



# 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

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

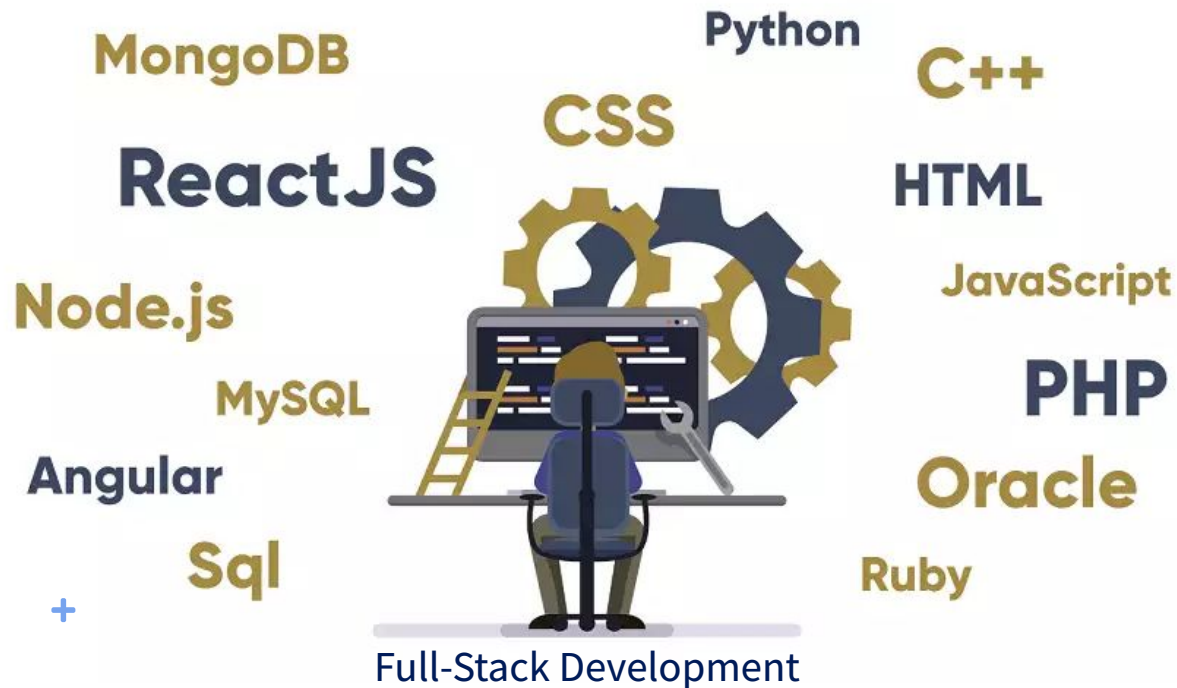
# Requirements



- **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!





# 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

<u>Topic</u>	<u>Week</u>	<u>Notes</u>
Web Protocols and Architectures	1	Introduction to the web (Quiz 1 on the 2 <sup>nd</sup> 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

<b><u>Midterm 1</u></b>	15%
<b><u>Midterm 2</u></b>	15%
<b><u>Project*</u></b>	20%
<b><u>Assignments /Quizzes (3)</u></b>	10%
<b><u>Final Exam</u></b>	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





# Objectives

- To introduce the internet and web
  - Client/server model
  - Internet protocols





# 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.



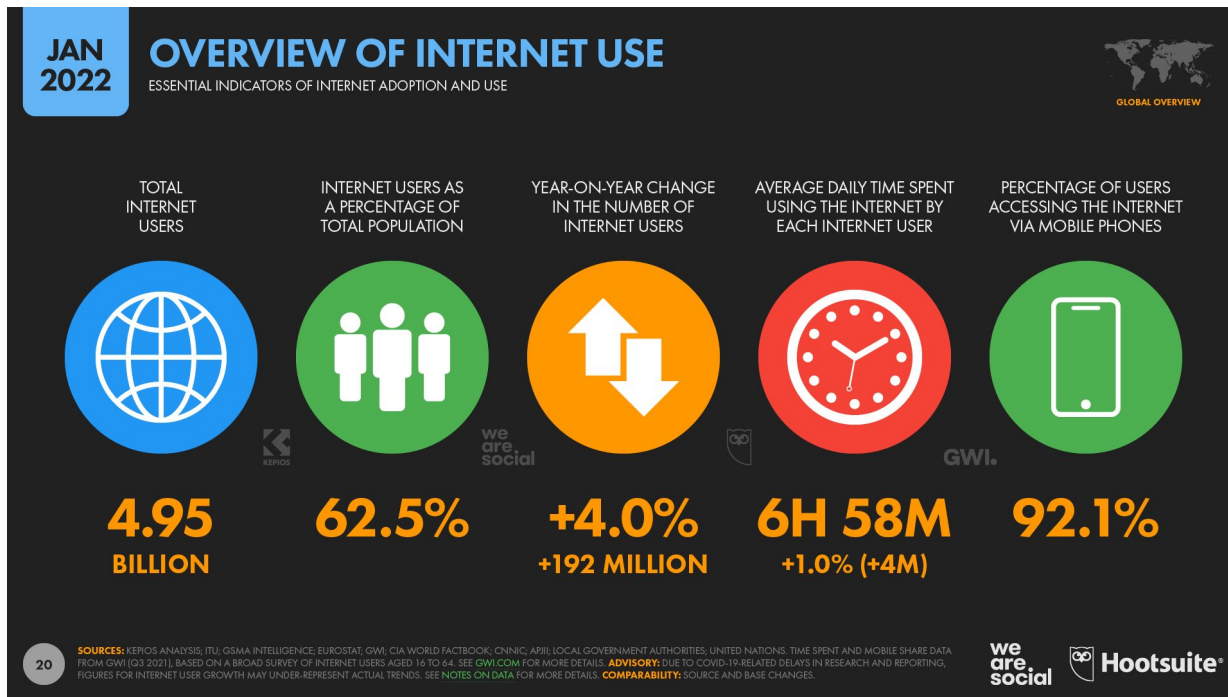


# The World Wide Web

- 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**.



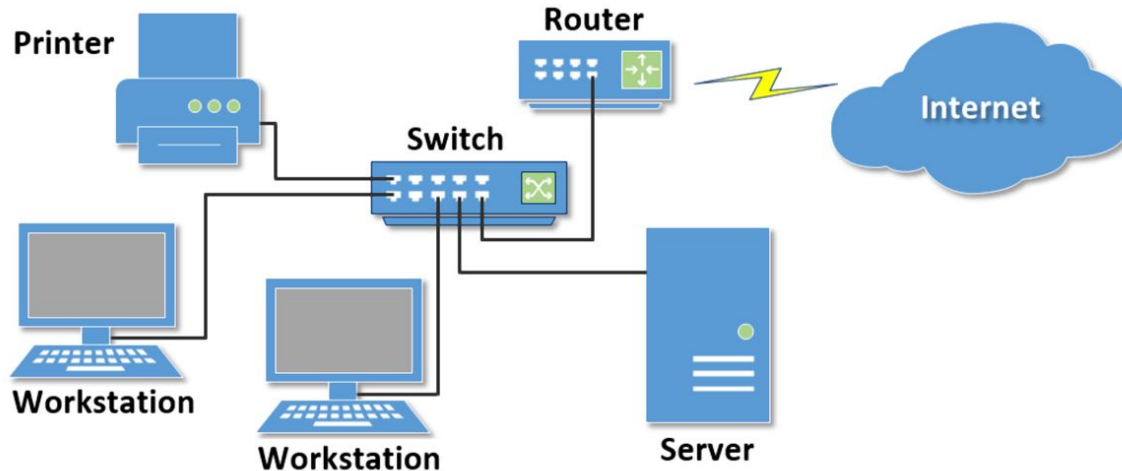
# Growth of the Internet



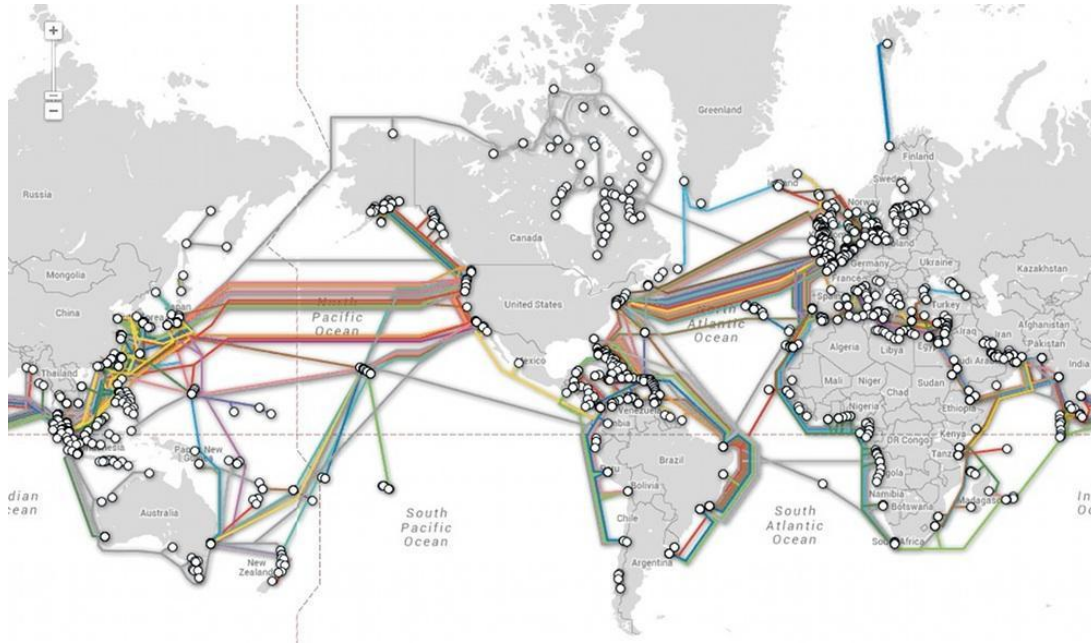


# Network

- 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>

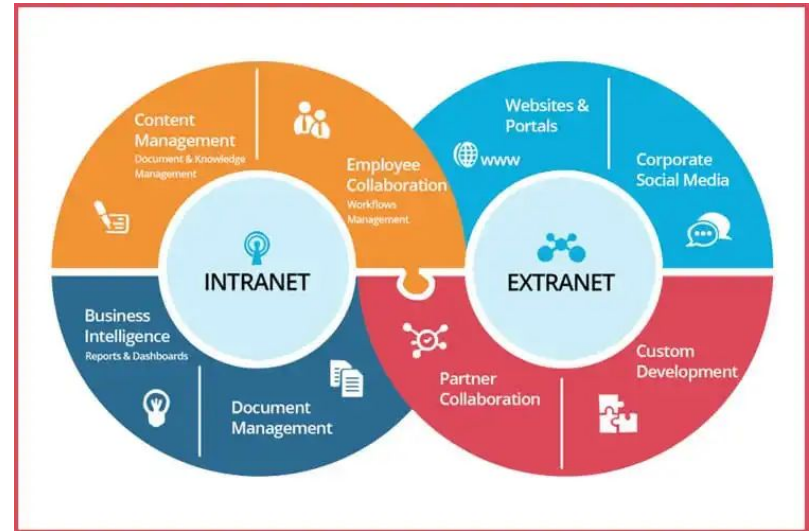
# Intranet & Extranets

- Intranet

- A private network contained within an organization or business used to share information and resources among coworkers.

- Extranet

- A private network that securely shares part of an organization's information or operations with external partners





# 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





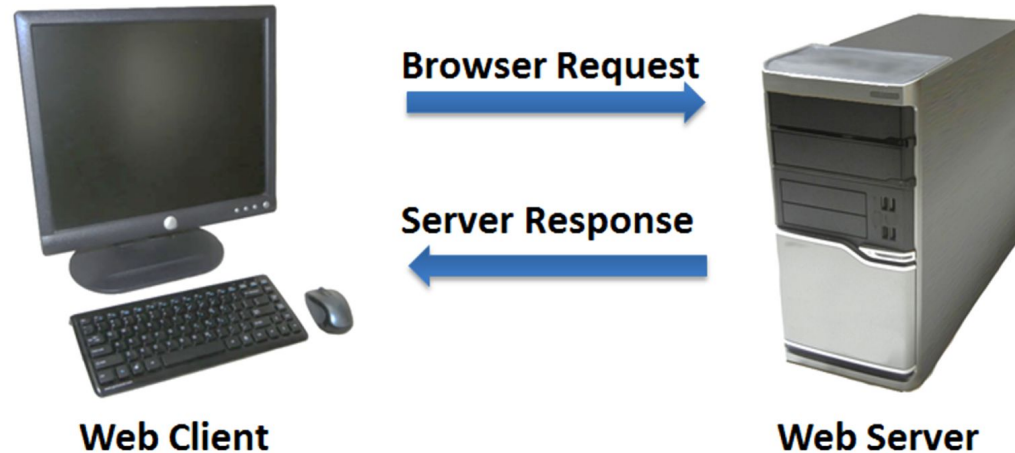
# Client/Server Structure of the Web

- 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.





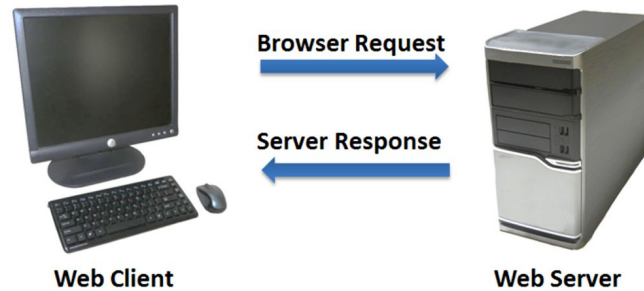
# E-mail Protocols

- 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.



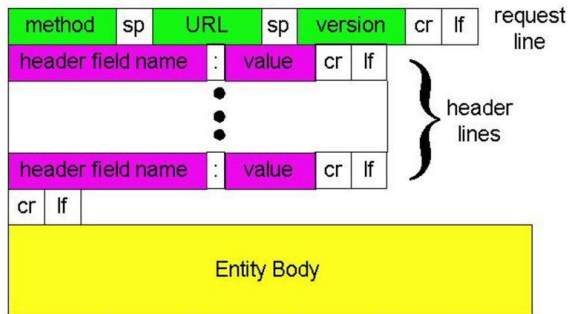
# TCP - Transmission Control Protocol

- 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

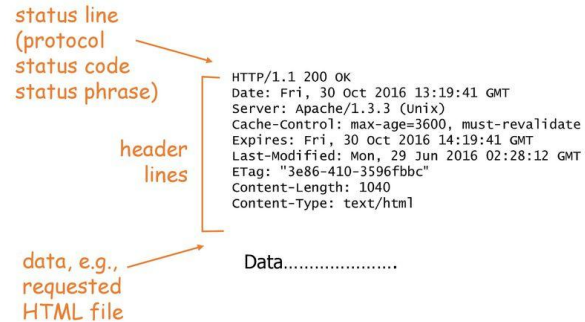


# HTTP Message

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.





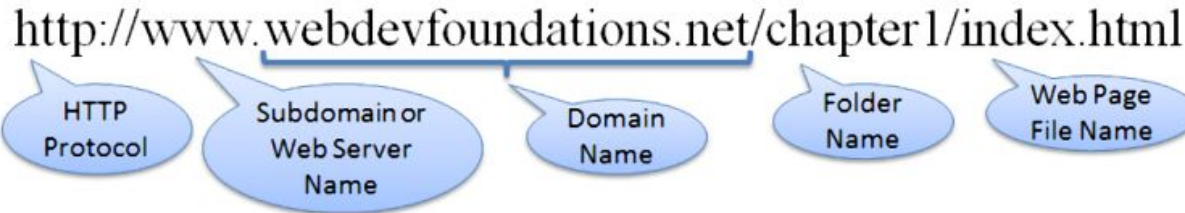
# Domain Name

- 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



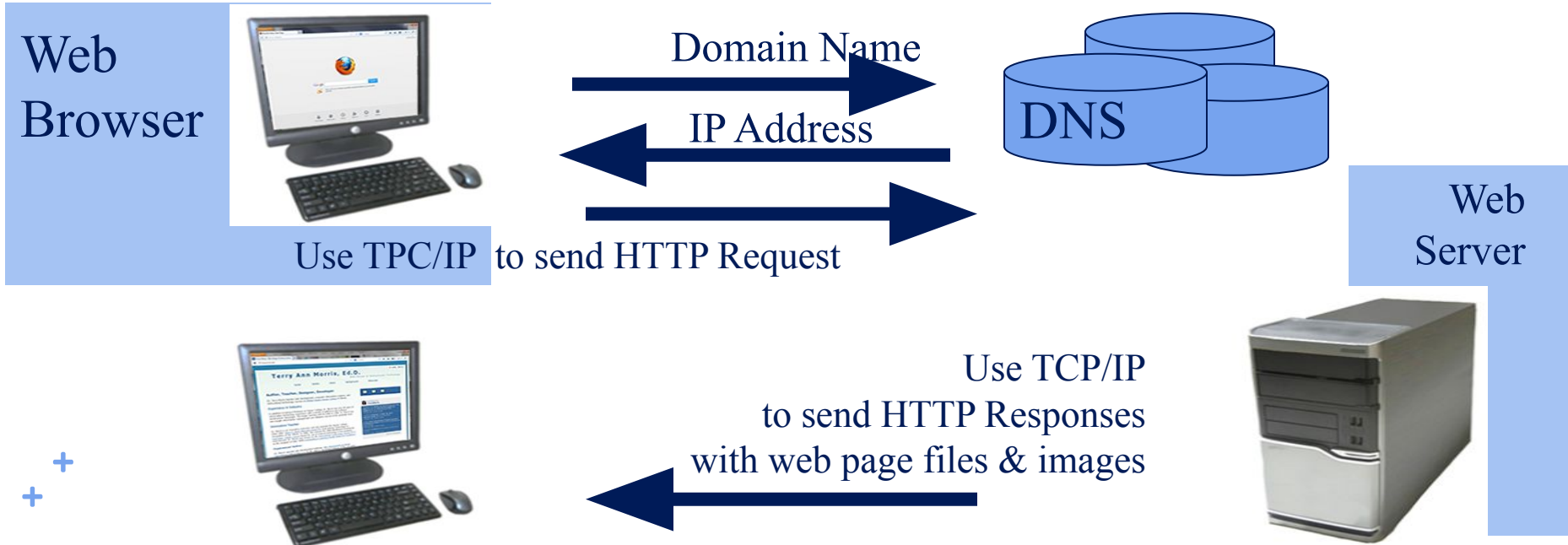


# Country Code TLDs

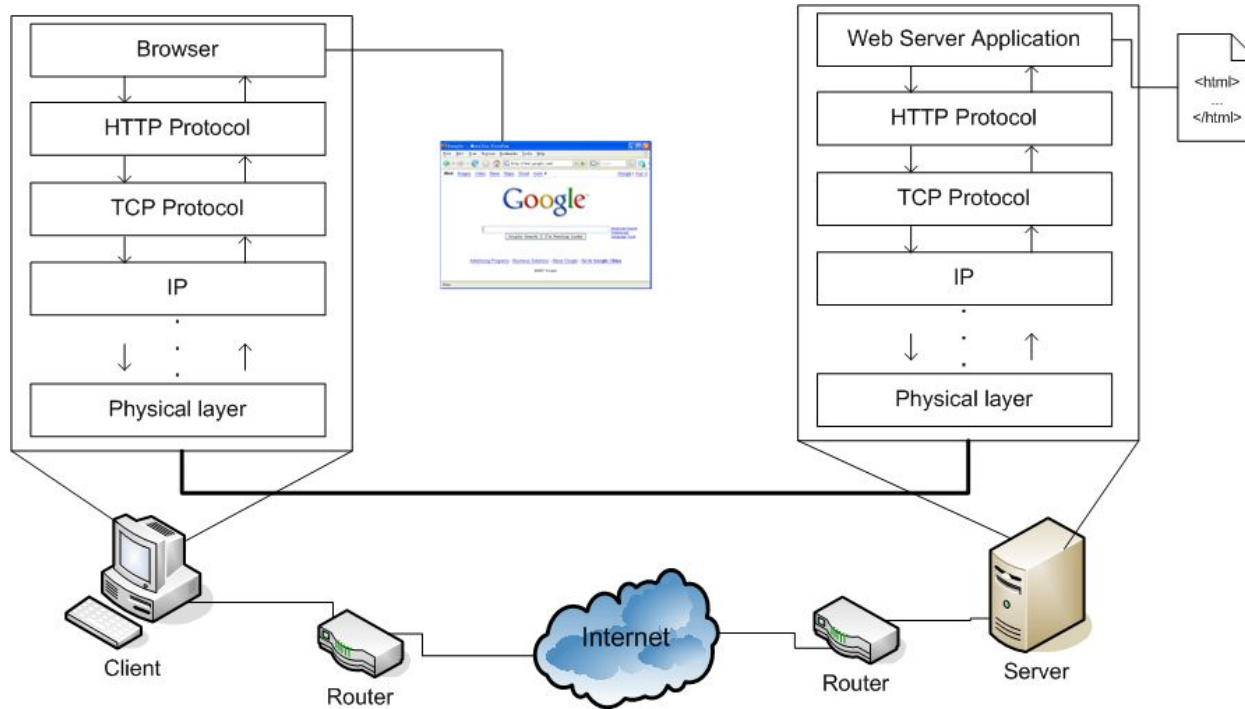
- Two character codes originally intended to indicate the geographical location (country) of the web site.
  - In practice, it is fairly easy to obtain a domain name with a country code TLD that is not local to the registrant.
  - Examples:
    - .tv, .ws, .au, .jp, .uk
    - See <http://www.iana.org/cctld/cctld-whois.htm>
- 

# 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

