CGT 141/CPT 141 Lecture 9 Wk 5
Server Environments and Dealing with Bandwidth

Servers

- Sources of further information:
  - Server basics: http://msdn.microsoft.com
- Two Most Common HTTP servers
  - Apache (free)
  - Internet Information Server ($)
- Primary issues are:
  - Security
    - Windows: Has major security loop-holds (being found weekly); must be adamant about installing security patches and fixes.
    - Unix: Very secure environment.
  - Ease of use:
    - Windows: Windows-based IIS is easier to use and configure.
    - Unix: relatively difficult to configure and maintain for the general user.
  - Stability:
    - Windows: Moderately stable environment.
    - Unix: Very stable environment.
- Choice of server (or, what server you have available), will probably determine the technologies you can readily use (without adding plugins or other server components):
  - Client-side scripting
    - Windows: VBScript or JavaScript
    - Unix: JavaScript
  - Server-side Scripting
    - Windows: Active Server Pages (ASP) or JavaScript Server Pages (JSP)
    - Unix: JavaScript Server Pages (JSP), PERL, and others.
  - Databases (likely you will have access to)
    - Windows: Microsoft SQL
    - Unix: Oracle, mySQL or other.
- Server-type will more than likely determine your access-type:
  - Windows: Direct Drive Access or FTP
  - Unix: FTP
- How you set permissions….
  - Windows: GUI-based
  - Unix: CMI-based
- All these prior considerations are “likely” scenarios, not “always” scenarios.
- When you choose a server technology (or have one dictated to you), consider that these things are what are affected.
- Decisions you make in designing web content should include server type as a consideration before you choose a technology out of the ether.

Dealing with Multipurpose Internet Mail Extensions (MIME)

- Recall that when the browser requests a file from a server, the response header from the server tells the browser what type of files are being sent.
- The server knows the file type of files in its directory structure (and what data is in the files) based upon the extensions of the files it has (files in its directory structure) and the list of files that it can distribute (MIME).
- To be able to deliver a file, the server must be told that it can deliver a file by entering information about that type of file in the server's MIME types list.
- The MIME types list contains:
  - The file's extension
  - The file's type and subtype (in other words, "when a file has an extension, the file contains this type of data")
    - Note that because you can change an extension in Windows (by renaming the file), extensions do not always guarantee file integrity. Thus, be cautious of changing a file's extension.
  - A description of the type of application that created (or can open) the file
  - Whether the file is binary (encoded) or ASCII (text)
  - Examples:

Extension	Type/Subtype	Description	B/A
.htm	text/html	HTML Document	A
.swf	application/x- shockwave-flash	Shockwave File	B

- Setting up MIME types on a server vary depending on the server, but include the basic information described.
- MIME types are also established for the browser and operating system. This is how the browser knows, once it receives the header data from the server, what to do with the file. When the browser receives a file, its MIME types can be set up so that it:
  - Opens the file directly into the browser (assuming the element is something that can be read directly by the browser.
  - Open the file inline using a plugin or ActiveX component
  - Open the file using a helper application.
  - Save the file to some location on the machine for later opening.

Dealing with Bandwidth

- When dealing with server issues and web design, two other things must be considered:
  - Server loading and distribution of workload
  - Bandwidth and delivery to the end-user.
- Bandwidth versus data rate
  - Bandwidth – the amount of data that can be pushed through a network connection
    - Measured in bits per second
    - "The last mile" is the weakest link.
  - Data rate – the amount of data that can be pushed through a device
    - Measured in Kilobytes per second
    - Need this to truly know download times

- Issues
  - To convert bandwidth to data rate, divide by 8 (conversion of bits to bytes)
  - To convert data rate to bandwidth, multiply by 8
  - Anytime you are dealing with conversion of file sizes remember:
    - 1 megabit (mb) equals 1024 kilobits (kb)
    - 1 kilobit (kb) equals 1024 bits (b)
    - 8 bits (b) equals 1 byte (B)
    - 1024 Bytes (B) equals 1 kilobyte (KB)
    - 1024 KiloBytes (KB) equals 1 MegaByte (MB)
    - 1024 MegaBytes (MB) equals 1 GigaByte (GB)

Bandwidth table:

Connection	**Data Rate**	**Bandwidth**	**Time per 100 KB**
14.4 modem	1.8 KB	14.4 kb	55 sec
28.8 modem	3.6 KB	28.8 kb	27 sec
33.6 modem	4.2 KB	33.6 kb	23 sec
56K modem	7 KB	56 kb	14 sec
ISDN	7–16 KB	56–128 kb	14–6 sec
Frame relay	7–64 KB	56–512 kb	14–1.5 sec
T1	32–193 KB	256–1,544 kb	3.1–.5 sec
1X CD	150 KB	1.2 mb	.66 sec
DSL	188 KB	1.5 mb	.53 sec
Cable modems	188 KB	1.5 mb	.53 sec
2X CD	200 KB	1.6 mb	.5 sec
4X CD	450 KB	3.6 mb	.22 sec
10X CD	1.2 MB	9.6 mb	.08 sec
Fast ethernet	1.25 MB	10 mb	.08 sec
16X CD	2.4 MB	19.2 mb	.04 sec
24X CD	3.6 MB	28.8 mb	.02 sec
T3	5.5 MB	44 mb	.01 sec
USB	12 MB	96 mb	.0083 sec
Firewire	100–400 MB	800 mb–3.2 gb	.001–.00025 sec

Following example do not take into account:

- Server load
- Inherent time lost due to hardware (such as routers, switches, etc.)
- But these are "best approximations" without testing (use as a rule of thumb)

- Given a web page that requires 234 KB of data, how long will it take to load using a 28.8 modem, given optimum conditions?

  28.8 kbps 234 KB file(s)

  28.8 kbps / 8 bits = 3.6 KBps *convert kilobits/sec to KiloBytes/sec*

  234 KB / 3.6 KBps = 65 seconds

- Given an 2.35 MB file that needs to be downloaded, how long will it take using a DSL line at 1.5 mbps?

  1.5 mbps * 1024 = 1536 kbps *convert megabits/sec to kilobits/sec*

  1536 kbps / 8 = 192 KBps *convert kilobits/sec to KiloBytes/sec*

  2.35 MB * 1024 = 2406.4 KB *convert MegaBytes to KiloBytes*

  2406.4 KB / 192 KBps = 12.53 seconds

- Your boss, knowing you are a highly skilled (and highly paid) web developer asks you, "We are considering upgrading our corporate web connection in each office from ISDN to DSL. How much faster will the new connection be?" You know that ISDN has a bandwidth of 128 kbps and DSL has a bandwidth of 1.5 mbps. How much faster will the new connection be in terms of downloading a 1 MB file?

	Bandwidth	Data Rate
ISDN	128 kbps	16 KB per second
DSL	1.5 mbps	187.5 KB per second

  1 MB = 1024 KB

  ISDN 1024 KB / 16 KBps = 64 seconds
  DSL 1024 KB / 192 KBps = 5.33 seconds

  64 / 5.33 = 12.01 * 100 = 1201%

If the download time were cut in half that would be a 200% increase:

- 64 / 32 = 2 * 100 = 200%

If the download time were cut by ? that would be a 400% increase:

- 64 / 16 = 4 * 100 = 400%

And so forth:

- 64 / 8 = 8 * 100 = 800%
- 64 / 4 = 16 * 100 = 1600%