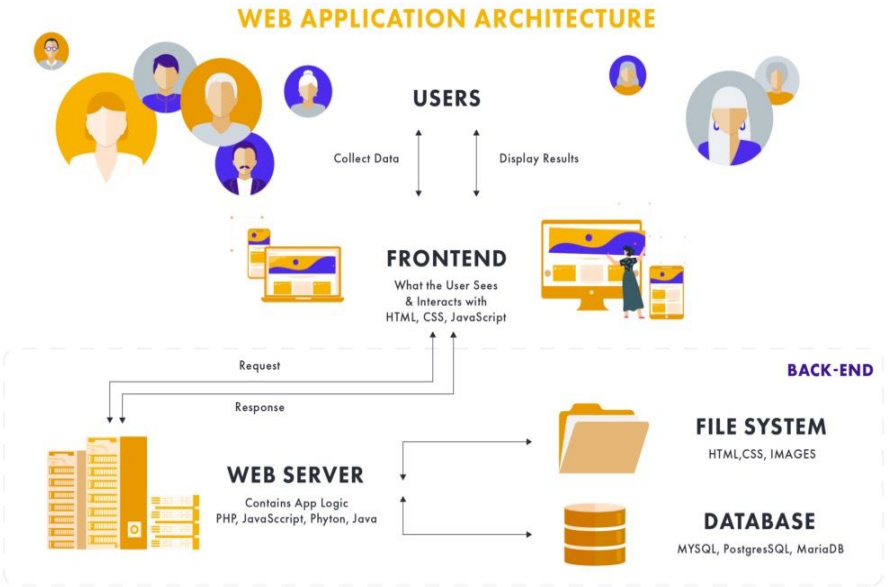
- A typical architecture of a website consists of:
  - Front-end part (user interface): HTML, CSS, JavaScript
  - Back-end part (business logic): Python, Java, PHP, etc.
  - Database: MySQL, PostgreSQL, MS SQL, Oracle
  - File System: images, audio, video, web pages

- **Front-end:** what users see and interact with.
- **Back-end:** the underlying system that supports and processes user interactions.

- A website can be **static** or **dynamic** depending on the content generated.



HTML, CSS, Javascript

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Hyper-Text Markup Language (HTML) is the standard markup language for documents designed to be displayed in a web browser.

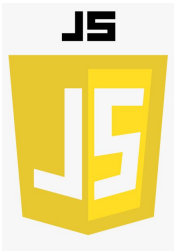
It describes the structure of the web page

Cascading Style Sheets (CSS) is a stylesheet language used to describe the presentation of a document written in HTML.

It describes the style of the web page

JavaScript (JS) is a lightweight and interpreted programming (or scripting) language for Web pages.

It adds interactivity to the web page



Introduction

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- To access a website:
  - Retrieve IP by Domain name (DNS)
  - Access the Web server by IP

To serve the website:

- Implement **Frontend**: HTML, CSS, JS

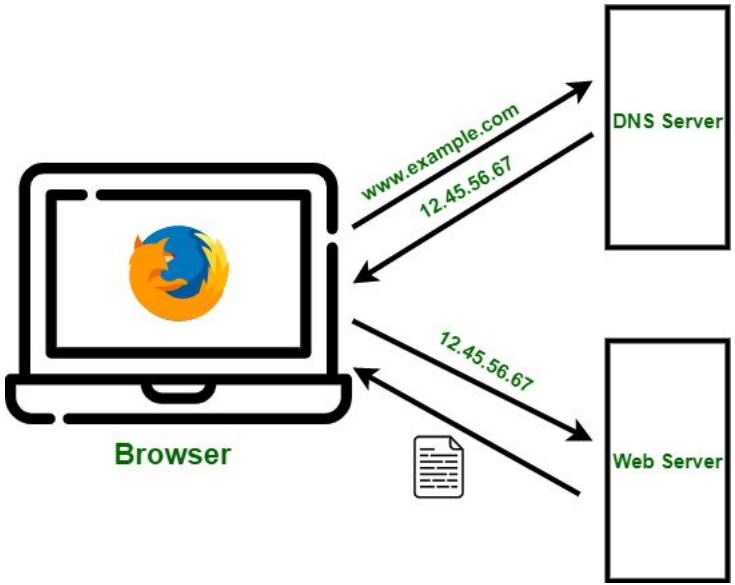

Fig.1 -Before reaching the web server

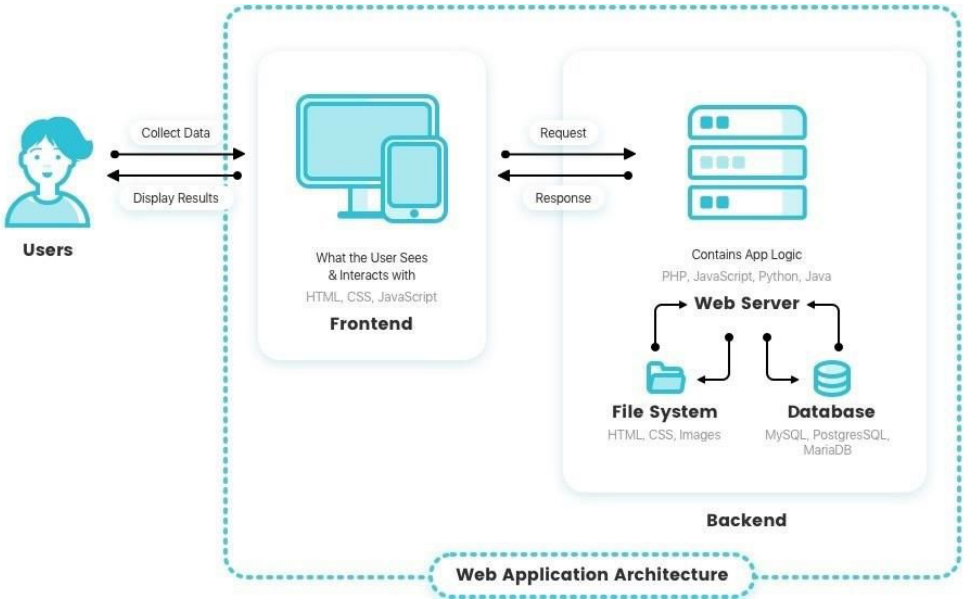

Fig.2 -After reaching the web server

HTML, CSS, Javascript

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- **Hyper-Text Markup Language (HTML)** is the standard markup language for documents designed to be displayed in a web browser.
  - It describes the structure of the web page
- **Cascading Style Sheets (CSS)** is a stylesheet language used to describe the presentation of a document written in HTML.
  - It describes the style of the web page
- **JavaScript (JS)** is a lightweight and interpreted programming (or scripting) language for Web pages.
  - It adds behavior to the web page

Part II

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HTML

History of HTML

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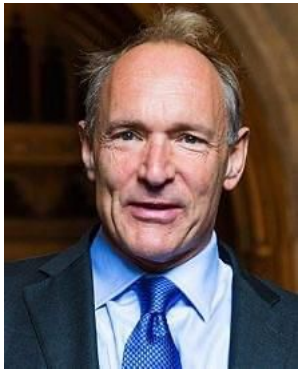
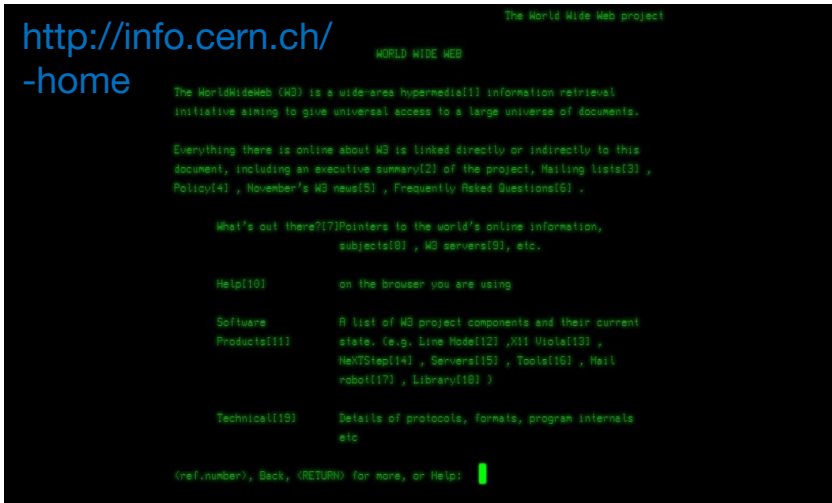
- 1989 • Invention of WWW, HTTP, HTML
  - **Tim Berners-Lee** (CERN)
- 1993 • Release of WWW software (CERN)
- 1994 • World Wide Web Consortium (W3C)
- 2000 • XHTML 1.0 based on XML (W3C)
- 2004 • WHATWG (Mozilla, Opera, and Apple)
- 2007 • HTML5 release (WHATWG, W3C)
- 2011 • HTML5.1, HTML5.2 and HTML5.3



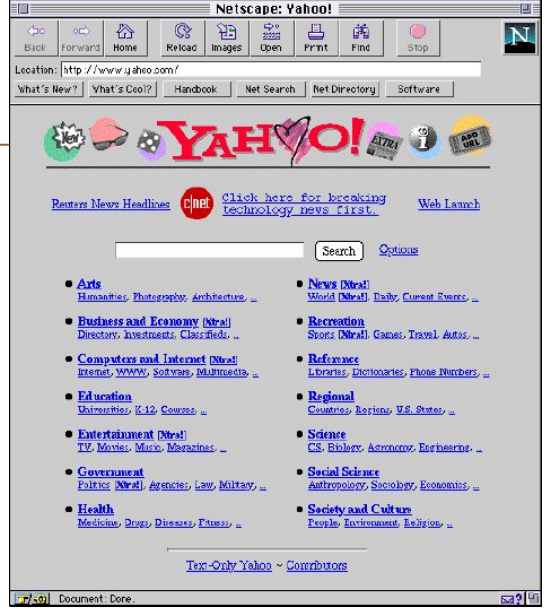
2011
Sir Timothy John Berners-Lee (8 June 1955), TimBL, is an English computer scientist, professor at MIT, and the director of the World Wide Web Consortium (W3C).

http://info.cern.ch/-home



History of HTML

Google (1998)



Yahoo (1994)

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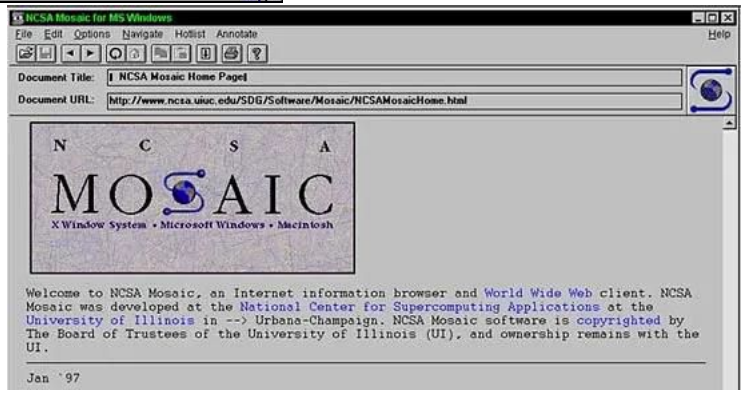
Amazon (1995)



eBay (1995)

What is HTML?

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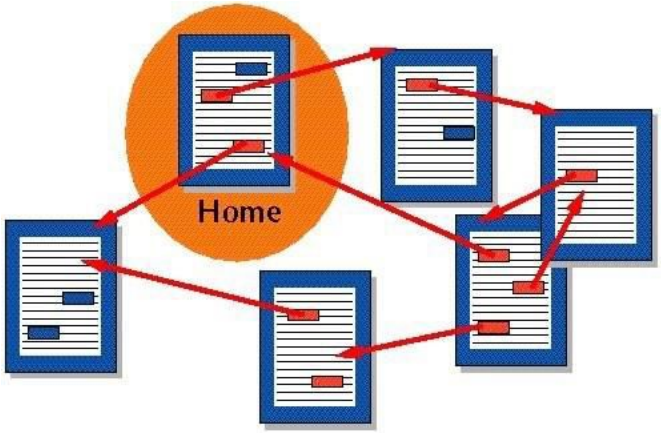
Hyper-Text Markup Language (HTML)

Hyper-Text – a document with hyperlinks (references) to other documents

Markup – a system (set of tags) of text annotation to control its structure, formatting and relationships between its parts

MS Word:	**Bold Text**
Markdown:	** Bold Text **
LaTeX:	\textbf{ Bold Text }
HTML:	Bold Text
WhatsApp:	*Bold text*



Language – a structured system of communication with its alphabet, vocabulary and a grammar (specific set of rules)

HTML Document

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What is a HTML document?

- Text file with an extension ".htm" or ".html"
- Can be created in a text editor: Notepad, TextEdit, Sublime, VS Code, WebStorm
- Contains markup tags (elements) which direct how a page is to be displayed by browsers
- Must have proper text encoding (UTF-8)
- HTML is not case sensitive (head = HEAD)

Example: *index.html*

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>My Website</title>
</head>
<body>
<h1>Hello, World!</h1>
</body>
</html>
```

HTML Document

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HTML document consists of **elements**

DOCTYPE – type of document

`<!DOCTYPE html> - stands for HTML5`

html – root element of a HTML document

head – section for **meta** information

(encoding, display settings, other resources)

title – title of a document, shown in browser's Tab

body – section for main content of a webpage

h1 – defines a heading (h1-h6)

p – defines a paragraph

```
<!DOCTYPE html>
<html>
 <head>
  <meta charset="UTF-8">
  <title>My Website</title>
 </head>
  <body>
    <h1>Hello, World!</h1>
    <p>Some paragraph</p>
  </body>
</html>
```

HTML Elements

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HTML elements must follow specific structure and rules to be correctly processed and shown in browsers
Elements consist of opening tag, content and closing tags (except for some elements):
`<h1>Hello, World!</h1>` - no spaces after < and </
`<hr>, <br> <meta>` - no closing tags, no content

Elements must be correctly nested
CORRECT: <body> <h1> Hello, World! </h1> </body>
WRONG: <body> <h1> Hello, World! </body> </h1>
Special element for comments: *<!--Browsers don't show this content -->*

HTML Attributes

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Elements may have attributes that come in name="value" pairs

```
<meta charset="UTF-8">
```

Attributes provide additional information about elements

Attributes are always specified in the opening tag

```
<h1 title="I'm a header"> Hello, World! </h1>
```

Attribute values must be in quotes (single or double)

H1 vs. Div

H1 tag

- Needs to reflect the content of the page
- Helps SEO (Search Engine Optimization)

DIV tag

- Block-level element – universal tag
- Can be styled with CSS to look like any other element
- Mostly used with class and id attributes as in my.nu.edu.kz

Semantic tags

- Semantic elements’ name imply some meaning to the content
- Human/machines can better understand the structure of a document
- Some useful tags:
  - header, footer
  - nav
  - section, article, aside

`1.html`

Links

Fragment links

Page Fragment

…

Internal links

Some internal page

External links

Some external link

Image links

<img src="w3.org.png" width="50px">

Email links

Email link

Links

Use target attribute of <a> tag to:

open in the new window

….

open in the current window

….

Menu

To create a menu for a website use:

- semantic tag <nav> to wrap menu items
- unordered list to wrap each menu item
- apply CSS and JS to style a menu (later)

```
<nav>
      <ul>
            <li><a href="1.html">Menu Item 1</a></li>
            <li><a href="2.html">Menu Item 2</a></li>
            <li><a href="3.html">Menu Item 3</a></li>
      </ul>
</nav>
```

1.html

Displaying Images

Some useful notes on <img> tag

- remember that <img> is an inline element
- use src attribute is similar to href attribute
- the attribute alt is required for visually impaired people
- use width and height attributes to allocate space on the page

Images can be used as links (as logo)

```
<a href="http://w3.org"><img src="w3.org.png" width="50px"></a><br>
```

Escape characters

There are 3 main characters to be escaped:

use < to escape < symbol

use > to escape > symbol

use & to escape & symbol

Useful escape symbols:

" - to make a quotation

  - non-breaking space

© – copyright symbol

Document Object Model

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When a web page is loaded, the browser creates a **Document Object Model (DOM)** of the page.

The HTML DOM model is constructed as a **Tree of Objects**.

HTML Elements can be found and accessed with JavaScript:

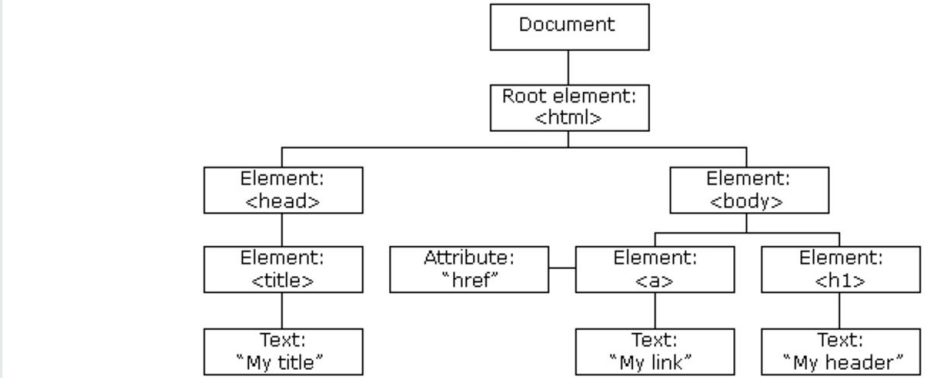
Finding elements by id

Finding elements by tag name

Finding elements by class name

Finding elements by CSS selectors

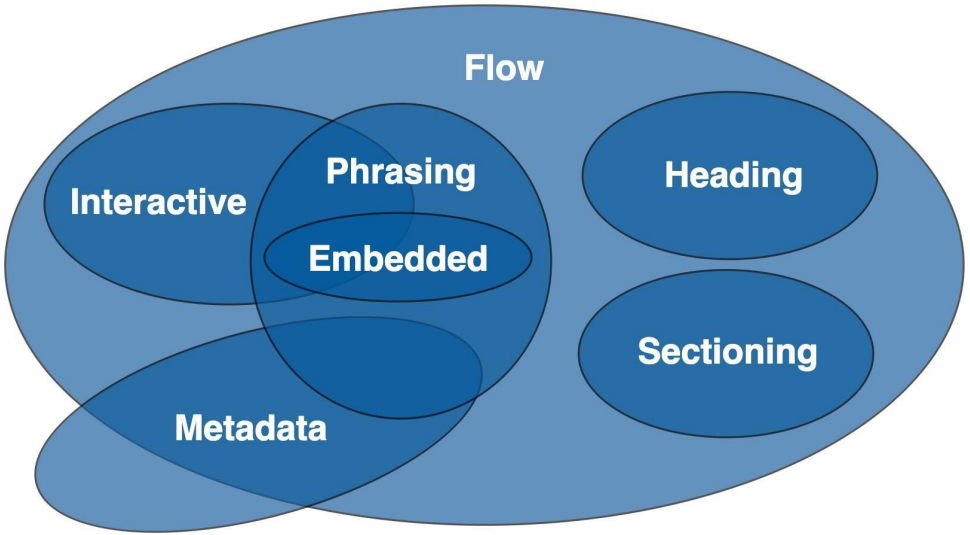
The HTML DOM Tree of Objects



HTML Content Model

Each element in HTML falls into zero or more categories that group elements with similar characteristics together:

- Metadata content
- Flow content
- Sectioning content
- Heading content
- Phrasing content
- Embedded content
- Interactive content



https://www.w3.org/TR/2011/WD-html5-20110525/content-models.html#content-models

HTML Content Model

Block-level elements

- Placed on a new line (by default)
- Occupies full width of the line
- May include other block-level or inline elements
- Roughly corresponds to Flow content
- eg.: h1, div, p, ul, ol

Inline elements

- Placed on the same line line (by default)
- May include only other inline elements
- Roughly corresponds to Phrasing content
- eg.: span, strong, a

https://www.w3schools.com/html/html_blocks.asp

Summary

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- Web technology (frontend) is based on HTML 5, CSS 3 and JavaScript 6
- HTML Documents are specially written text files and have html extension
- HTML elements and attributes direct browsers how to display a web page
- Use h1 tag for a page to convey the topic of the content
- Use semantic tags whenever possible to improve your SEO
- Use different types of links for your needs
- Use unordered lists for menu items
- Use width and height attributes of <img> tag accurately
- Use escape character not to break your HTML code
- Document Object Model is a tree like structure associated with HTML document

self-study:

https://www.w3schools.com/html/default.asp

Thanks for Attention!