ITMD-361

Week 1

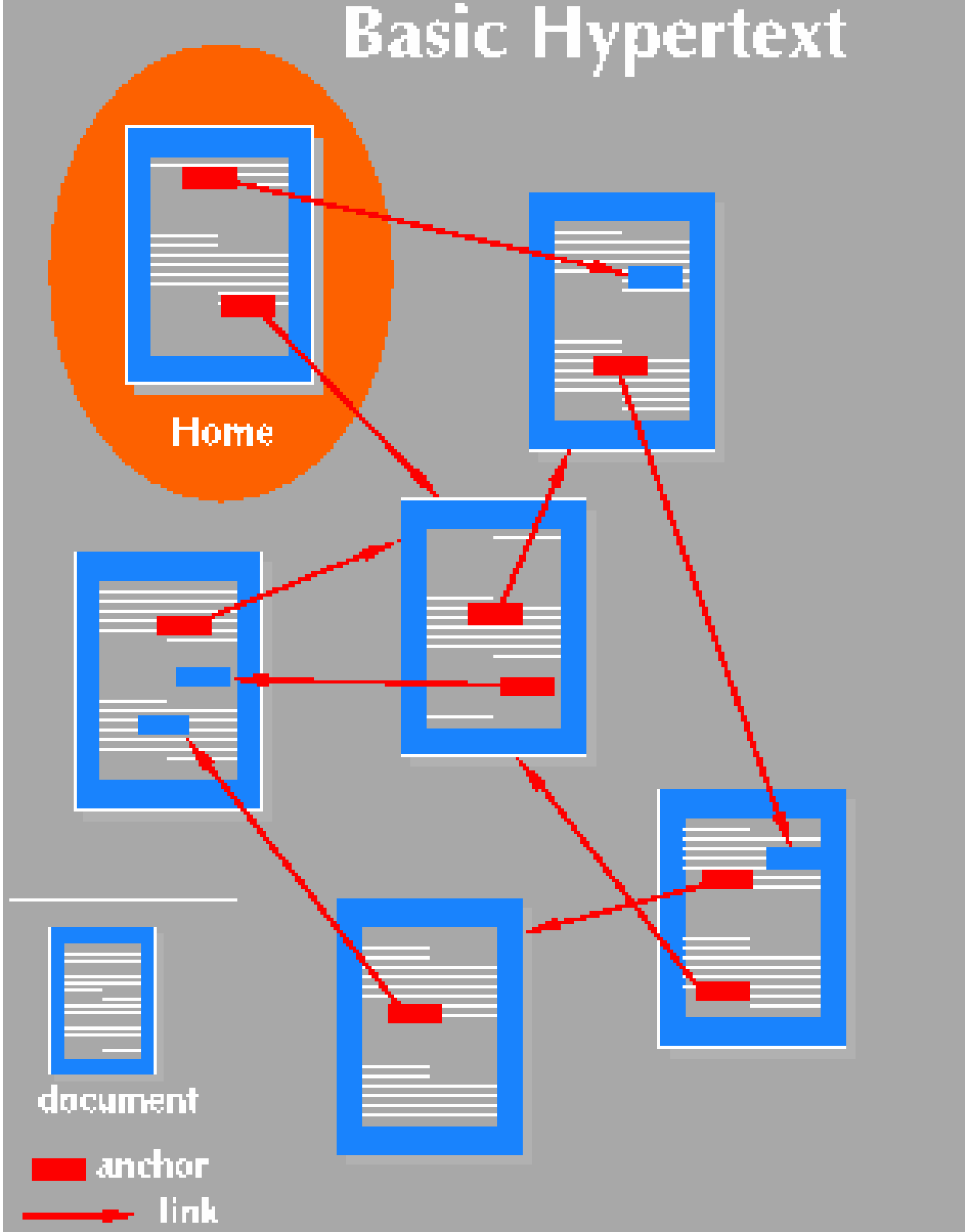
January 10, 2018

ITMD-361

- Welcome to ITMD-361
  - Internet Technologies and Web Design
- Tonight's Agenda
  - Syllabus Review
  - A Bit of History
  - Software Development vs Web Development
  - How the Web Works
  - HTTP Request Response

A Brief History of the Web

- 1963 – Ted Nelson coined term hypertext. Text linked content
- 1969 – ARPANET
  - First Real Packet Switched Network
  - Under Contract from ARPA by BBN of Cambridge, MA and under Bob Kahn
  - Connected mostly a handful of Universities
  - First linked UCLA and Stanford


Basic Hypertext
Home
document
anchor
link

A Brief History of the Web

- 1972 – Email adapted for ARPANET
  - Ray Tomlinson of BBN, choose @ to separate name and host
- 1973-74 – TCP (Transmission Control Protocol)
  - Bob Kahn at DARPA and Vint Cerf at Stanford develop TCP
  - 1978 TCP finalized into TCP/IP
  - “The Network” of the internet

- 1980 - Tim Berners-Lee at CERN creates ENQUIRE
  - personal database of people and software models
  - simple Hypertext program
- 1983 – ARPANET switches over to TCP/IP from NCP
- 1984 – DNS (Domain Name System)
  - made addresses on the Internet more human-friendly
- 1987 – About 30,000 hosts on Internet

A Brief History of the Web

- 1989 – Tim Berners-Lee of CERN develops a new technique for distributing information on the Internet.
  - Information Management: A Proposal
  - Based on Hypertext
  - Called it the World Wide Web
  - http://www.w3.org/History/1989/proposal-msw.html

A Brief History of the Web

- 1990 - World Wide Web protocols finished
  - HTML, HTTP, and URLs

- 1991 - First web page created
  - http://www.w3.org/History/19921103-hypertext/hypertext/WWW/TheProject.html

A Brief History of the Web

- 1993 - Mosaic – first major graphical web browser to make the Internet accessible to non-techies
  - Developed by Marc Andreeson and team at the National Center for Supercomputing Applications (NCSA), University of Illinois
  - Later forms Netscape
- 1994-95
  - CompuServe, America Online, and Prodigy start providing dial-up Internet access.
  - Netscape develops Navigator Browser and SSL

A Brief History of the Web

- 1995 continued
  - Ebay, Amazon, Vatican, Geocities all go online
  - Sun releases Java programming language
  - JavaScript created by Brendan Eich (originally called LiveScript) is released as part of Netscape Navigator
- 1996 – HoTMalL, First webmail
- 1997 – Weblog term coined
  - NASA pathfinder sets traffic record with 46 million hits in a day

A Brief History of the Web

- 1998 – Google goes live
- 1999 – Napster
- 2001 – Wikipedia
- 2004 – Facebook
- 2005 – Youtube
- 2006 – Twitter
- 2007 – iPhone brings era of mobile web
- W3C How it all Started http://www.w3.org/2004/Talks/w3c10-HowItAllStarted/?n=0
- Web History Timeline - http://webdirections.org/history/#0

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- How is web development different from software development? How is it the same?
  - Types of code
  - Runtimes and environments
    - Browser as platform
  - Networking with the internet

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- When you make a piece of Desktop Software you
  - Code in a language like C++, C, Java, Objective C or C# / Visual Basic
  - Compile the code into an executable for one or more platforms
  - The user downloads your application and installs it on a platform (operating system)
  - Manage the software with updates, registry entries and logs.

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- When you make a web application, mobile web application, or website you
  - Write front-end HTML, CSS and Javascript code for the visual presentation and interaction with the user
  - Write backend code to interact with databases and, filesystem on the server. This code may or may not be compiled.
  - Deliver the application to the user via a URL
  - The browser is your platform and compiler
  - The server is where the code is made available to users via the HTTP protocol when using the Internet

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- Software Development
  - 1 language, local database, 1 or more compiled executables, platform restricted
- Web Development
  - HTML, CSS, Javascript, Backend language (like ROR or PHP or ASP.net or Java or Python) and Database. Platform un-restricted, including mobile

How the Web Works

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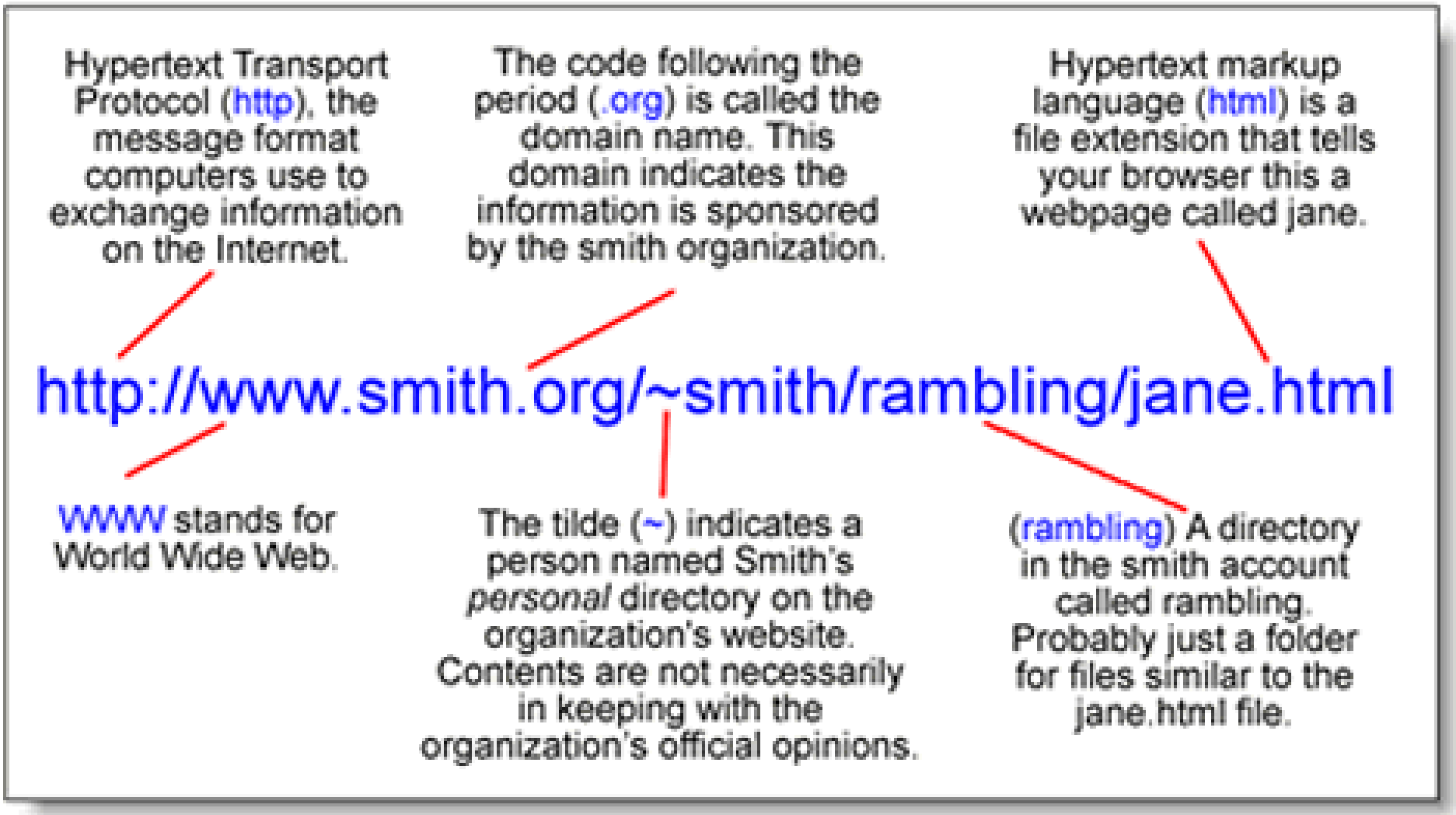
- Websites are requested and delivered to user's browsers via the HTTP Protocol.
- HTTP stands for Hyper Text Transfer Protocol
- OSI Model of networking
  - What other protocols are involved with this transaction?
    - TCP / IP
    - UDP
    - DNS
    - ARP


Hypertext Transport Protocol (http), the message format computers use to exchange information on the Internet.
The code following the period (.org) is called the domain name. This domain indicates the information is sponsored by the smith organization.
Hypertext markup language (html) is a file extension that tells your browser this a webpage called jane.
http://www.smith.org/~smith/rambling/jane.html
www stands for World Wide Web.
The tilde (~) indicates a person named Smith's personal directory on the organization's website. Contents are not necessarily in keeping with the organization's official opinions.
(rambling) A directory in the smith account called rambling. Probably just a folder for files similar to the jane.html file.

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- URI vs URL
  - A URL is a URI but a URI is not a URL, technically
- URI - uniform resource identifier
  - A URI identifies a resource either by location or name.
  - Don't necessarily know what the resource type is
  - http://www.iit.edu/logo

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- URL - uniform resource locator
  - Technically type of URI
  - A URL defines the network location of a specific representation for a given resource.
  - Know what the resource type is
  - http://www.iit.edu/logo.png
- In practice they are used interchangeably but more often than not URI would be the generally correct term

HTTP Requests

HTTP Request

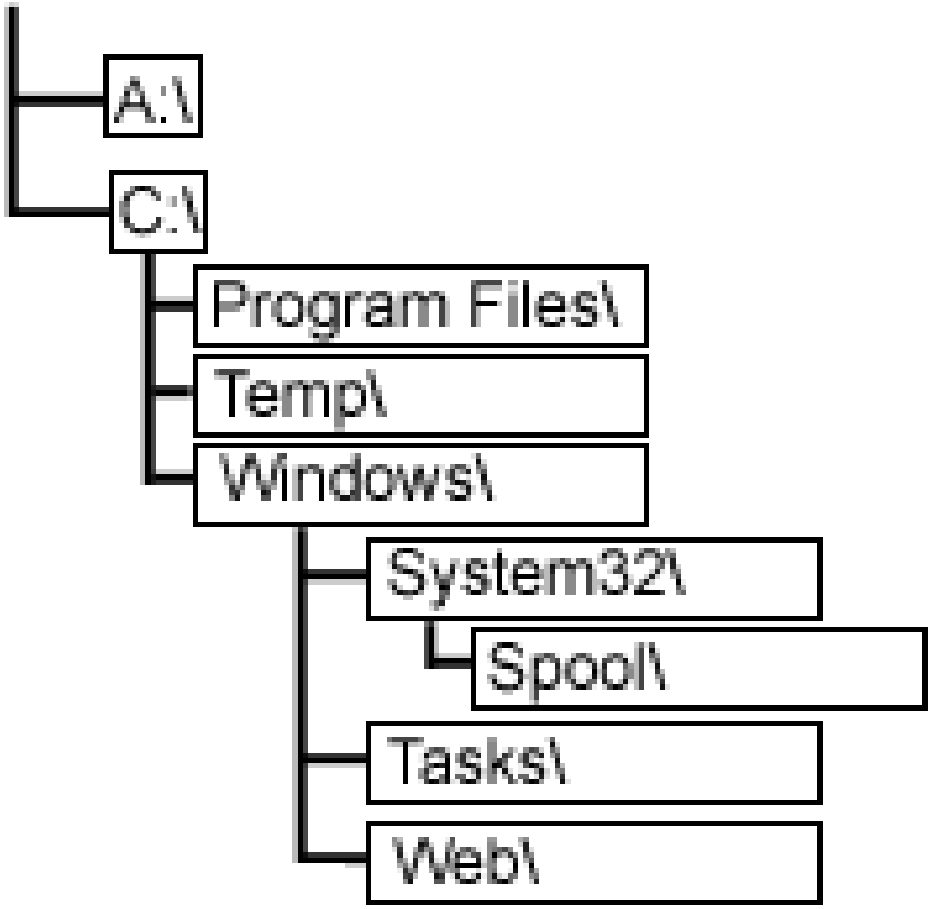
- Client Parses the URI
  - protocol://server/request
- Client sends request to Server
  - Usually HTTP protocol
  - [METH] [REQUEST-URI] HTTP/[VER]
  - [fieldname1]: [field-value]
  - ...
  - [request body, if any (used for POST and PUT)]
- Example - GET / HTTP/1.1

HTTP Request

GET /index.html HTTP/1.1	Request Line	HTTP Request
Date: Thu, 20 May 2004 21:12:55 GMT Connection: close	General Headers	
Host: www.myfavoriteamazingsite.com From: joebloe@somewebsitesomewhere.com Accept: text/html, text/plain User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1)	Request Headers	
	Entity Headers	
	Message Body	

http://www.tcpipguide.com/free/t_HTTPRequestMessageFormat.htm

Hierarchical file system



http://www.computerhope.com

HTTP Request

- HTTP Methods
  - GET, POST, PUT, DELETE, HEAD, TRACE, CONNECT
  - First 4 are the common ones. Mostly GET.
  - http://www.w3.org/Protocols/rfc2616/rfc2616-sec9.html
- GET
  - Most common, Basically get me this document
  - Any variable or form data is sent as part of the URL
  - http://www.domain.com/?q=232&name=joe
  - Data q=232 and name=joe is available to target page

HTTP Request

- POST
  - Second most common method
  - Used often to send form data
  - Any variable or form data is sent in the request body and not appended to the URL
- PUT & DELETE
  - Used mostly with web programming frameworks
  - Used in Ruby on Rails
- HEAD: Returns only the Response headers

HTTP Response

- Server sends response to client
  - Usually HTTP Protocol
  - HTTP/[ver] code text
  - [fieldname1]: [field-value]
  - ...
  - [response body]
- First line is status of request
- Then multiple header fields can follow
- Lastly the response body follows

HTTP Response

HTTP/1.1 200 OK	**Status Line**	**HTTP Response**
Date: Thu, 20 May 2004 21:12:58 GMT Connection: close	**General Headers**	
Server: Apache/1.3.27 Accept-Ranges: bytes	**Response Headers**	
Content-Type: text/html Content-Length: 170 Last-Modified: Tue, 18 May 2004 10:14:49 GMT	**Entity Headers**	
<html> <head> <title>Welcome to the Amazing Site!</title> </head> <body> This site is under construction. Please come back later. Sorry! </body> </html>	**Message Body**	

http://www.tcpipguide.com/free/t_HTTPResponseMessageFormat.htm

HTTP Response

- Status Codes
  - 3 digit numbers grouped into 5 groups by first digit
- 1xx – Informational
  - No 1xx status codes are defined, expermental
- 2xx – Successful
  - 200 OK – Server did request and all is well
  - Rest of the 200's are mostly used for scripting, not commonly seen

- Status Codes continued
- 3xx – Redirection
  - 301 Moved permanently
    - The resource is somewhere else and links and references should be updated
  - 302 Moved temporarily
    - Means same as 301 but links and references should not be updated since it may move again in the future
  - 304 Not modified
    - Returned if the if-modified-since header used
    - Basically means cached version should be displayed

HTTP Response

- Status Codes continued
- 4xx Client error
  - 400 Bad request – Incorrect request syntax
  - 401 Unauthorized
    - Client not allowed access to resource
    - May change if client retries with authorization header
  - 403 Forbidden
    - Client not allowed access to resource
    - Authorization header will not help
  - 404 Not found – Dead link

HTTP Response

- Status Codes continued
- 5xx Server error
  - 500 Internal server error
    - Something went wrong inside the server
  - 501 Not implements
    - The request is not supported by the server
  - 503 Service unavailable
    - Usually happens when a server is overloaded
- http://www.w3.org/Protocols/rfc2616/rfc2616-sec6.html

HTTP Response

- Response headers can include
  - Location
  - Server
  - Content-length
  - Content-type
  - Content-encoding
  - Expires
  - Last-modified
  - And others

HTTP 1.1

- HTTP/1.0
  - http://www.w3.org/Protocols/HTTP/1.0/spec.html
- HTTP/1.1 - 1999
  - http://www.w3.org/Protocols/rfc2616/rfc2616.html
- 1.0 vs 1.1
  - 1.0 only had GET, POST, HEAD Methods
  - 1.1 requires host header
  - 1.1 adds some cacheing and persistence and more
  - http://www2.research.att.com/~bala/papers/h0vh1.html

HTTP 2.0

- HTTP/2.0 is the next planned version
- Based on SPDY
  - http://en.wikipedia.org/wiki/SPDY
  - Effort by Google to speed up http protocol with things like compressing and multiplexing
  - Supported in some modern browsers now
- Still in development

Popular Software

Software

AT A GLANCE

Popular Web Design Software Links

Web page authoring

Adobe Dreamweaver *www.adobe.com*

Microsoft Expression Web *www.microsoft.com/products/expression*

Nvu (open source web page editor) *www.nvu.com*

HTML editing

TextMate by MacroMates for Mac OS *www.macromates.com*

Sublime Text *www.sublimetext.com*

TextPad for Windows *www.textpad.com*

Coda by Panic Software *www.panic.com/coda/*

BBEdit by Bare Bones Software *www.barebones.com*

Image editing and drawing

Adobe Photoshop *www.adobe.com*

Adobe Photoshop Elements *www.adobe.com*

Adobe Illustrator *www.adobe.com*

Adobe Fireworks *www.adobe.com*

Corel Paint Shop Pro Photo *www.corel.com/paintshoppro*

GIMP *gimp.org*

Browsers

Microsoft Internet Explorer (Windows only) *www.microsoft.com/windows/internet-explorer/*

Firefox *www.firefox.com*

Google Chrome *www.google.com/chrome*

Opera *www.opera.com*

Safari *www.apple.com/safari*

Networking

WS_FTP, CuteFTP, AceFTP, and others for Windows available at: *www.download.com*

Transmit (for Macintosh OSX) *www.panic.com/transmit*

Cyberduck (for Macintosh OSX) *cyberduck.ch*

Fetch (for Macintosh OSX) *fetchsoftworks.com*

Cygwin (Linux emulator for Windows) *www.cygwin.com*

PuTTY (telnet/SSH terminal emulator) *www.chiark.greenend.org.uk/~sgtatham/putty/*

Software

Text Editor

- Notepad++ (windows)
- Textpad (windows)
- TextWrangler (mac)
- Sublime Text 2 (multi-platform)

Software

SFTP

- WinSCP (windows)
- Filezilla (multi-platform)
- Cyberduck (mac)
- Transmit (mac)

SSH (optional for some)

- Terminal (mac & linux)
- PuTTY (windows)