CME4414 Advances in Web Technologies

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Course Content

- Basics of Web Programming
- HTML, CSS
- XML
- Web services
- Dynamic Web Programming (JavaScript, ...)
- Web Programming with PHP, JSP
- Web Programming with ASP.NET
- Web Access to Databases
- SilverLight, Flash, Action Script
- Web Reporting Tools
- Software Engineering, Web Development Life Cycle, Issues
- Mobile Web Application
- …..

Course

Assessment

- Midterm exam
- Project
- Final Exam

Internet

Definition
The Internet is a huge collection of computers connected in a communications network.

The Internet (contraction of interconnected network) is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link devices worldwide.

Internet

In the 1960s, the U.S. Department of Defense (DoD) became interested in developing a new large-scale computer network. Advanced Research Projects Agency (ARPA), the network was named ARPAnet. The first node of this network was established at UCLA in 1969

A new national network, NSFnet, was created in 1986. It was sponsored, of course, by the National Science Foundation (NSF).

By 1992, NSFnet connected more than one million computers around the world.

Commercial internet service providers in 1995

TCP/IP

Communicate with each other is a single, low-level protocol named Transmission Control Protocol/Internet Protocol (TCP/IP)

- became the standard for computer network connections in 1982.
- can be used directly to allow a program on one computer to communicate with a program on another computer via the Internet.
- IP address of a machine connected to the Internet is a unique 32-bit number
- uses TCP/IP to transmit data via various types of media

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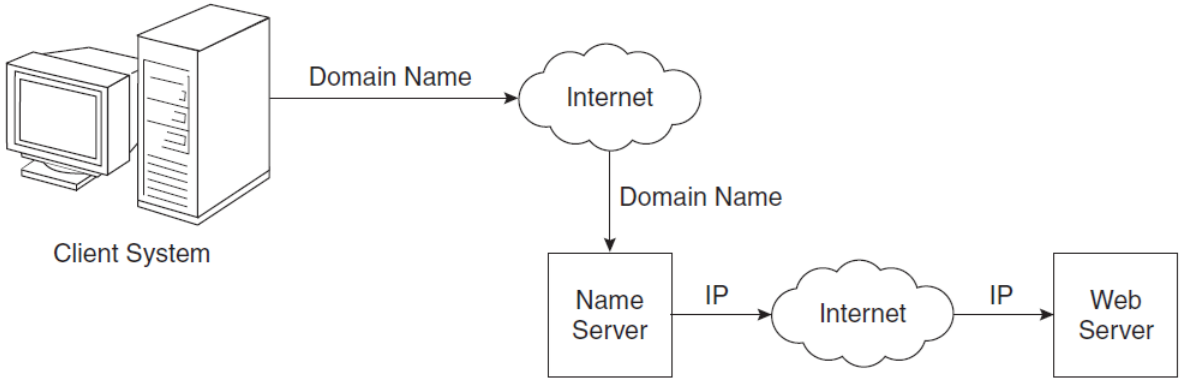
Domain Name

Domain name conversion

Fully qualified domain names requested by a browser are translated into IPs before they are routed to the appropriate Web server.



Internet = Web ?

- Internet actually refers to the global network of servers that makes the information sharing that happens over the Web possible.

- The internet refers to the global communication system, **including hardware and infrastructure**.

- The Web does make up a large portion of the Internet,

- but they are not one and same.

World Wide Web

The Web is the common name for the World Wide Web, a subset of the Internet consisting of the pages that can be accessed by a Web browser.

The Web is just one of the ways that information is shared over the Internet; others include email, instant messaging and File Transfer Protocol (FTP).

WWW

In 1989, a small group of people led **by Tim Berners-Lee** at Conseil Européen pour la Recherche Nucléaire (CERN) or European Organization for Particle Physics proposed a new protocol for the Internet, as well as a system of document access to use it.

The intent of this new system, which the group named the World Wide Web, was to allow scientists around the world to use the Internet to exchange documents describing their work.

The proposed new system was designed to allow a user anywhere on the Internet to search for and retrieve documents from databases on any number of different document-serving computers connected to the Internet

Web

- Web pages are formatted in a language called **Hypertext Markup Language** (HTML).
- **HTML** allows users to click through pages on the Web via links.
- The Web uses **HTTP protocol** to transmit data and share information.
- Browsers such as Internet Explorer, Google Chrome or Mozilla Firefox are used to access Web documents, or Web pages, which are connected via links.

Web Browsers

Browser is a client on the Web

Initiates the communication with a server, which waits for a request from the client before doing anything.

When two computers communicate over some network, in many cases one acts as **a client** and the other as **a server**.

The client *initiates the communication*, which is often a *request for information stored on* ***the server***, which then sends that information back to the client.

The Web, as well as many other systems, operates in this client-server configuration.

Internet Explorer, Firefox, and Chrome, Opera,Safari

Web Servers

Web servers are programs that provide documents to requesting browsers.

- The most commonly used Web servers are Apache, which has been implemented for a variety of computer platforms,
- Microsoft’s Internet Information Server (IIS), which runs under Windows operating systems
- Apache is controlled by a configuration file that is edited by the manager to change Apache’s behavior.
- With IIS, server behavior is modified by changes made through a window-based management program, named the IIS snap-in, which controls both IIS and ftp.

URLs
Uniform Resource Locators

Uniform (or universal) Resource Identifiers (URIs) are used to identify resources (often documents) on the Internet

Specify addresses of resources available on the Web

All URLs have the same general format:

scheme:object-address
http://en.wikipedia.org

The scheme is often a communications protocol.

Common schemes include
http, ftp, gopher, telnet, file, mailto

MIME

A browser needs some way to determine the format of a document it receives from a Web server.

- Without knowing the form of the document, the browser would not be able to render it
- Different document formats require different rendering software

The forms of these documents are specified with **Multipurpose Internet Mail Extensions** (MIMEs).

type/subtype

MIME types are text, image, and video

text/html

HTTP

The Web supports a variety of protocols, the most common one is the HTTP.

Provides the communication interface for connections between browsers and Web servers.

HTTP provides a standard form of communication between browsers and Web servers.

All Web communications transactions use the same protocol:

the Hypertext Transfer Protocol (HTTP)

The current version of HTTP is **1.1**, formally defined as RFC 2616, approved 1999.

RFC 2616 is available at the World Wide Web Consortium (W3C), http://www.w3.org.

HTTP

HTTP consists of two phases:

- the request
- the response

Each HTTP communication (request or response) between a browser and a Web server consists of two parts:

- a header
- a body

The header contains information about the communication

The body contains the data of the communication if there is any.

HTTP Request

The general form of an HTTP request is as follows:

1. HTTP method Domain part of the URL HTTP version
2. Header fields
3. Blank line
4. Message body

The following is an example of the first line of an HTTP request:

GET /storefront.html HTTP/1.1

Table 1.1 HTTP request methods

Method	Description
GET	Returns the contents of a specified document
HEAD	Returns the header information for a specified document
POST	Executes a specified document, using the enclosed data
PUT	Replaces a specified document with the enclosed data
DELETE	Deletes a specified document

HTTP Response

The general form of an HTTP response is as follows:

1. Status line
2. Response header fields
3. Blank line
4. Response body

HTTP Status Code

The status line includes the HTTP version used, a three-digit status code for the response, and a short textual explanation of the status code.

Example: HTTP/1.1 200 OK
The status codes begin with 1, 2, 3, 4, or 5.

404 Not Found

First Digit	Category
1	Informational
2	Success
3	Redirection
4	Client error
5	Server error

Static Site
Dynamic Site

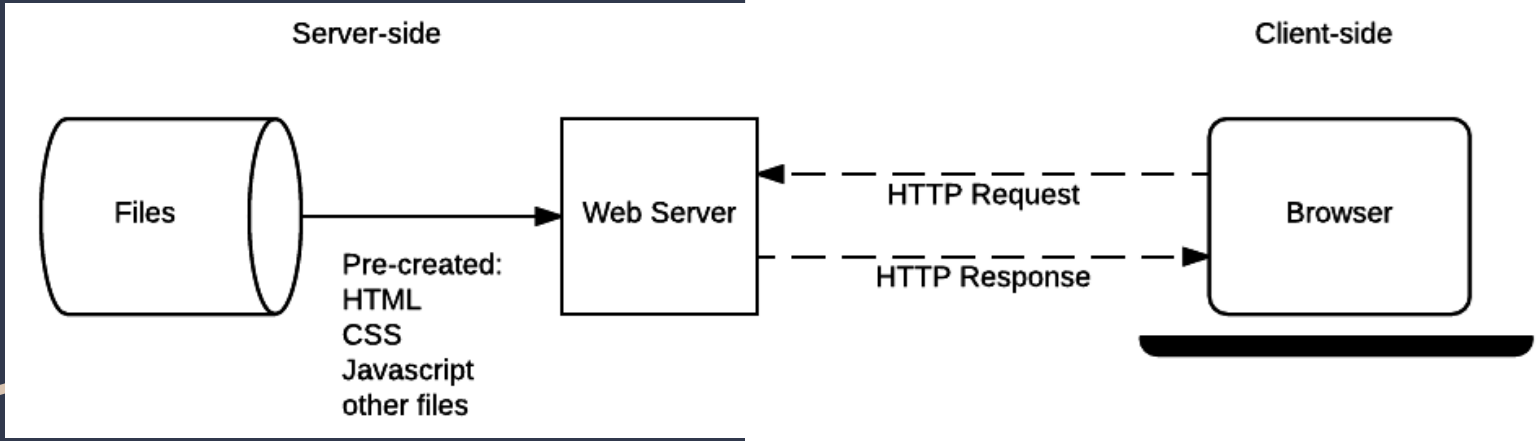
- Basic web server architecture for a static site

  a static site is one that returns the same hard-coded content from the server whenever a particular resource is requested

- A dynamic website is one where some of the response content is generated dynamically only when needed.
- On a dynamic website HTML pages are normally created by i**nserting data from a database** into placeholders in HTML templates

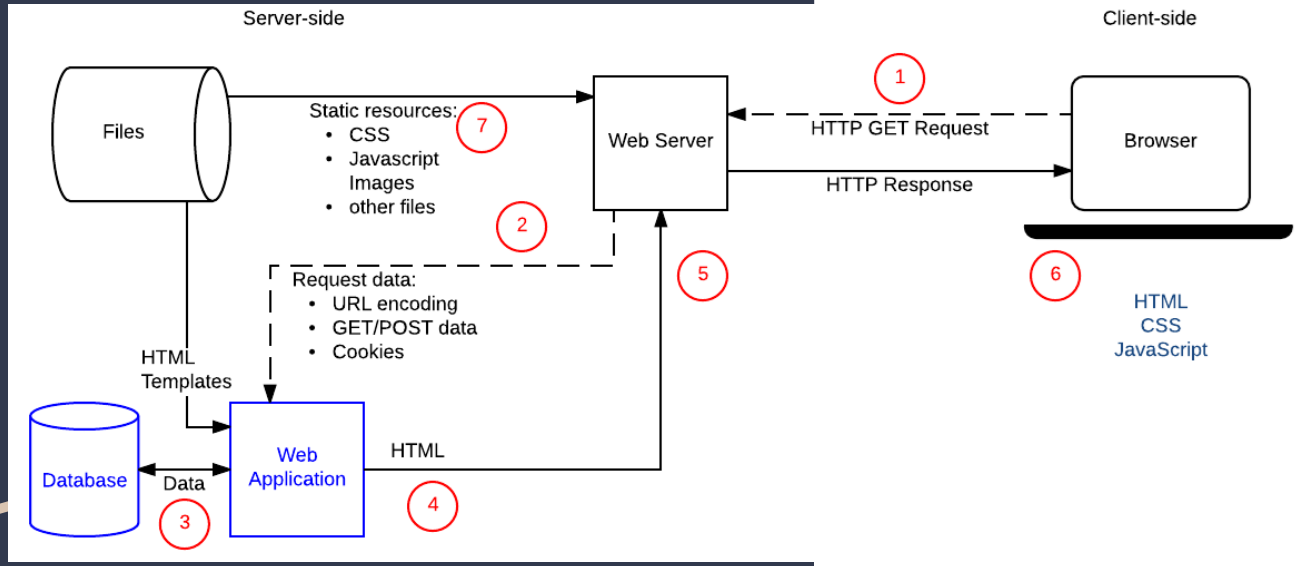
Client Side Programming

Client-side programming primarily concerned with improving the appearance and behavior of a rendered web page



Server Side Programming

Server-side programming topic is a series of modules that show how to create dynamic websites



Security

- On the Web server side, **anyone on the planet** with a *computer*, a *browser*, and an *Internet connection* can request the execution of software on any server computer.
- Access data and databases stored on the server computer.
- On the browser end: Any server to which the browser points can download software to be executed on the browser host machine
- Such software can access parts of the memory and memory devices attached to that machine that are not related to the needs of the original browser request.

Security

Transmitting a credit card number to a company

The security issues for this transaction are as follows:

1. Privacy: It must not be possible for the credit card number to be stolen on its way to the company's server.

2. Integrity: It must not be possible for the credit card number to be modified on its way to the company's server.

3. Authentication: It must be possible for both the purchaser and the seller to be certain of each other's identity.

4. Nonrepudiation: It must be possible to prove legally that the message was actually sent and received.

Security

The basic tool to support privacy and integrity is **encryption**.

Data to be transmitted is converted into a different form, or encrypted.

Another, completely different security problem for the Web is the **intentional and malicious destruction of data** on computers attached to the Internet.

There is now a continuous stream of new and increasingly devious *Denial-of-Service (DoS) attacks, viruses, and worms* being discovered, which have caused billions of dollars of damage, primarily to businesses that use the Web heavily.

Protection against viruses and worms is provided by antivirus software, which must be updated frequently

Web Programmer's Toolbox

Tools commonly used by Web programmers

HTML, XML, JavaScript, Flash, Servlets, JSP, JSF, ASP.NET, PHP, Ruby, Rails,
and Ajax.

- HTML, the standard markup language for describing the content to be presented by browsers.
- JavaScript is a client-side scripting language
- PHP is the server-side equivalent of JavaScript
- Ajax is an approach to building Web applications in which partial document requests are handled asynchronously

References

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