# Course Goals

- Learn how to develop sophisticated Web content
  - Dynamic, program-generated content
  - Underlying functionality
  - User-friendliness
- Understand concepts and principles underlying Web technology
  - What's going on behind the scenes

# Lectures & Office Hours

- Lectures
  - Tuesday 2-3pm
  - Thursday 2-4pm
- Office hours
  - Tuesday 3-4pm
  - Thursday 4-5pm

# References

- Textbook (Optional)
  - Web Programming Step by Step
    Marty Steep, Jessica Miller and Victoria Kirst
  - Programming the World Wide Web
    Robert Sebesta

- Other references
  - Mainly from http://www.w3.org

- Course web site
  - Lecture Notes
  - Student Guide

# Minimum Preparation

- Pre-requisites (**not enforced**):
  - CSC209 Software Tools and Systems Programming
  - CSC343 Introduction to Databases
- Systems programming, SQL and RDBMS, some degree of maturity in programming
- No prior knowledge of Web technologies is assumed.

# Marking

- A1 (HTML, CSS, JQuery) 15%
- A2 (PHP, CodeIgniter, Databases) 25%
- A3 (AJAX & Security) 20%
- Midterm 15%
- Final Exam 25%

# Assignments

- Groups of 2
- Posted on the course's web page
- Hand-in on Blackboard
- Most work on the CDF facility
  - Your project should work properly in that environment
  - NO EXCUSES!
- Late policy
  - 1/10 of f for every day
  - Maximum of 2 days late
  - If there are problems, **don't wait until deadline**
- Re-marking
  - TA will hold remarking session
  - 7 days limit
- Communications
  - Bulleting board
  - CDF email

# Course Topics

- HTML5
- CSS
- Javascript
- JQuery
- HTTP and CGI
- PHP
- MVC
- CodeIgniter
- Databases
- Security
- Cloud computing

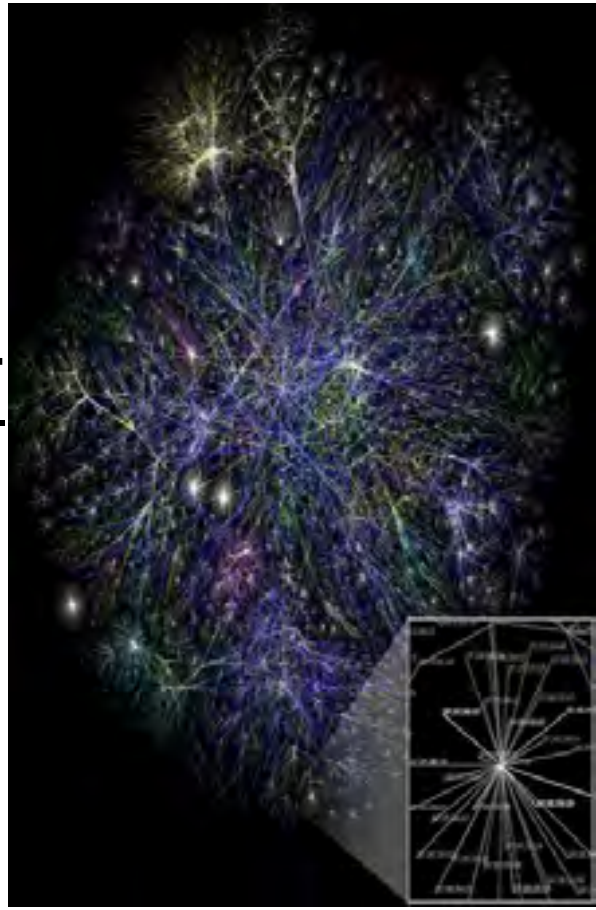
# WWW

# vs.

# Internet

# Internet

- A connection of computer networks using the Internet Protocol (IP)
- Began as a US Department of Defense network called ARPANET (1960s-70s)
- Opened to commercial interests in late 80s



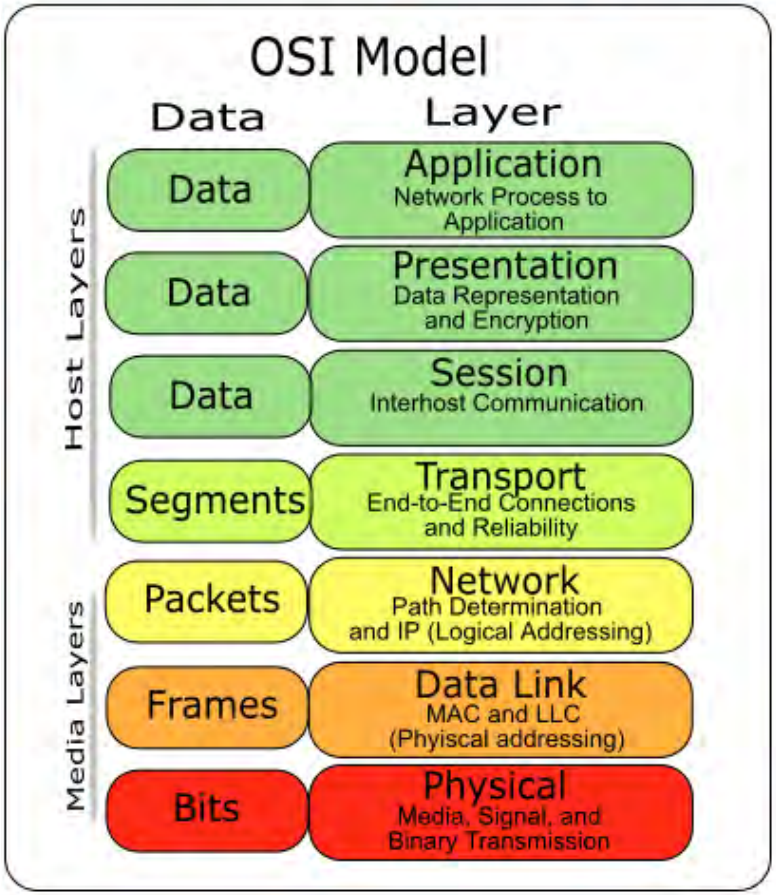
# Key Properties of the Internet

# Standard Bodies and Organizations

- Internet Engineering Task Force (IETF):
  - internet protocol standards
- Internet Corporation for Assigned Names and Numbers (ICANN):
  - decides top-level domain names

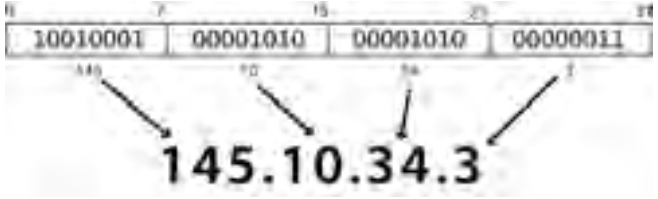

# Architecture

- The internet uses a layered hardware/software architecture (also called the "OSI model"):



# Internet Protocol (IP)

- A simple protocol for attempting to send data between two computers
- Each device has a 32-bit IP address written as four 8-bit numbers (0-255)




- Find out your internet IP address:
  - http://whatismyip.com
- Find out your local IP address: in a terminal, type: ipconfig (Windows) or ifconfig (Mac/Linux)

# Domain Name System (DNS)

- A set of servers that map written names to IP addresses
  - Example: www.cs.toronto.edu→ 128.100.3.30

- Many systems maintain a local cache called a hosts file
  - Windows: C:\Windows\system32\drivers\etc\hosts
  - Mac: /private/etc/hosts
  - Linux: /etc/hosts

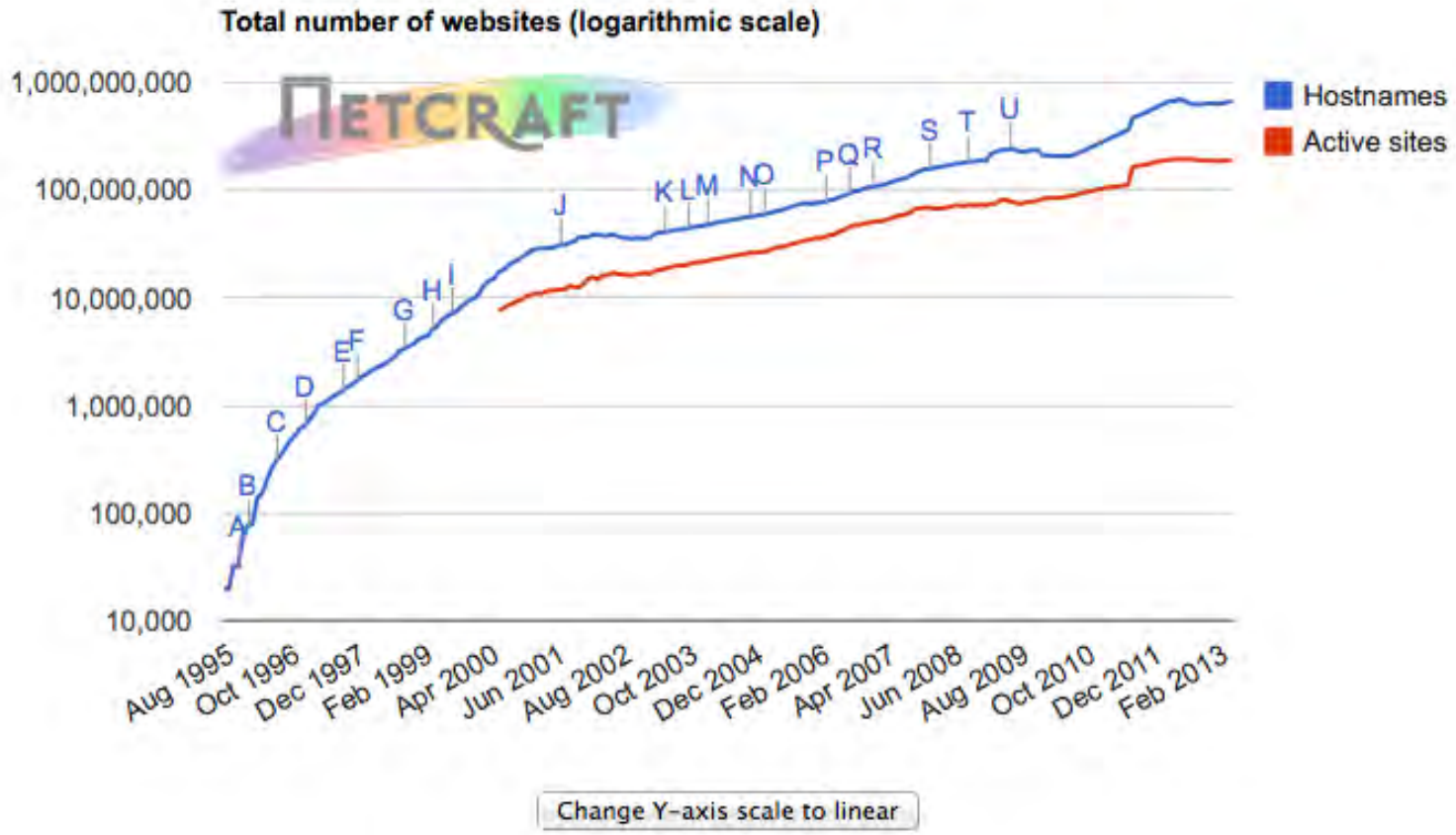
# Transmission Control Protocol (TCP)

- Adds multiplexing, guaranteed message delivery on top of IP
- **Multiplexing**: multiple programs using the same IP address
  - **port**: a number given to each program or service
  - port 80: web browser (port 443 for secure browsing)
  - port 25: email
  - port 22: ssh
- Some programs (games, streaming media programs) use simpler UDP protocol instead of TCP

# World Wide Web (WWW)

- Inventor:
- Where:
- Why:
- What:

# WWW Growth




Over 670million active sites as of May 2013

http://news.netcraft.com

# WWW Uses

- Data/information sharing
- Services

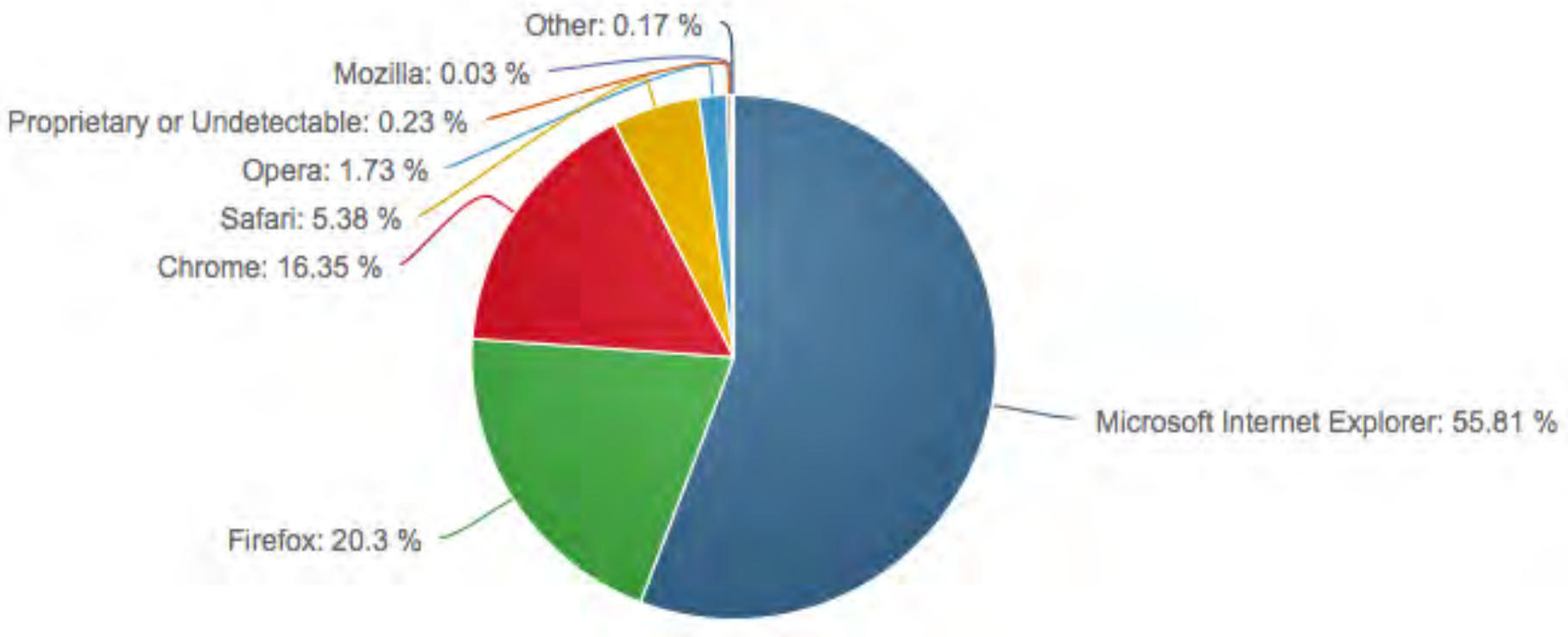
# WWW Building Blocks

- Software
- Standards
- Content Generation

# Web Browser

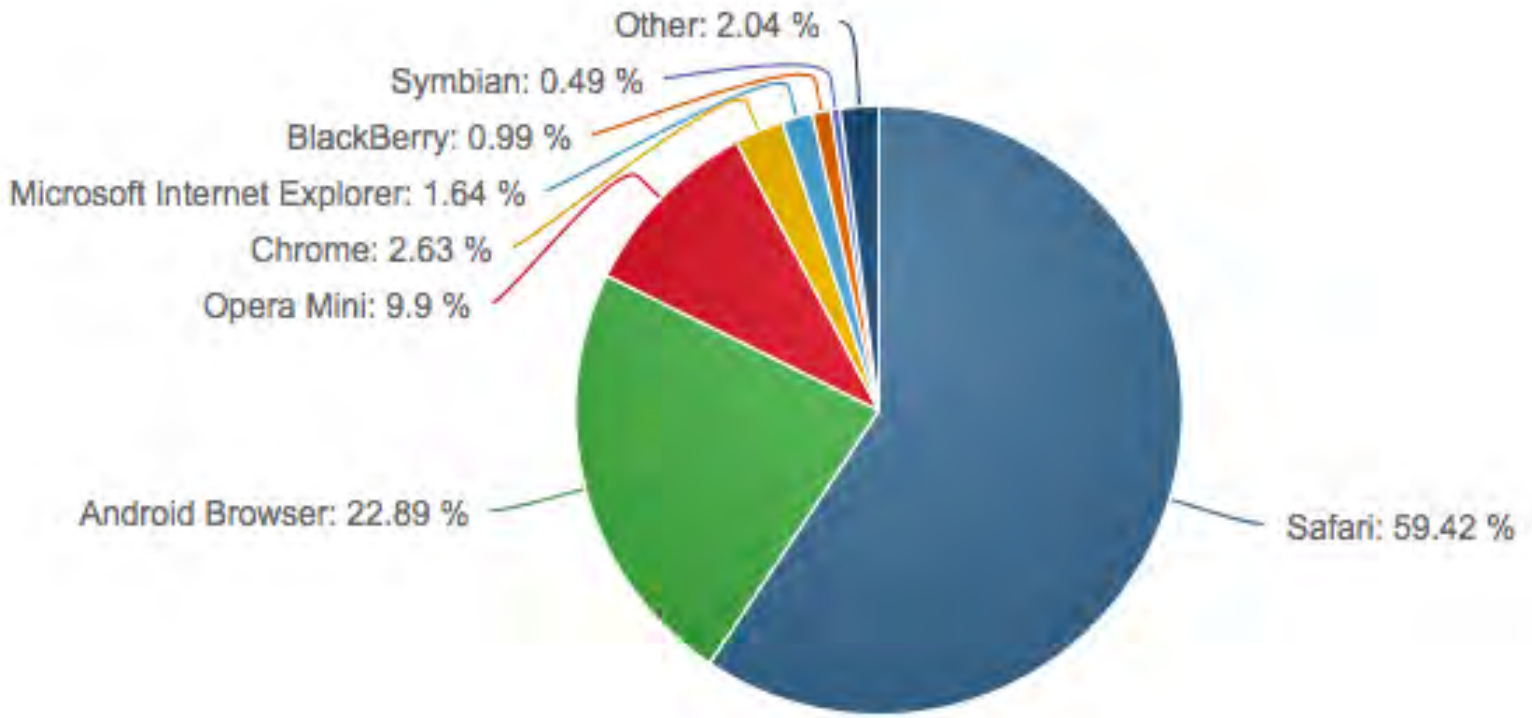
- Fetches/displays documents from web servers
- Mosaic 1993
- Firefox,IE,Chrome,Safari,Opera,Lynx,Mosaic,Konqueror
  - ***There are standards, but wide variation in features***
- Features: http://www.caniuse.com
- Design principle:
  - Make pages act reasonably on lowest common denominator

# Desktop Browser Market Share




- Source: www.netmarketshare.com (Apr 2013)

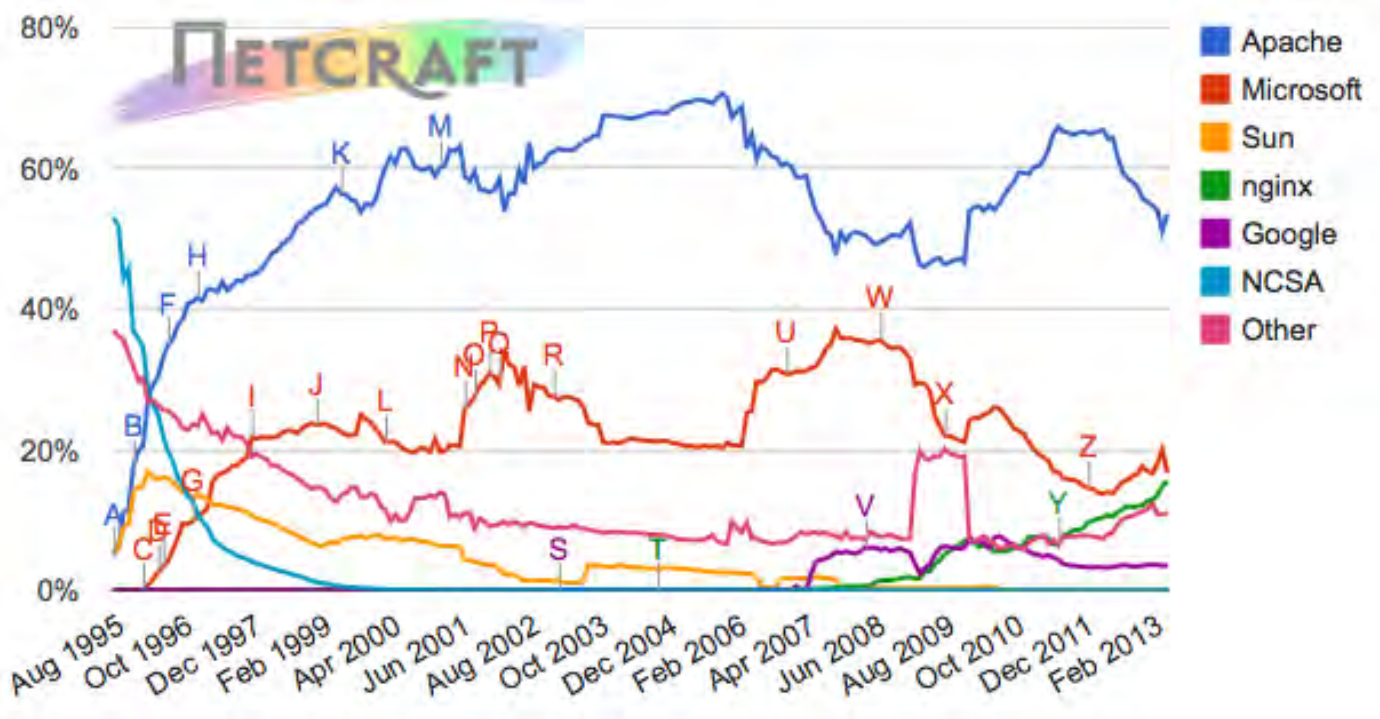
# Mobile Browser Market Share




- Source: www.netmarketshare.com (Apr 2013)

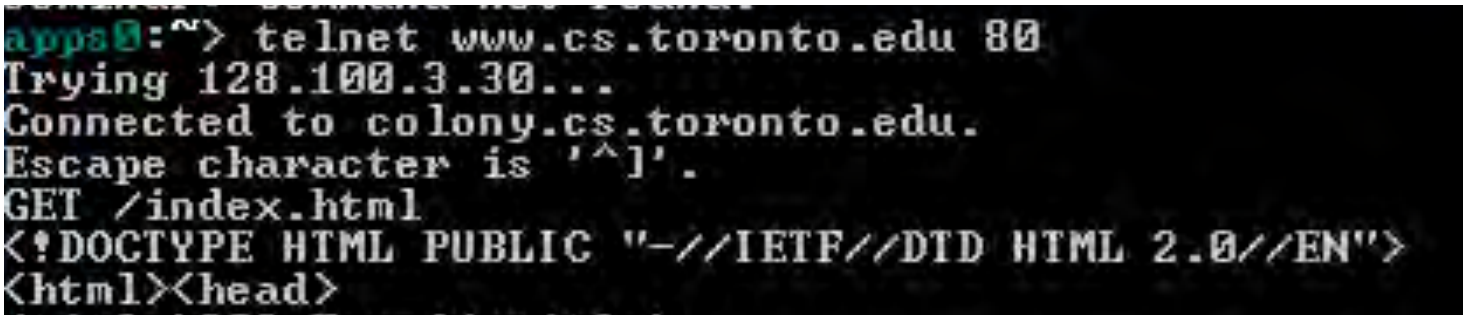
# Web Server

- Software that listens for web page requests
- NCSA 1994 – National Center for Supercomputing App. (UIUC)
- Apache 1995



# Hypertext Transport Protocol (HTTP)

- The set of commands understood by a web server and sent from a browser
- Runs on top of TCP/IP
- Managed by the World Wide Web Consortium (W3C)
- Current version HTTP 1.1, IETF RFC 2616
- Two phase protocol
  - Request followed by response
- Simulating a browser with a terminal window:



# Uniform Resource Locator (URL)

- An identifier for the location of a document on a web site

- Format

  <scheme>:<scheme-specific-address>
  <scheme> = http,file,ftp

  For HTTP

  // domain-name/path-to-document

  www.cs.toronto.edu/~delara/courses/csc309/index.html

# Content Encoding

- Hypertext Markup Language (HTML): used for writing web pages
- Cascading Style Sheets (CSS): stylistic info for web pages
- MIME: Internet media types
  - Developed for email
  - Identifies object data type
    - ***text, formatted text, images, video, sound, etc***
  - Format

    <type>/<subtype>

    text/plain, text/html, image/gif, video/mpeg

# Content Generation

- Client side
  - Interactive and programmable web pages
  - JavaScript
  - Flash/Silverlight

- Server side:
  - Dynamically create pages on a web server
  - PHP
  - Ruby on Rails
  - Servlets/JSP/Struts
  - ASP

# Putting it all Together

| Browser | HTTP Server | |
|---|---|---|
| Type URL on browser<br>http://www.cs.toronto.edu<br>DNS translate name to IP address<br>128.100.1.32<br>Connect to TCP port 80 on server | Accept connection | |
| Send an HTTP GET request | Parse request<br>Get content<br>Static: Read page from disk<br>Dynamic:<br>Program generates content<br>CGI, JavaServlets, ASP, PHP,EJB | |
| Render content<br>Dynamic: Execute client-side code<br>JavaScript, Java, Flash plug in | | |
| *Security is an important issue when executing content on client*<br>*Server is not trusted*<br>*Keep machine safe from intruders* | Send reply<br>*Security also an issue, but the other way: Client is not trusted* | |
| | | |