Web Development
CS 335

Elective Course

Room: S01C1006

Date/Time: STT – 11:00-11:50

Dr. Noura Aljeri

Course Description

The course concentrates on complex applications, which require concepts, methods and tools coming from different areas of communication and computing. The course requires a sound knowledge of computer networks and the ***World Wide Web*** *on the one hand as well as* ***hands-on*** *in programming languages. Web applications are based on documents, which are generated and stored on servers and requested by and transferred to client applications. The course covers* ***static*** *as well as* ***dynamic documents*** *and appropriate concepts to create, handle and transfer them, like* ***HTTP*** *and other protocols,* ***scripting*** *languages, and security and performance issues.* ***Course projects*** *give students the chance to complete the training in this field.*

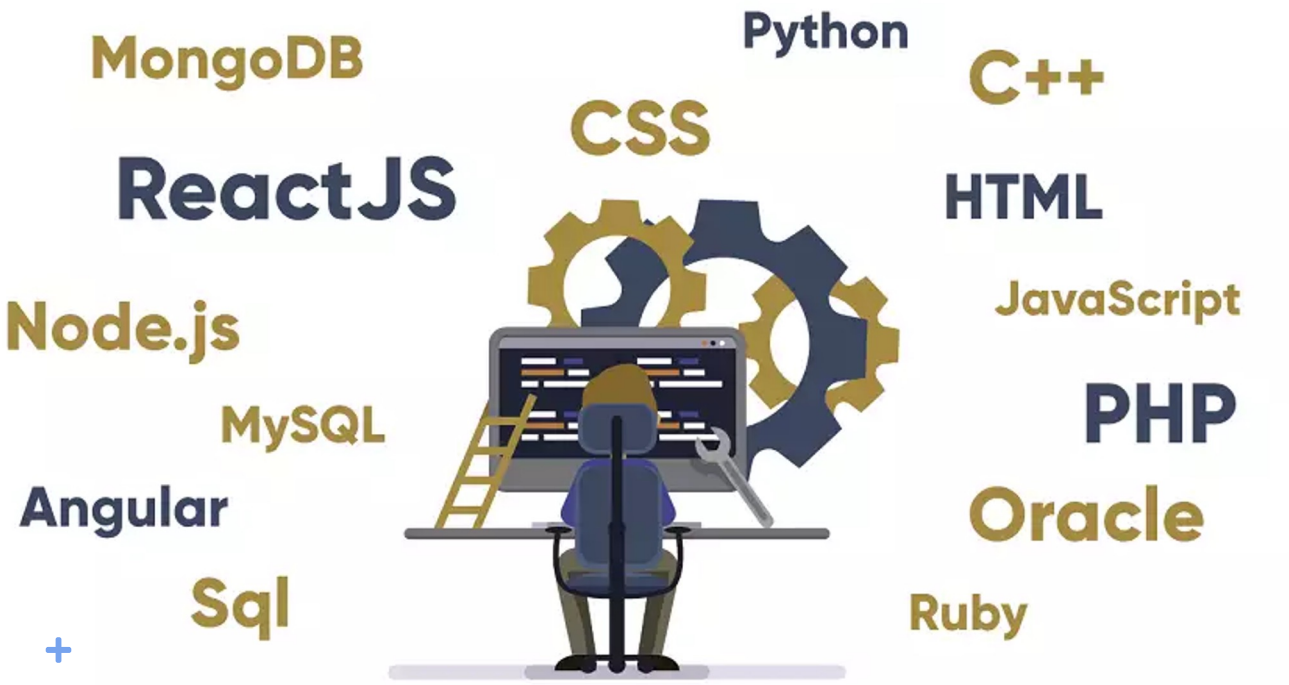
General information

Instructor	Dr. Noura Aljeri
Office	n/a
phone/email	Ext. 82724/ aljeri@cs.ku.edu.kw
Class Time & Location	STT: 11:00-11:50
Office Hours	Sun., Tues.: 13:30 - 14:30 or by appointment
Teaching Assistant	TBA

Requirements

- **Prerequisite** 0418-**201**
- Textbook
  - Title: Internet and World Wide Web: How to Program (Latest Edition)
  - Author: P. Deitel, H. Deitel, and A. Deitel
  - Publisher: Pearson
- Ready to work in a Team!
- Hard work and lots of practices and testing!

What are we learning!



Full-Stack Development

01

Overview

Course details

Course Overview

Why Web Development?

- The web is everywhere: desktops, mobiles, IoT devices
- **High demand** for skilled web developers
- Opportunity to create and innovate
- Foundation for other tech careers

Course Objectives

- Understand the fundamentals of web technologies
- Build responsive and interactive websites
- **Learn full-stack development** with front-end, back-end, and databases
- Complete a group project showcasing your skills

Tentative Schedule

May be subject to change during the semester – Topics may be shuffled

Topic	**Week**	**Notes**
Web Protocols and Architectures	1	Introduction to the web (Quiz 1 on the 2nd Thursday)
Static web pages development	1-3	HTML + CSS (Quiz 2 + HW)
Dynamic web pages development	3-5	JavaScript + jQuery
Web application development framework	6-8	Focus on React (frontend) + Node JS (backend)
Web databases	9-10	Focus on MongoDB
Web Security	11	Secure coding practices – HTTPS – authentication & authorization
Web Services	12	APIs and RESTful services

Grading!

All students start with 100% grade – until they start losing points here and there

Midterm 1	15%
Midterm 2	15%
Project*	20%
Assignments /Quizzes (3)	10%
Final Exam	40%

*You will be working in groups of two! Assignments are individual work!

Tools & Resources

- Moodle - TBA
- Slides - Exercises
- Online (endless resources)
- Download IDEs/Editors

QUESTIONS?

01.1 Overview

Introduction to the Internet and Web

Internet

- The interconnected network of computer networks that spans the globe.

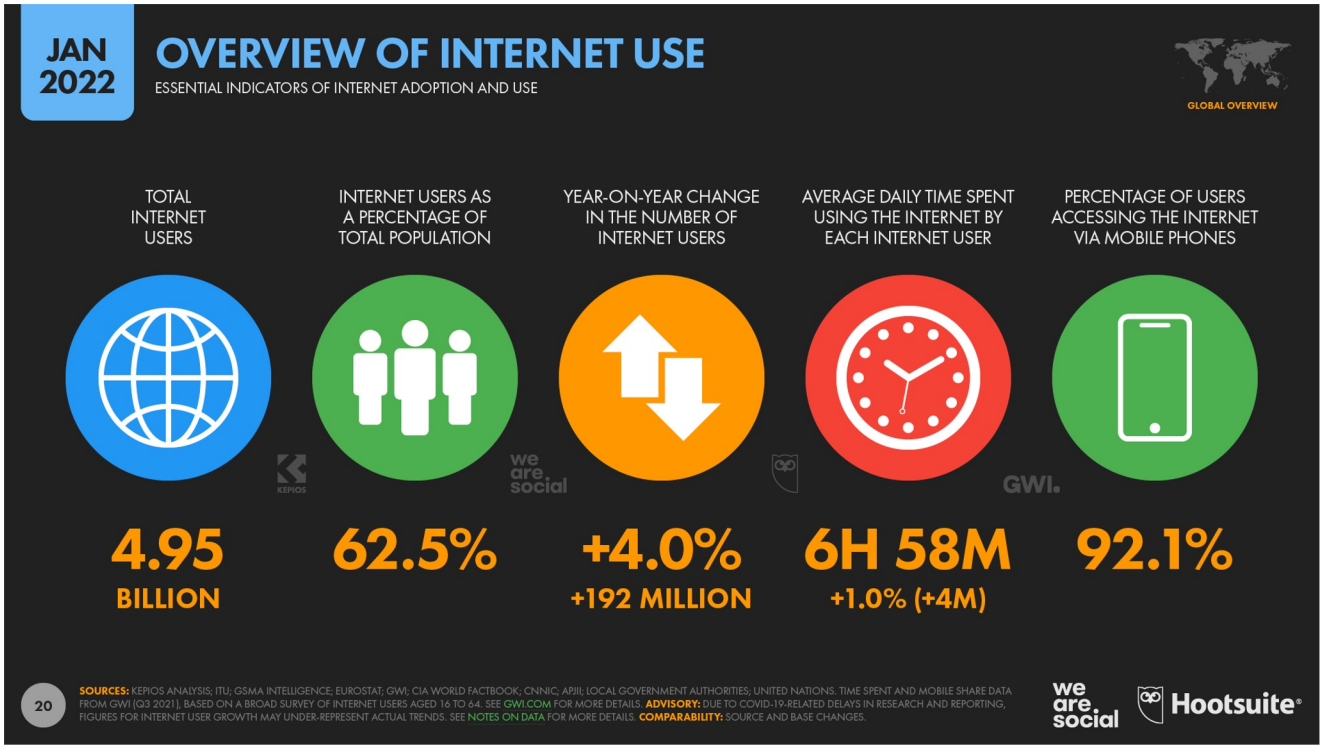
The World Wide Web

The graphical user interface to information stored on computers running web servers connected to the Internet.

The World Wide Web

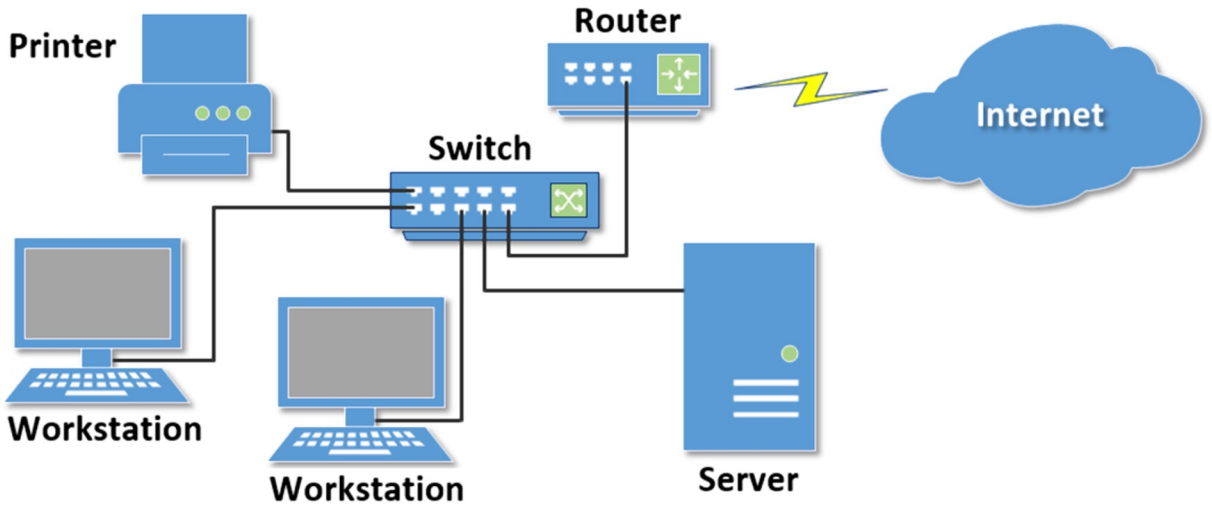
- The **Web (World Wide Web)** consists of information organized into Web pages containing text and graphic images.
- It contains hypertext links, or highlighted keywords and images that lead to related information.
- A collection of linked Web pages that has a common theme or focus is called a **Web site**.
- The main page that all of the pages on a particular Website are organized around and link back to is called the site's **home page**.

Growth of the Internet

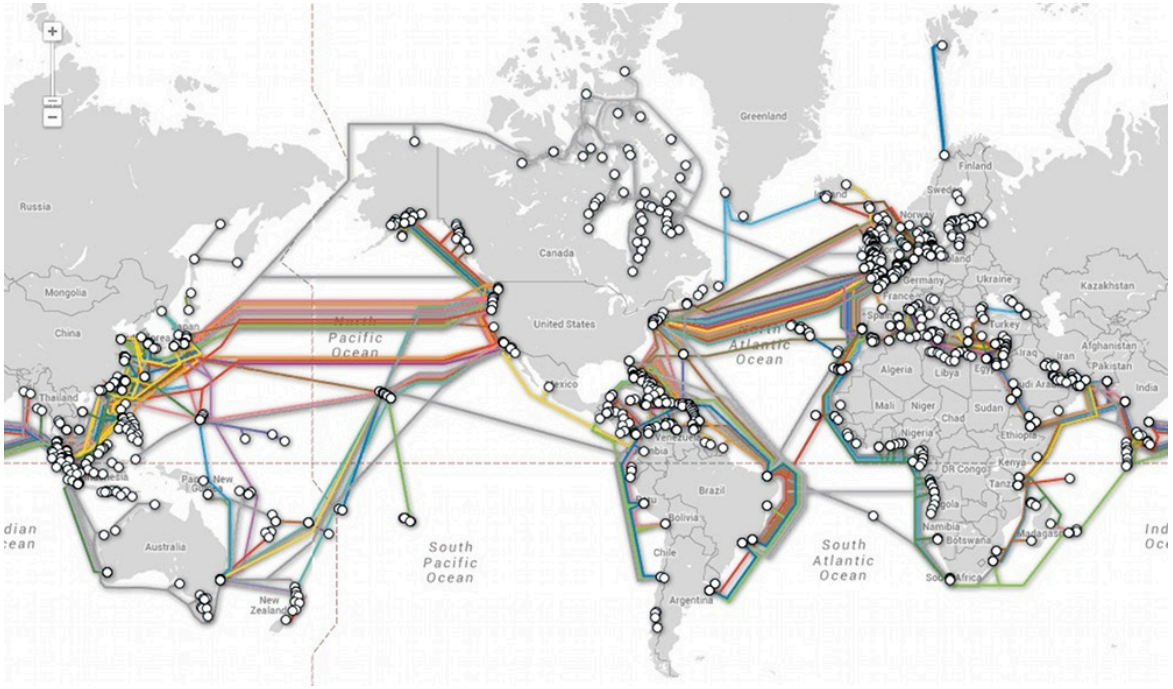


Network

- Two or more computers connected together for the purpose of communicating and sharing resources



Global Internet



Travel through Fiber Optics (SoL)

https://www.submarinecablemap.com

The Client/Server Model

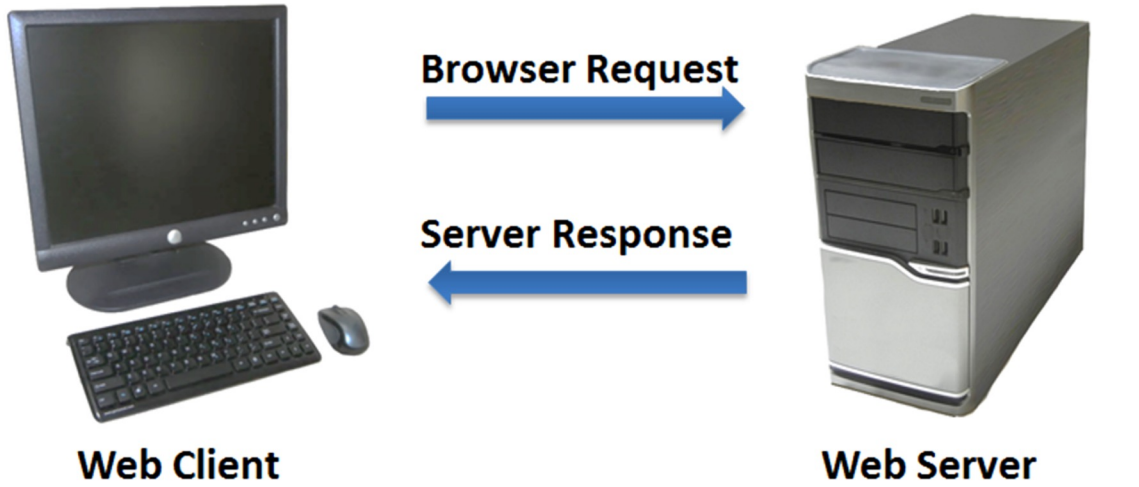
- Client/Server can describe a relationship between two computer programs –
  the "**client**" and the "**server**".
- Client
  - requests some type of service (such as a file or database access) from the server.
- Server
  - fulfills the request and transmits the results to the client over a network

Client/Server Structure of the Web

- Web is a collection of files that reside on computers, called **Web servers**, that are located all over the world and are connected to each other through the Internet.
- When you use your Internet connection to become part of the Web, your computer becomes a **Web client** in a worldwide client/server network.
- A **Web browser** is the software that you run on your computer to make it work as a web client.

The Internet Client/Server Model

- Client – Web Browser
- Server – Web Server



Web Client

- Connected to the Internet when needed
- Usually runs web browser (client) software (*such as Internet Explorer or Firefox)*
- Uses HTTP (Hypertext Transfer Protocol)
- Requests web pages from server
- Receives web pages and files from server

Web Server

- Continually connected to the Internet
- Runs web server software
  (such as Apache or Internet Information Server)
- Uses HTTP (Hypertext Transfer Protocol)
- Receives request for the web page
- Responds to request and transmits status code, web page, and associated files

Internet Protocols

- Rules that describe the methods used for clients and servers to communicate with each other over a network.
- There is no *single* protocol that makes the Internet and Web work.
- A number of protocols with specific functions are needed.

File Transfer Protocol (FTP)

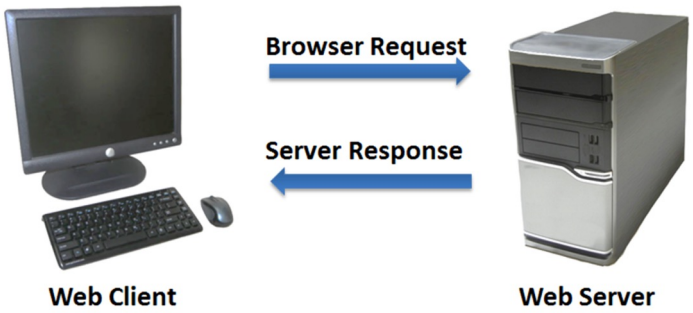
- A set of rules that allow files to be exchanged between computers on the Internet.
- Web developers commonly use FTP to transfer web page files from their computers to web servers.
- FTP is also used to download programs and files from other servers to individual computers.

E-mail Protocols

- Sending E-mail
  - SMTP Simple Mail Transfer Protocol
- Receiving E-mail
  - POP (POP3) Post Office Protocol
  - IMAP Internet Mail Access Protocol

HTTP - Hypertext Transfer Protocol

- A set of rules for exchanging files such as text, graphic images, sound, video, and other multimedia files on the Web.



- Web browsers send HTTP requests for web pages and their associated files.
- Web servers send HTTP responses back to the web browsers.

HTTP & HTTPS

- Most web addresses begin with **HTTP**, which is an acronym for "Hyper Text Transfer Protocol." It's the protocol used to allow you to communicate with web sites.

- **HTTPS** stands for "Hyper Text Transfer Protocol Secure." It means that information exchanged between you and a web site is encrypted and cannot be hijacked by someone who might want to electronically eavesdrop when you type a credit card number, a password, a social security number, or any other person information.

TCP/IP: Transmission Control Protocol/ Internet Protocol

- TCP/IP has been adopted as the official communication protocol of the Internet.

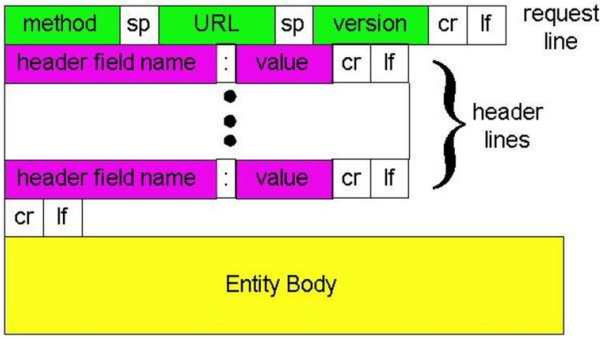
- TCP and IP have different functions that work together to ensure reliable communication over the Internet.

TCP - Transmission Control Protocol

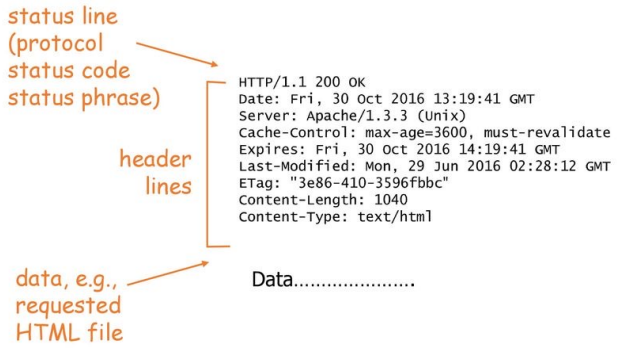
- Purpose is to ensure the integrity of communication
- Breaks files and messages into individual units called packets
- Data is transmitted by packet switching using the standard **Internet Protocol** (**IP**)
- **Packet** – a unit of information carriage
- **Packet switching** – process of moving packets from one node (computer device) to another

HTTP Message

HTTP request message:
general format



HTTP response message



IP - Internet Protocol

- A set of rules that controls how data is sent between computers on the Internet.
- IP routes a packet to the correct destination address.
- The packet gets successively forwarded to the next closest router (a hardware device designed to move network traffic) until it reaches its destination.

tracert traceroute

IP Address

- Each device connected to the Internet has a unique numeric IP address.
- These addresses consist of a set of four groups of numbers, called octets.

  173.194.116.72 will get you Google!
- An IP address may correspond to a domain name.

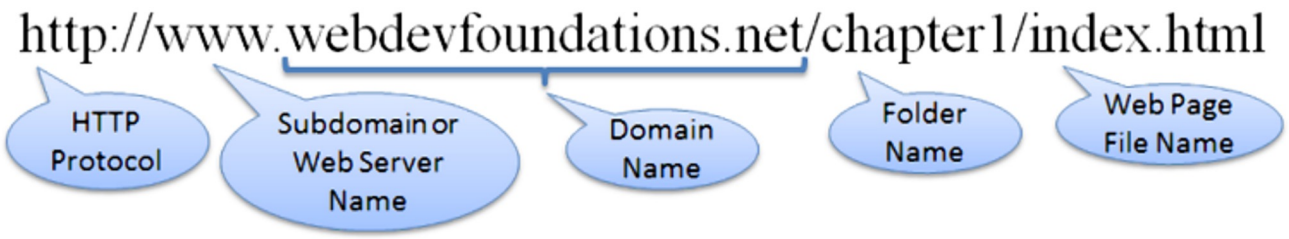
Domain Name

- Locates an organization or other entity on the Internet

- Domain Name System
  - Divides the Internet into logical groups and understandable names
  - Associates unique computer IP Addresses with the text-based domain names you type into a web browser
  - Browser: http://google.com
  - IP Address: 173.194.116.72

Uniform Resource Identifier

- **URI – Uniform Resource Identifier**
  - identifies a resource on the Internet
- **URL – Uniform Resource Locator**
  - a type of URI which represents the network location of a resource such as a web page, a graphic file, or an MP3 file.



TLD - Top-Level Domain Name

- A top-level domain (TLD) identifies the right-most part of the domain name.

- Examples of generic TLDs:
  .com, .org, .net, .mil, .gov, .edu, .int, .aero, .asia, .cat, .jobs, .name, .biz, .mobi, .museum, .info, .coop, .post, .pro, .tel, .travel

Country Code TLDs

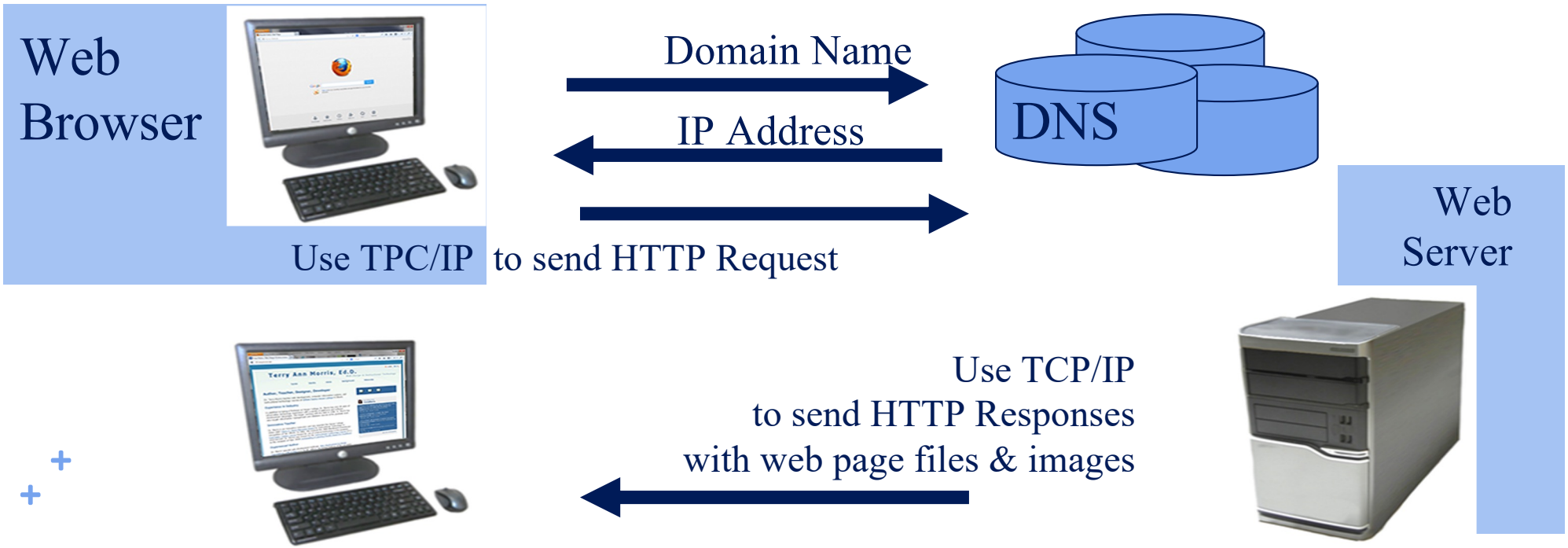
- Two character codes originally intended to indicate the geographical location (country) of the web site.

- In practice, it is fairly easy to obtain a domain name with a country code TLD that is not local to the registrant.

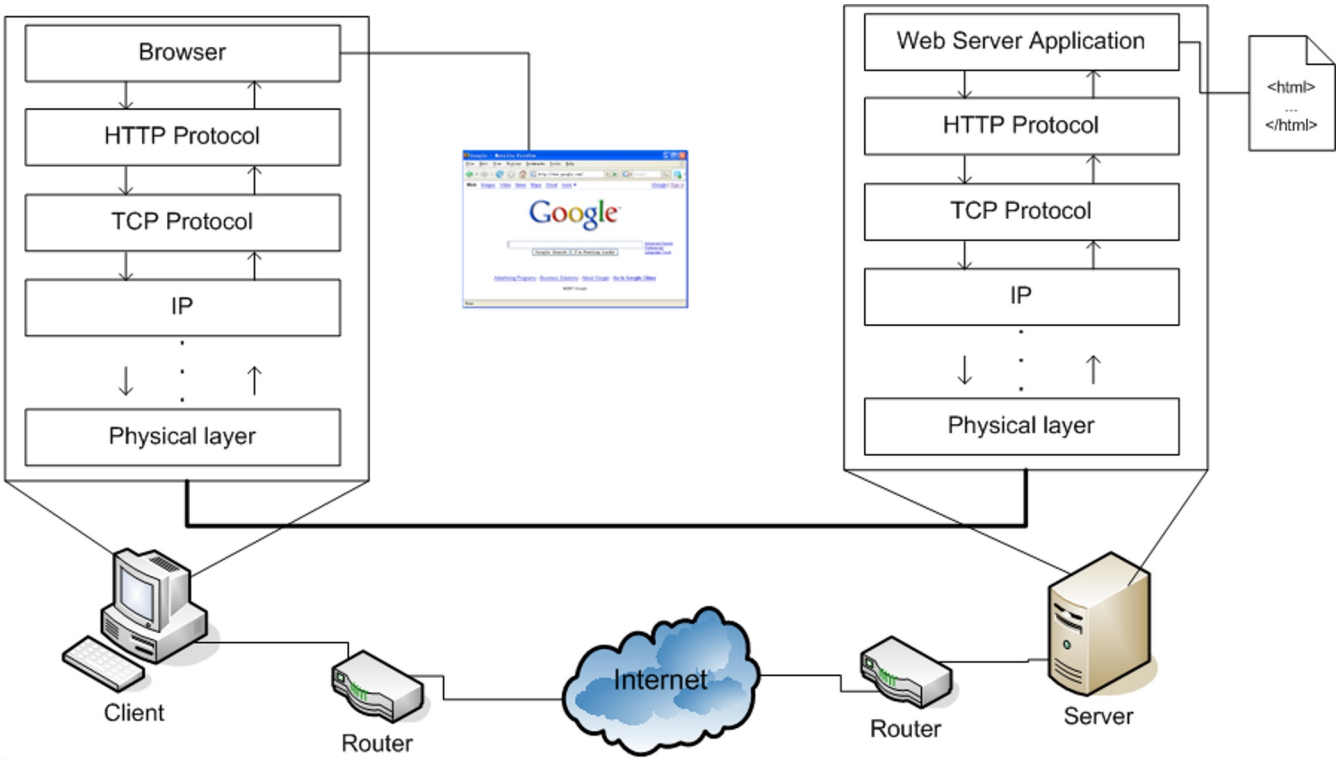
- Examples:
  - .tv, .ws, .au, .jp, .uk
  - See http://www.iana.org/cctld/cctld-whois.htm

Domain Name System

- The Domain Name System (DNS) associates (maps) Domain Names with IP addresses.



Putting it All Together



Common Web Development Languages

- HTML
  - The language for building web pages
- CSS
  - The language for styling web pages
- JavaScript
  - The language for programming web pages
- PHP
  - A web server programming language
- SQL
  - A language for accessing databases
- jQuery
  - A JavaScript library for developing web pages