Introduction to Web Development

Week 1 - Intro, The Internet!, & Dev Environment

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ACM Lecture Series

University of Cincinnati, OH

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About the Series

Goals

- High-level understanding of web technologies
- What makes up a website.
- How you can build & maintain one.
- Whatever interests you!

Schedule

Week 1 Intro, How the Internet Works, Dev Environment

Week 2 HTML, CSS, PHP

Week 3 Graphics!

Week 4 Page Layout

Week 5 SEO, JavaScript, AJAX, ...

Week 6 CMS - Wordpress, Joomla!, Drupal, etc...

About the Series

Old Class Website

`http://fuzzpault.com/instruction/tfta.php`

Me

- BS in Math & CS from St.Lawrence University. '03
- MS in CS from Syracuse University. '06
- Ph.D from Syracuse University 2012
  Exploiting Data Locality in Dynamic Web Applications
- University of Cincinnati - Assistant Professor Educator
- "Modeling user interactions for (fun and) profit: preventing request forgery attacks on web applications" - 2009 - Jayaraman, Talaga, Lewandowski, Chapin, Hafiz
- "Enforcing request integrity in web applications" - 2010 - Jayaraman, Lewandowski, Talaga, Chapin
- Design, Maintain, & Host 9 sites (starting 1996).

Sizes

Bit	0/1 (b)
Byte	8 bits (B) ($2^8 = 256$) $\approx$ 1 character
Kilobyte	kB - 1000 bytes ($2^{10} = 1024$bytes memory, KiB)
Megabyte	MB - 10^6 bytes ($2^{20} = 1024$kB memory, MiB)
Gigabyte	GB - 10^9 bytes ($2^{30} = 1024$MB memory, GiB)
Terabyte	TB - 10^{12} bytes ($2^{40} = 1024$GB memory, TiB)
Petabyte	PB - You get the idea.

Speeds: Latency - Bandwidth

- Latency (ms) (10^{-3} seconds)
- kb/s, kbit/s, kbps - kilobit per second (b not B!)
- Mb/s, Mbit/s, Mbps - Megabit per second
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The Internet!

What is the Internet?

"It's a series of tubes." - Ted Stevens, 2006 - NO!

Jargon

Web	Interconnected networks of computers
IP	Internet Protocol v4 & v6
TCP	Transmission Control Protocol
DNS	Domain Name System
HTTP(S)	Hypertext Transfer Protocol
HTML	Hypertext Markup Language
URL	Uniform Resource Locator

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IPv4 vs IPv6

xkcd

Tools

- `ping`
- `ping6`
- `traceroute`
- `whois`
- `tcpdump`
- `Wireshark`

IPv4 32bit, IPv6 128bit

4 billion in IPv4, World Population 6 billion!

DNS

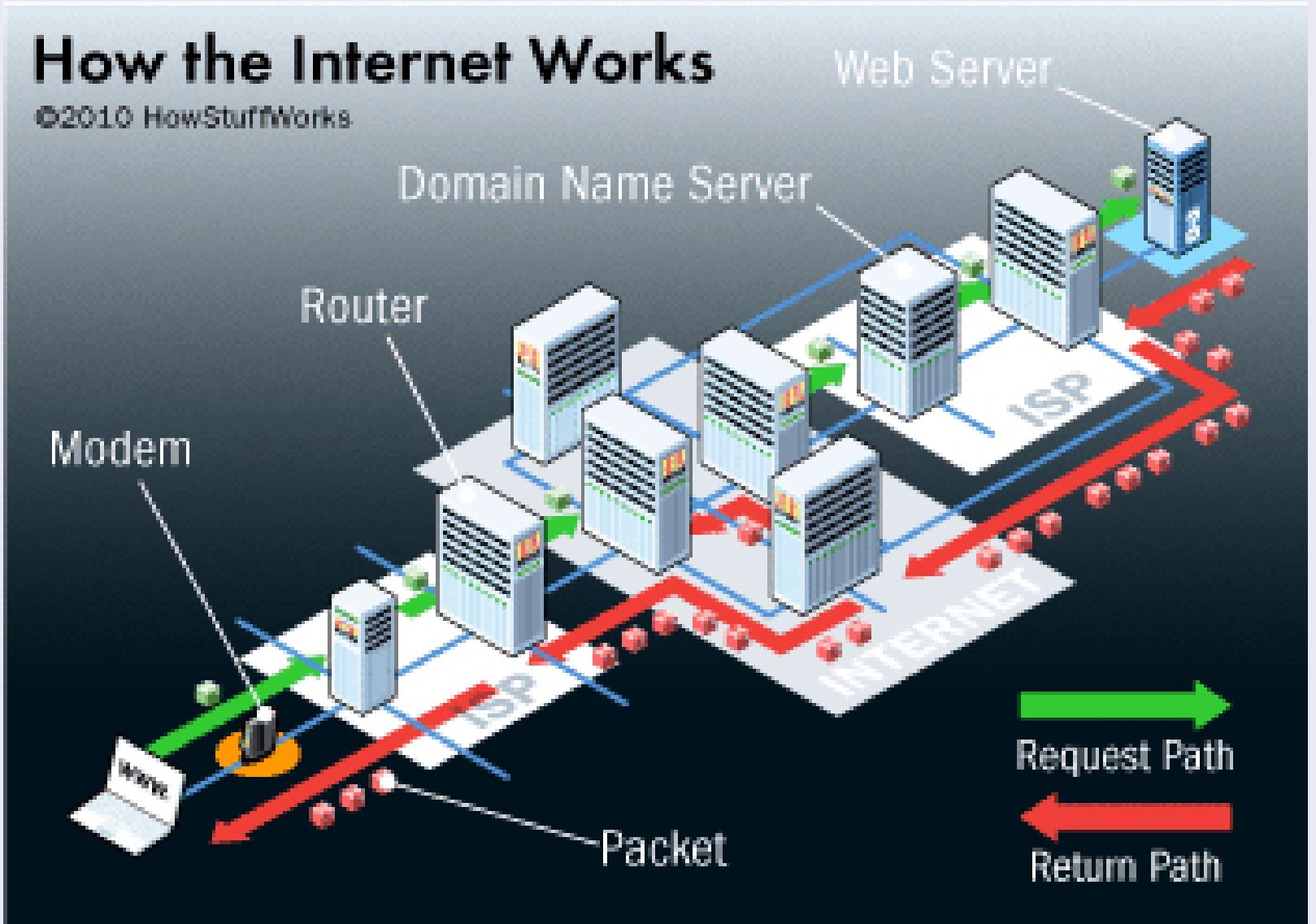
Domain Name System: Maps domain name to IP address

```
PING google.com (74.125.225.71): 56 data bytes
64 bytes from 74.125.225.71:  time=16.638 ms

In NJ.  Why not the same?!?
PING google.com (74.125.137.102) 56 bytes of data.
64 bytes from (74.125.137.102):  time=23.5 ms

PING uc.edu (10.23.135.100): 56 data bytes
64 bytes from 10.23.135.100:  time=1.130 ms
```

Every website must have a nameserver responding to DNS requests.

Putting it together

HowStuffWorks.com



HTTP?

HyperText Transfer Protocol

- Request-response protocol
- http - TCP port 80
- https http through SSL/TLS TCP port 443
- HTTP/1.0 - 3 methods: GET, POST, HEAD
- HTTP/1.1 - 8 methods total
- Status Codes: 200, 400, 404
- Single TCP session per request, HTTP/1.1 adds persistent connection
- A Webserver speaks HTTP!
- SPDY: An experimental protocol for a faster web

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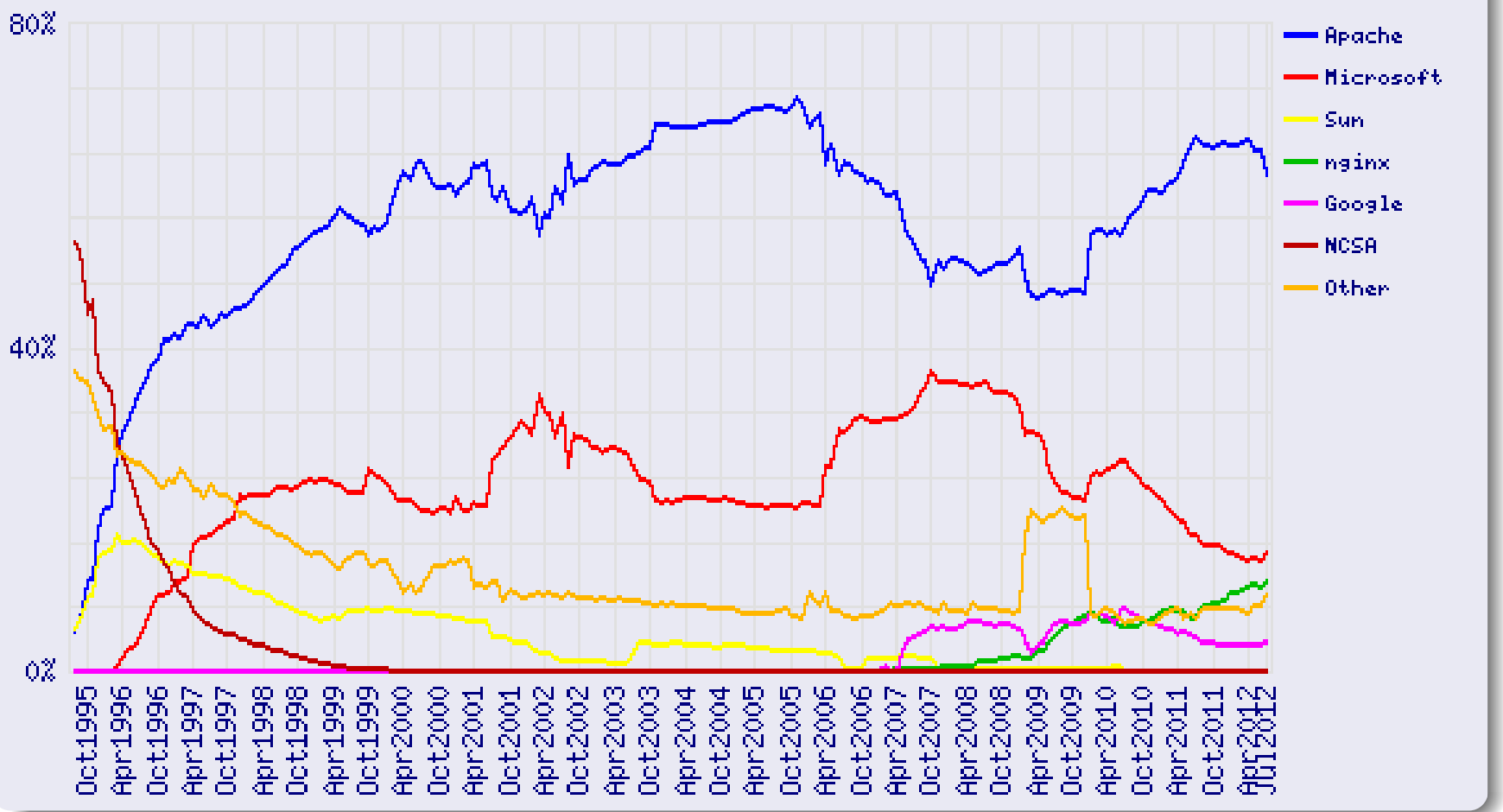
Web Server Market Share

Netcraft.com



Development Environment: This Works for Me

Setup:

- Fedora 14 - Similar to CentOS (Webserver)
- Local Webserver & Database (Apache w/PHP, MySQL)
- Editors (Emacs, gedit, Gimp, Photoshop)
- Web Browsers (Chrome, Firefox, IE, Opera, Safari)

Development Progression:

1. Write HTML/PHP
2. View from local server
3. Repeat until happy
4. View in other browsers/ benchmark
5. Deploy! (FTP, SFTP, SSH, SCP, rsync)
6. Weekly/Monthly snapshots of local files
7. Weekly Database snapshots from webserver

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Thanks! See you next week!