German Jordanian University الجامعة الألمانية الأردنية

# CS355 Web Technologies

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Lecture 2

# Introduction to Internet

- A global computer network providing a variety of information and communication facilities.
- Consists of interconnected networks using standardized communication protocols.
- Consists of wide range of networks and carries huge amount of information resources and services.

# Internet Protocols

- The Internet protocol suite (TCP/IP) Transmission Control Protocol / Internet Protocol is used to link devices worldwide.
- A protocol is a description of the rules that computers must follow to communicate with each other.

# Internet Protocol Suite TCP/IP

- TCP/IP protocols are working together.
- TCP breaks down data into IP packets before data send and assembles IP packets when they arrive.
- IP is responsible for sending the packets to the correct IP address.

# World Wide Web

- The World Wide Web (WWW) is an information space where web resources and documents are identified by Uniform Resource Locators (URLs), interlinked by hypertext links, and can be accessed via the Internet.
- Web pages are primarily text documents formatted and marked up with Hypertext Markup Language (HTML).

# World Wide Web

- Web pages may contain multimedia components (images, video, audio, …etc.) that are concentrated in the user's web browser as pages.

# World Wide Web

- Embedded hyperlinks permit users to navigate between web pages.
- Website consists of multiple web pages with a common theme and  a common domain name.
- Websites may be mostly informative for commercial, governmental, or non-governmental organizational purposes.

# World Wide Web

- WWW is an example of client/server computing.

Each time a hyperlink is clicked, the client is requesting a component from a Web server.

- Web server uses Hyper Text Transport Protocol HTTP to navigate hypertext documents.
- Hyper Text Markup Language HTML is used for creating hypertext documents for the WWW.

# IP Addresses

- IP address is required for each computer to connect to internet.
- A Web site is identified by an IP address or a URL
- TCP/IP uses IP address for internet communication.
- An IP address is a set of four numbers separated by a period, each number between 0 and 255. For example, 80.50.20.70

# IP Addresses

- IP address is 32-bit (4 bytes) numbers.
- A byte can hold 256 different values: 00000000, 00000001, 00000010, … 11111111
- TCP/IP uses 32-bit addresses.
- The rapid growth of the Internet has led to a new version of IP address referred to as IPng (IP Next Generation) by lengthening the IP address from 32 bits to 128 bits.

# Domain Names

- Web sites are identified by Domain Names.
- Domain names are easier to remember than IP address.
- Domain name like http://www.gju.edu.jo is translated to a number by a Domain Name Server (DNS)
- When a new domain is registered together with a TCP/ IP address, all DNS servers in the world are updated with the new domain.

# URLs

- String of alphanumeric characters that represents location or address of a resource on Internet and how that resource should be accessed.
- Defines uniquely where documents (resources) can be found.

# URLs

URL consists of three main parts:

- Connection protocol
- Host name
- Path name on the host (where resource stored).

URL can optionally specify:

- port through which connection to the host should be made.

URL usually has the following syntax rules:

Http://host.domain.country_code:port/path/file_name

# Hypertext Transfer Protocol Http

- Responsible for the communication between a web server and a web browser.

- Used for sending requests from a client browser to a web server and receiving web response (content pages) from the server back to the client.

# Hypertext Transfer Protocol Http

Http protocol includes the following messages:

- Connection: Establishes a connection between the client and the server
- Request: sending request from a client browser asking for a resource
- Response: receiving web response content pages (resource pages)
- Close: Terminates the connection

# Web navigating Mechanism

- Web communication begins on the client's side by typing resource URL into the browser.
- The browser translates the resource URL into IP address.
- The browser then sends a request to the web server (server side) using the HTTP protocol
- The web server returns the requested page contents to the client browser.

# Port Number

- Part of the addressing information used to identify the senders and receivers of messages.
- Used to distinguish between the different networking applications that are running concurrently above the TCP/IP protocol stack.
- A Web server will normally be listening for connections on port 80.
- A web browser will use a default port 80 to connect to the remote computers.

# Browsers

- An application that provides a way to access the World Wide Web.
- It interacts with the information on the WWW.
- It retrieves, presents, and traverses web pages, images, video, and other multimedia content.
- Most popular web browsers:
  - Firefox
  - Google Chrome
  - Microsoft Edge
  - Apple Safari
  - Opera
  - Brave
  - …

# The Web Programming Languages

- HTML:
  - a hypertext markup language to describe the general form and layout of documents.
  - An HTML document is a mix of content and controls (tags) that specify how the content should be displayed in the document.
- XML:
  - A meta-markup language (a language for defining markup language).
  - Used to create a new markup language for a particular purpose or field.

# The Web Programming Languages

- JavaScript:
  - A client-side HTML-embedded scripting language
  - Provides a way to access elements of HTML documents and dynamically change them.
- PHP:
  - A server-side scripting language
  - Used for form processing and database access through the WWW.
- Ruby:
  - A pure object-oriented interpreted scripting language.
  - Data is stored in an object, and all operations are done via method calls, Both classes and objects are dynamic.