

Chapter 1. Introducing the Internet and Web Technologies.

1.1 Web History.

• Internet And Web

- Computers in 1940s and 1950s were solitary.
1960s evolved.

- the Internet began as four networked computers in 1969.

- Documents were plain text: no image, no formatting and no interaction

- FTP (File Transfer Protocol) was an early way for transferring files over the internet.

- 1990s "World Wide Web" "web" involved:

1. Text File, known as HTML files, containing links to other text file.
2. A program known as browser, for viewing HTML files.
3. A set of rules, known as the HTTP protocol, for transferring HTML files among computers.

- Web Server: a program that serves web pages to web browsers.

- HTML: (HyperText markup language) is the standard markup language for web documents.

hyperText: text that has links to other text

today is also to image, video, and more.

markup: special markings in document, provide additional information about links, formatting, and image.

HTML also permits adding metadata like search engine keywords, author information, and language.

- Web vs. Internet.

Today, much of the Internet traffic is web traffic

ZyBooks practice said 1990



1991/8/1 First Website

• Browser wars and HTML standardization

Web browser: a program that downloads an HTML documents from a web server, display it to user with appropriate formatting, interact with it (clicking Hyperlinks.) Web browser use HTML

1990 1st web browser

1995-2002 1st Browser War IE wins

2004-2013 2nd Browser War Chrome wins

W3C (World Wide Web Consortium)

: The international standards organization.

WHATWG (Web Hypertext Application Technology Working Group)

HTML5 standard published 2014

• Separation of duties

- HTML: defines the structure and content of a web page.
- CSS: specifies the layout and visible appearance.
- JavaScript: describes the dynamic behaviors and actions of a web page.

1.2 Ip addresses, domain names, and URLs

- Ip addresses

Packet: contains To and From IP addresses, the information to communicate, and other configuration information.

Ip address (Internet Protocol address)
Computer Unique address on Internet

IPv4 32-bit addresses. represent 2^{32}

IPv6 128-bit addresses. represent 2^{128}

- Domain names and DNS

Domain name: A name for an IP address

DNS server: Convert domain name to an IP address

DNS (Domain Name System)

- Domain name Levels

.com, .net, .org, .gov, .edu. . . .

⌞ Top-level domains (TLD).

.uk, .cn, .ru.

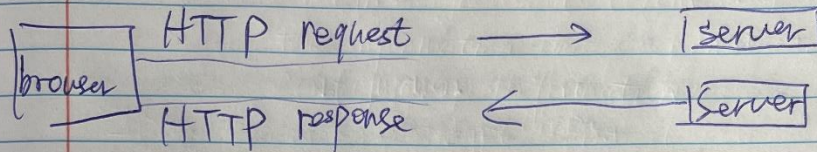
⌞ Country code top-level domain (ccTLD)

ICANN: organization that manages TLDs.

- URL (Uniform Resource Locator) : The location of a web resource on the web.

1.3 HTTP

- DNS lookup before connection



- Request and Response headers (both composed of 4 parts)

1. Status Line.
2. header field (0 or more)
3. Empty line.
4. Message body

- Request methods and response status codes

Common HTTP request methods.

GET, HEAD, POST, PUT, DELETE.

Status code : 3-digit # , indicates status
successfully requested, 200 status code
others : various reasons.

Common HTTP response status codes.

- 200. OK
- 301. Moved Permanently.
- 302. Found
- 304. Not Modified.
- 403. Forbidden
- 404. Not Found.
- 505. Internet server Error.

URL shortening : technique to create shorter URLs that redirect to longer URLs

- Browser caching

browser cache: An area on computer's disk where web content can be stored by the web browser for quick retrieval later.

Entity tag (ETag): An identifier for a specific version of a web resource.

↑ with If-None-Match header.

- HTTPS

HTTPS uses TLS (Transport Layer Security).

which uses asymmetric public keys to encrypt data between browser and web server.

HTTPS acquire a digital certificate

✓
issued by trusted certificate authority

1.4 Web trends

Web browser market share continues to change.

Mobile devices are replacing desktop computers on the web.

Developers of mobile-friendly web pages need to consider the following:

- Screen size: much more smaller than computer.
- Load speed: may have limit or slower Internet connectivity.
- Device speed: Limit memory and CPU speed. means mobile browsers are not as powerful as desktop browsers.
- Battery life: Constantly runs JavaScript, will drain frequently loads data } battery faster.
- Interface: touch not mouse.

• IoT: The Internet of Things.

IoT: The global collection of communicating devices that sense and control technologies on behalf of humans.

IoT devices 1 or more of the following characteristics:

1. Gather information about the physical world using sensors (temperature, voltage, image).
2. Share the sensor data with control systems.
3. Interact with hardware to execute commands sent by control systems.

↳ people using app or webpage control IoT devices

- Web accessibility
 - Cognitive computing and big data intelligence
- Cognitive computing : Is the use of artificial intelligence techniques and access to vast amounts of data to simulate human problem solving in complex situations with ambiguity, changing data, and even conflicting information.

- Separation of concerns

Separation of concerns : The design principle of breaking up web contents using distinct languages and documents that overlap as little as possible.

Three key languages.

HTML : Language that describes page content.

CSS : Language that describes page layout.

JavaScript : Language that provides interactive functionality.

1.5 Introduction to HTML.

HTML and tags

HTML : 1. Textual Language.

2. saved with a .html or .htm file

3. Body of HTML document is constructed with several tags.

<xxx>

opening and closing tag.

some tags like don't require close tag.

Common tags.

{ h1, h2, h3
p
em, strong
img
a

headers, h1 is largest.

Paragraph.

Emphasis, Strong Emphasis

Image.

Link.

• Links

1.6 Introduction to CSS

CSS and rules

- CSS (Cascading Style Sheets) = Textual Language describing how a web page is styled for visual presentation.
controls the look and layout of web page content.
- CSS rules specifies styling properties for specific HTML elements placed within `<style>` tag.

Common CSS properties

- background-color Element background color
- font-family Font used for the element's text
- font-size Font size used for the element's text.
- padding Spacing between content and border.
- margin Spacing around element (outside element's border)

Colors

- CSS Colors pre-defined like "blue", "red", "black" or rgb value (x, x, x)
(xx, xx, xx)
(xxx, xxx, xxx)

1.7 Introduction to JavaScript.

- Button click example.
JavaScript : programming language.
button click.
can be included in HTML file's

| | |
|--|------|
| | head |
| | body |
- If-else statement
- Drawing graphics example

1.8 Full-stack development (PHP)

Overview of front-end and back-end development.

Client-side (front-end)

Server-side (back-end)

front-end developer : proficient in client-side tech.

back-end developer : proficient in server-side tech.

full-stack developer : expertise in all aspects of a website or web applications development.
(client technologies, server technologies, data modeling, user interface)

- Web hosting
- Server-side Programming
developers must consider:
 1. Server platform
 2. Tool support
 3. Developer experience
 4. Library support
- Databases
- Client-side technologies
HTML preprocessor, CSS preprocessor, UI Library.
CSS front-end framework.
- Testing developers must test the full tech stack used by web applications