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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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- How does the web work
  - IP addresses and Domain names
  - DNS and getting domain
  - Client-Server Model
  - Websites and their architecture
  - HTML, CSS, JavaScript
- History of HTML
- What is HTML
- HTML document
- HTML elements
- HTML attributes
- Document Object Model
- Useful HTML Resources

IP addresses

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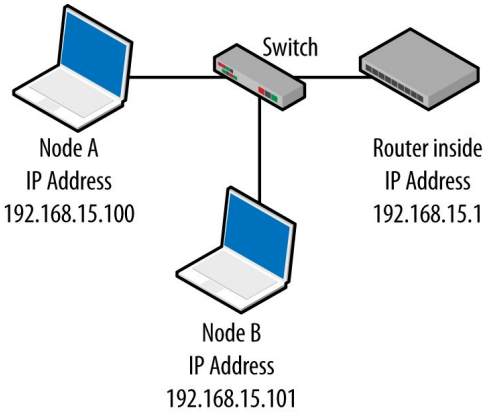
An **Internet Protocol (IP)** address is a unique identifier of a particular device on the Internet network

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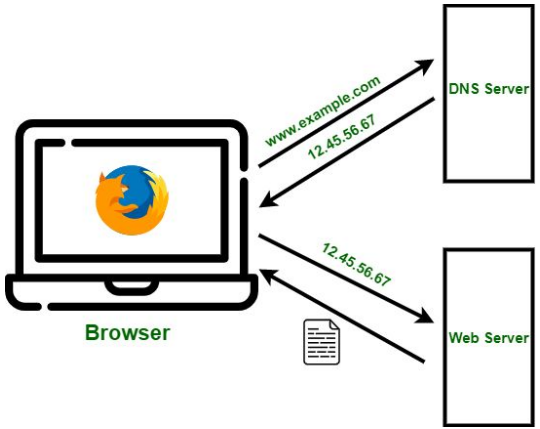
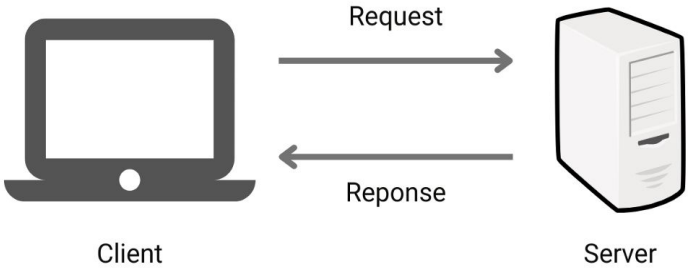
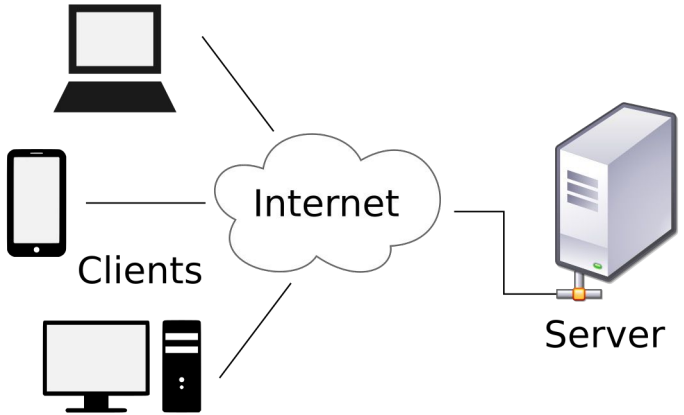
The Domain Name System (DNS) is the hierarchical and decentralized naming system (database) used to identify computers reachable through the Internet or other Internet Protocol (IP) networks. [Wikipedia]

- 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





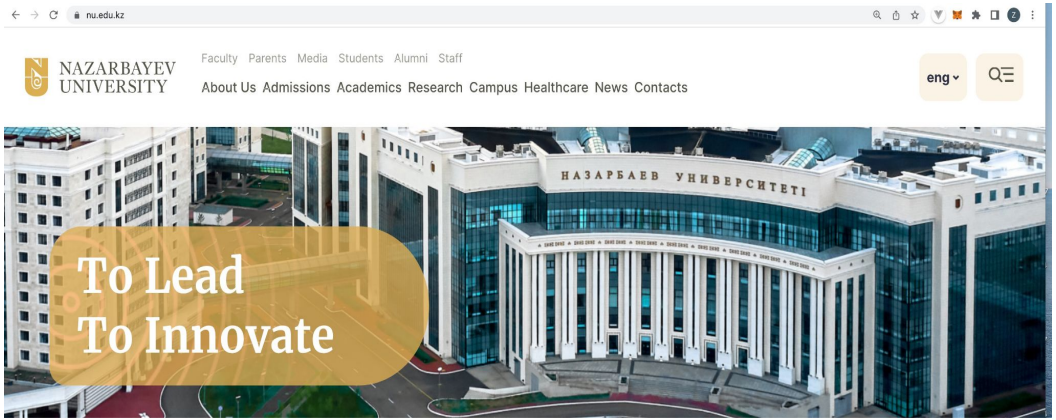
Websites

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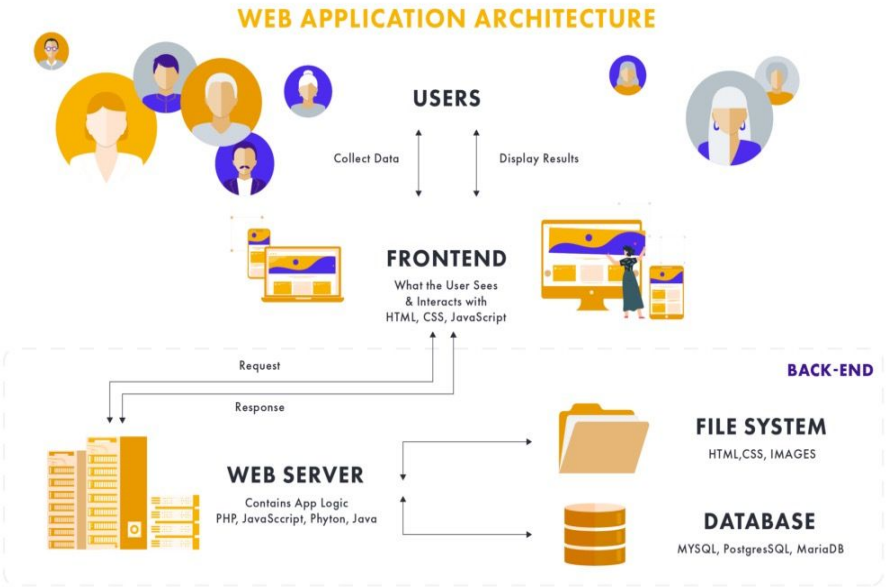
- A typical architecture of a website consists of:
  - Front-end part (user interface): HTML, CSS, JavaScript
  - Back-end part (business logic): Python, Java, PHP, etc.
  - Database: MySQL, PostgreSQL, MS SQL, Oracle
  - File System: images, audio, video, web pages

- **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.

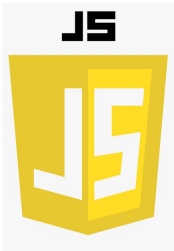
It describes the structure of the web page

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

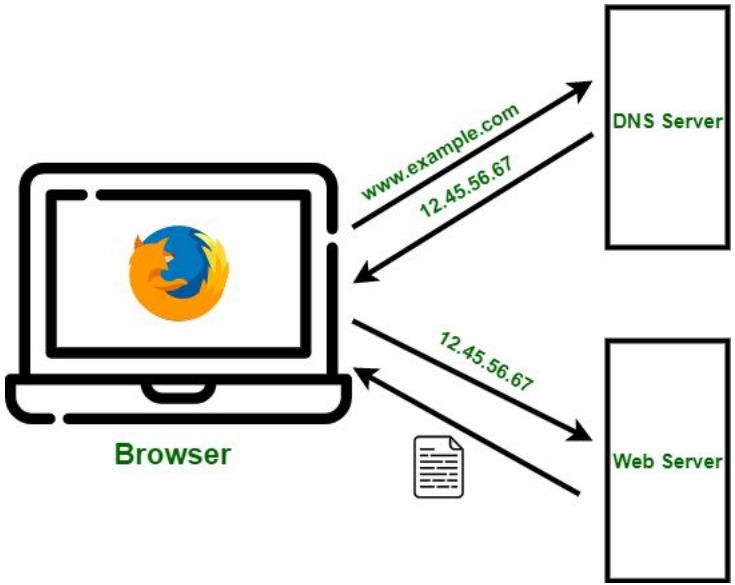

Fig.1 -Before reaching the web server

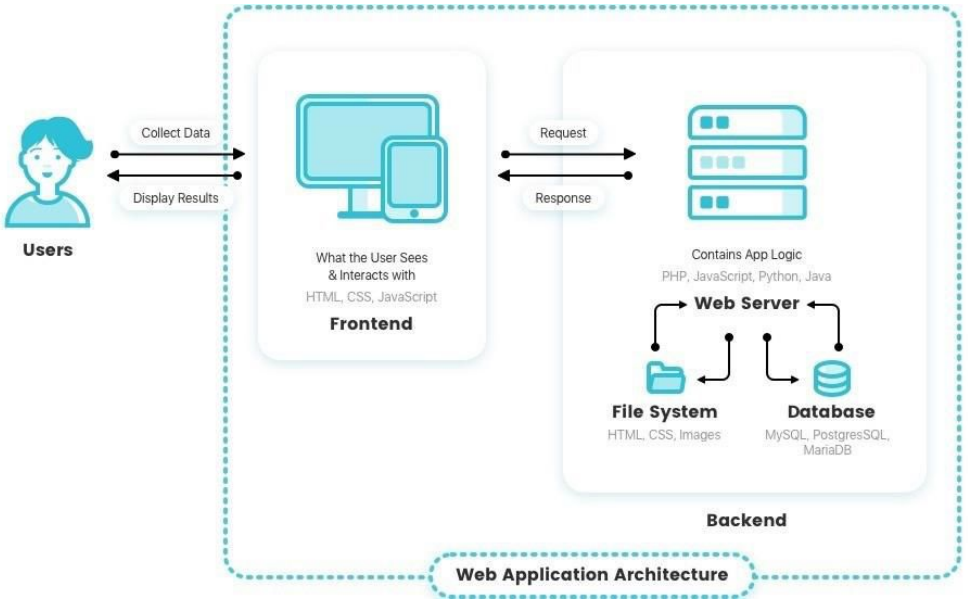

Fig.2 -After reaching the web server

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

History of HTML

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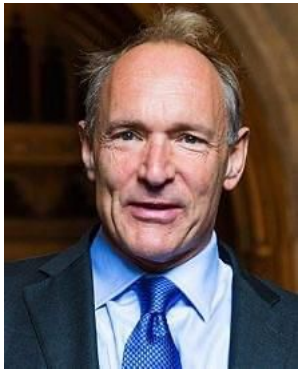
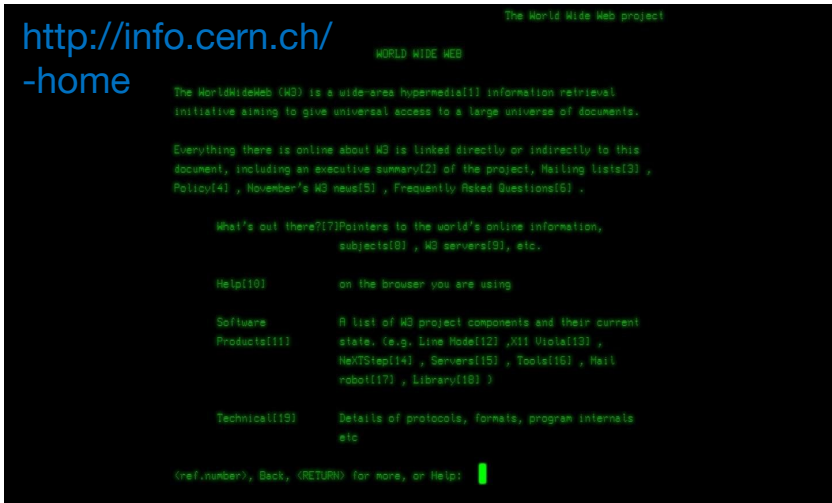
- 1989 • Invention of WWW, HTTP, HTML
  - **Tim Berners-Lee** (CERN)
- 1993 • Release of WWW software (CERN)
- 1994 • World Wide Web Consortium (W3C)
- 2000 • XHTML 1.0 based on XML (W3C)
- 2004 • WHATWG (Mozilla, Opera, and Apple)
- 2007 • HTML5 release (WHATWG, W3C)
- 2011 • HTML5.1, HTML5.2 and HTML5.3



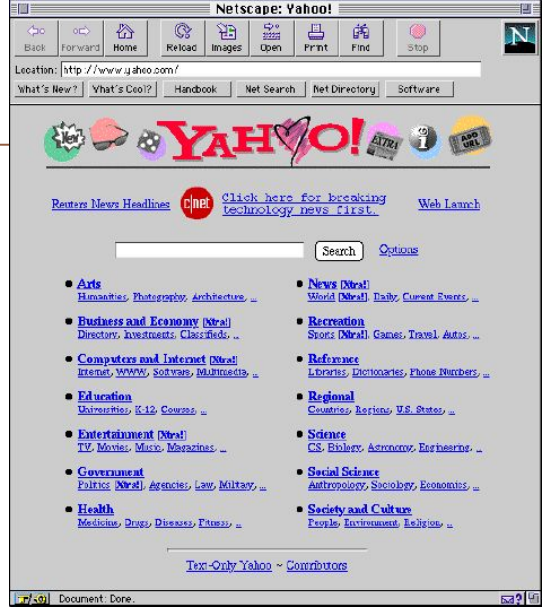
2011
Sir Timothy John Berners-Lee (8 June 1955), TimBL, is an English computer scientist, professor at MIT, and the director of the World Wide Web Consortium (W3C).

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



History of HTML

Google (1998)



Yahoo (1994)

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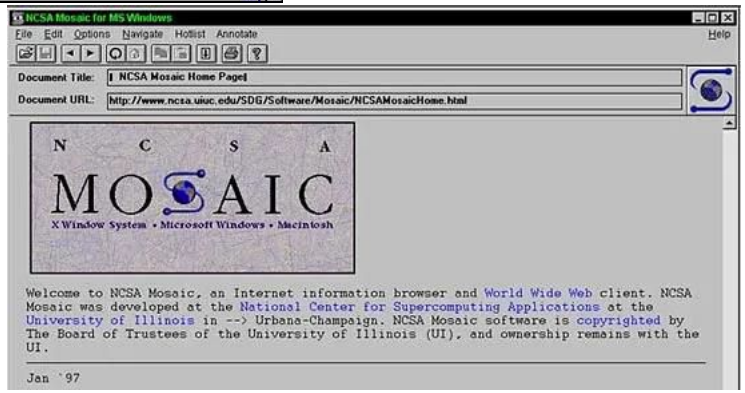
Amazon (1995)



eBay (1995)

What is HTML?

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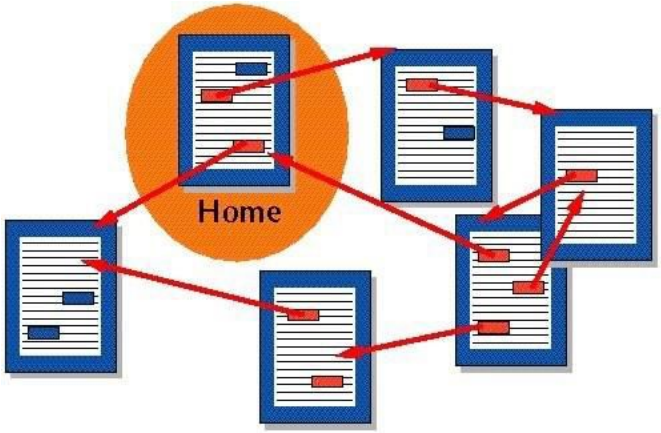
Hyper-Text Markup Language (HTML)

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)

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:

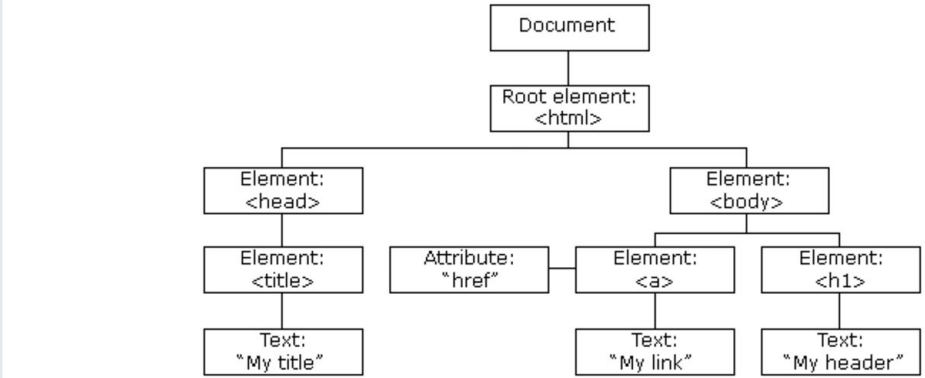
Finding elements by id

Finding elements by tag name

Finding elements by class name

Finding elements by CSS selectors

The HTML DOM Tree of Objects



Summary

- 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
- Document Object Model is a tree like structure associated with HTML document

self-study:

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

Thanks for Attention!