

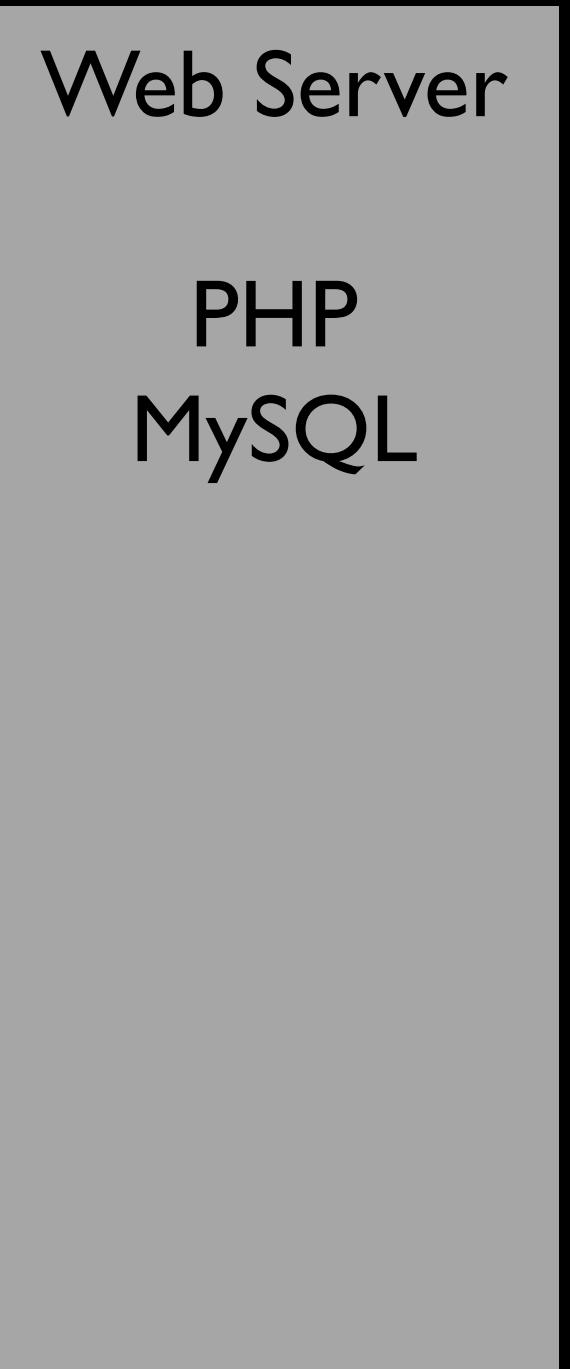
Introduction to Dynamic Web Content

Charles Severance
www.wa4e.com





<http://data.pr4e.org/page1.htm>





HTTP - Hypertext Transfer Protocol

- The dominant Application Layer Protocol on the Internet
- Invented for the Web - to retrieve HTML, Images, Documents, etc.
- Extended to handle data in addition to documents - RSS, Web Services, etc.
- Basic Concept: Make a connection - Request a document - Retrieve the document - Close the connection

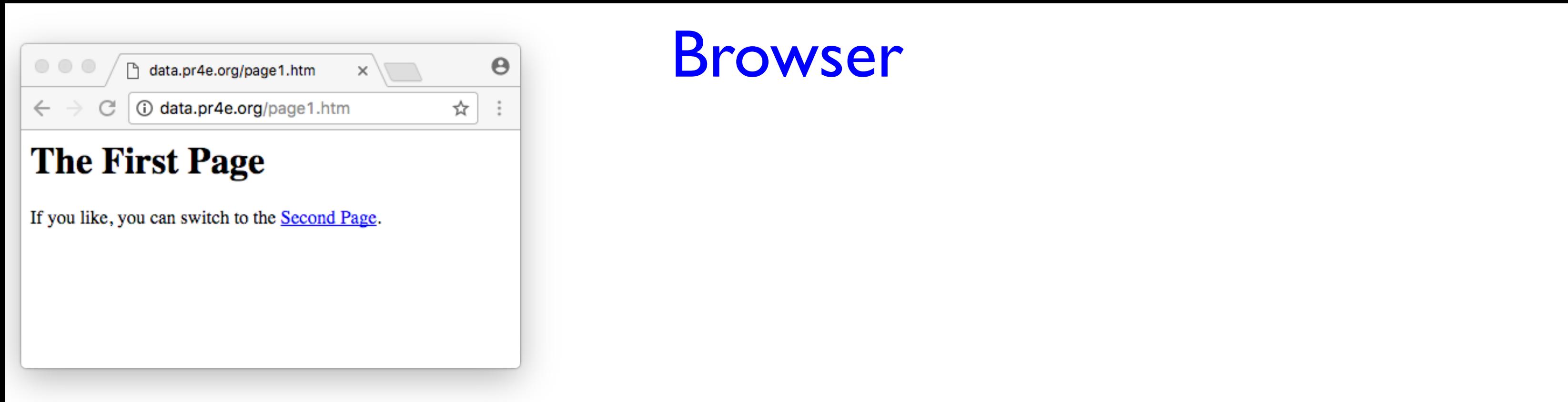
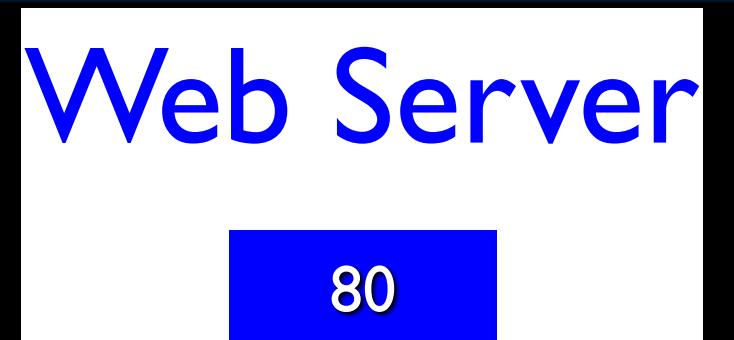
Uniform Resource Locator

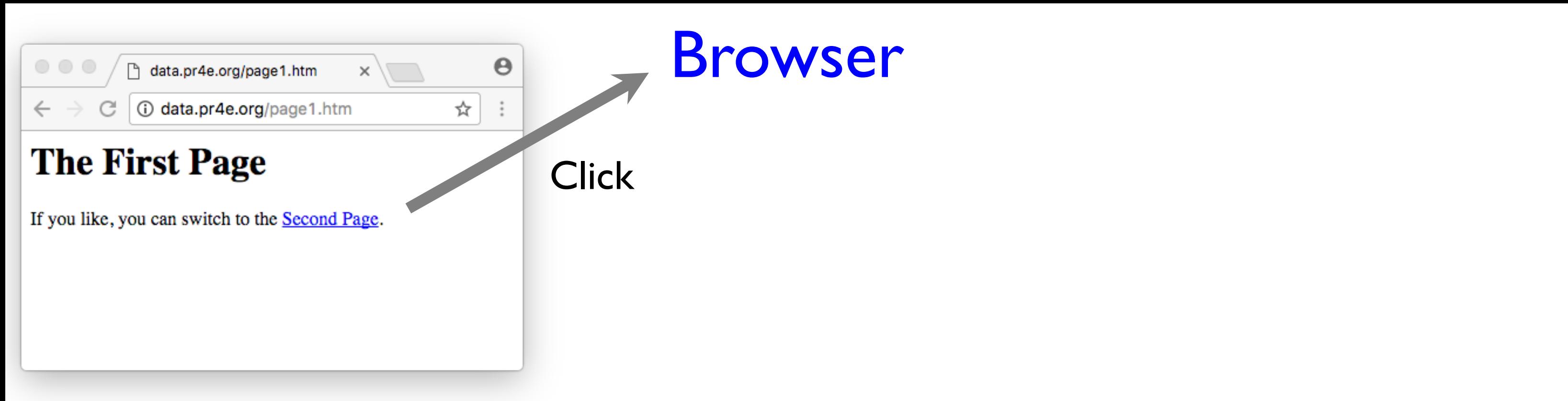
http:// www.dr-chuck.com /page1.htm

protocol host document

Getting Data from the Server

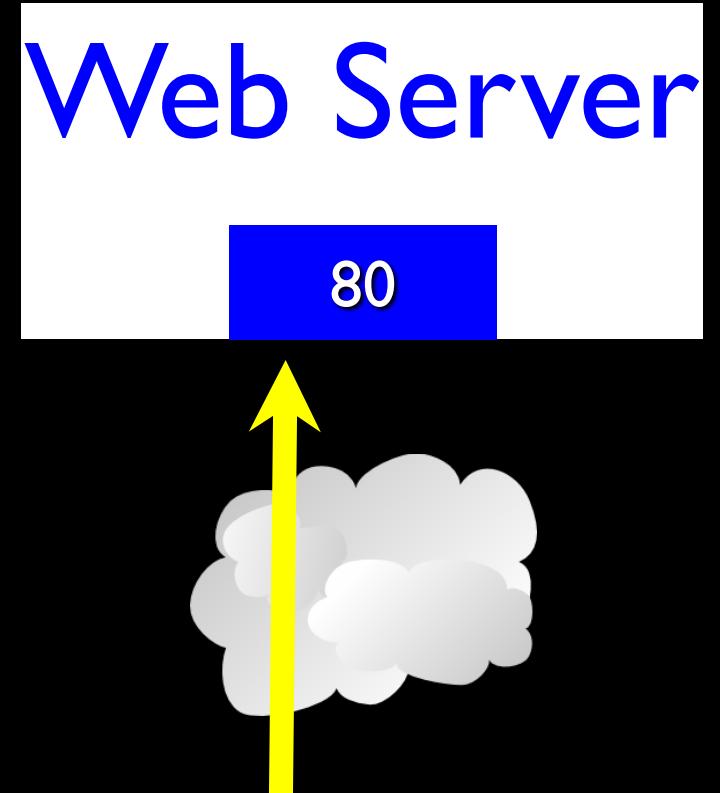
- Each time the user clicks on an anchor tag with an href = value to switch to a new page, the browser makes a connection to the web server and issues a “GET” request - to GET the content of the page at the specified URL.
- The server returns the HTML document to the browser, which formats and displays the document to the user.





Request

GET http://data.pr4e.org/page2.htm



Browser

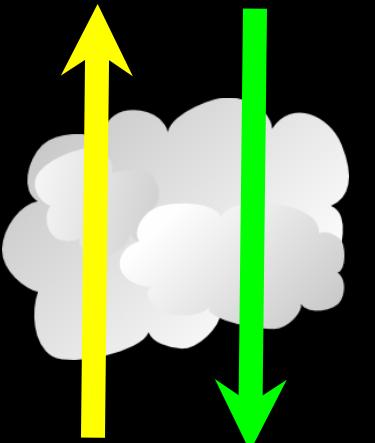
Click

Request

GET http://data.pr4e.org/page2.htm

Web Server

80



Response

<h1>The Second
Page</h1><p>If you like, you
can switch back to the First
Page.</p>

Browser

Click

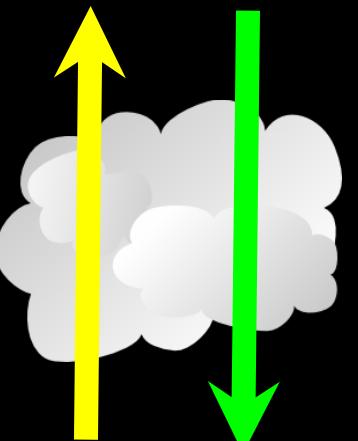


Request

GET http://data.pr4e.org/page2.htm

Web Server

80



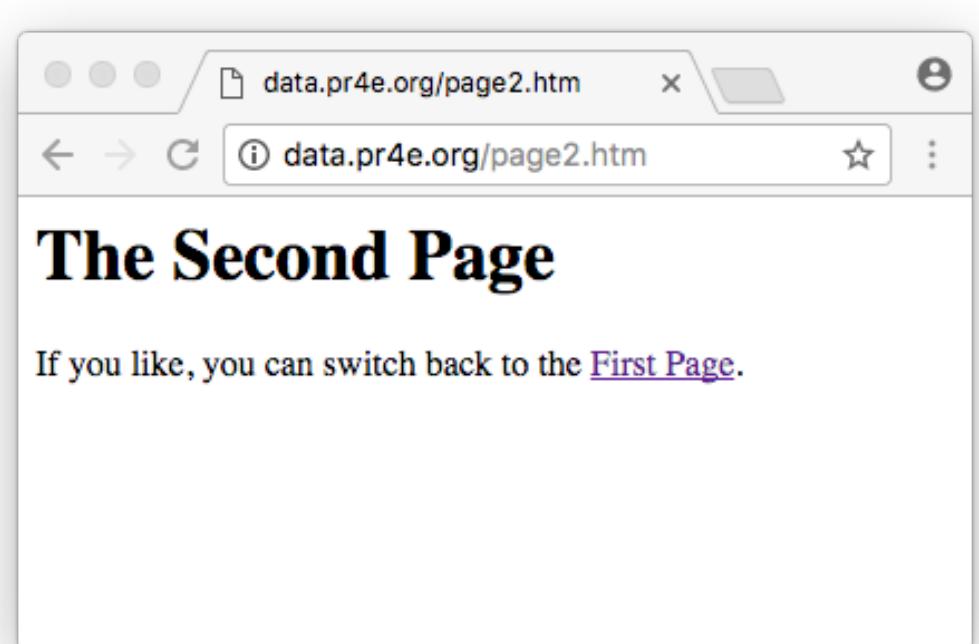
Response

<h1>The Second
Page</h1><p>If you like, you
can switch back to the First
Page.</p>

Browser

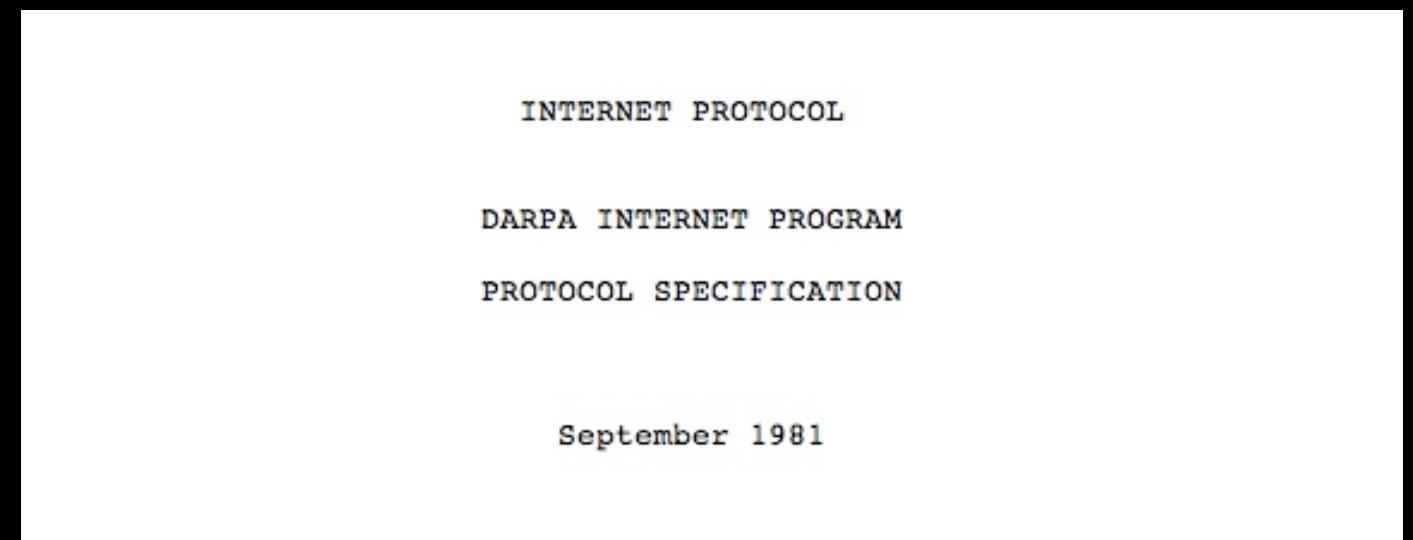
Click

Parse/
Render



Internet Standards

- The standards for all of the Internet protocols (inner workings) are developed by an organization
- Internet Engineering Task Force (IETF)
- www.ietf.org
- Standards are called “RFCs” - “Request for Comments”



The internet protocol treats each internet datagram as an independent entity unrelated to any other internet datagram. There are no connections or logical circuits (virtual or otherwise).

The internet protocol uses four key mechanisms in providing its service: Type of Service, Time to Live, Options, and Header Checksum.

Source: <http://tools.ietf.org/html/rfc791>



Network Working Group
Request for Comments: 2616
Obsoletes: 2068
Category: Standards Track

R. Fielding
UC Irvine
J. Gettys
Compaq/W3C
J. Mogul
Compaq
H. Frystyk
W3C/MIT
L. Masinter
Xerox
P. Leach
Microsoft
T. Berners-Lee
W3C/MIT
June 1999

<http://www.w3.org/Protocols/rfc2616/rfc2616.txt>

Hypertext Transfer Protocol -- HTTP/1.1

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

The Hypertext Transfer Protocol (HTTP) is an application-level protocol for distributed, collaborative, hypermedia information

5 Request

A request message from a client to a server includes, within the first line of that message, the method to be applied to the resource, the identifier of the resource, and the protocol version in use.

```
Request      = Request-Line ; Section 5.1
              *(( general-header
                | request-header      ; Section 4.5
                | entity-header ) CRLF) ; Section 5.3
                CRLF
                [ message-body ]      ; Section 7.1
                                      ; Section 4.3
```

5.1 Request-Line

The Request-Line begins with a method token, followed by the Request-URI and the protocol version, and ending with CRLF. The elements are separated by SP characters. No CR or LF is allowed except in the final CRLF sequence.

```
Request-Line = Method SP Request-URI SP HTTP-Version CRLF
```



Request/Response Cycle

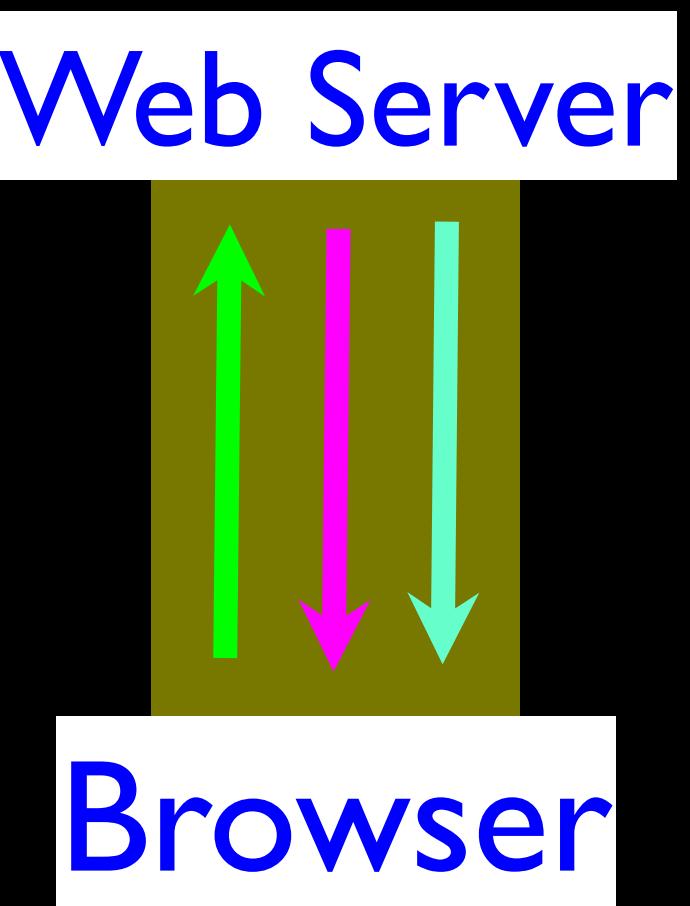
Making an HTTP Request

- Connect to the server like www.dr-chuck.com
 - a “handshake”
- Request a document (or the default document)
 - GET <http://data.pr4e.org/page1.htm> HTTP/1.0
- Fewer and fewer servers support the “old way”

```
$ telnet data.pr4e.org 80
Trying 192.241.136.170...
Connected to data.pr4e.org.
Escape character is '^]'.
GET http://data.pr4e.org/page1.htm HTTP/1.0
```

```
HTTP/1.1 200 OK
Date: Tue, 30 May 2017 18:08:52 GMT
Server: Apache/2.4.7 (Ubuntu)
Last-Modified: Mon, 15 May 2017 11:11:47 GMT
Content-Type: text/html
```

```
<h1>The First Page</h1>
<p>If you like, you can switch to
the <a href="http://www.dr-chuck.com/page2.htm">Second
Page</a>.</p>
Connection closed by foreign host.
```



Accurate Hacking in the Movies

- Matrix Reloaded
- Bourne Ultimatum
- Die Hard 4
- ...

<http://nmap.org/movies.html>



```
80/tcp open http
81/tcp open https
10/ssh open [mobile]
# nmap -v -SS -O 10.2.2.2
Starting nmap 0.2.54BETA25
Insufficient responses for TCP sequencing (3), OS detection
accurate
Interesting ports on 10.2.2.2:
(The 1539 ports scanned but not shown below are in state: closed)
Port      State    Service
22/tcp    open     ssh
No exact OS matches for host
Nmap run completed -- 1 IP address (1 host up) scanned
# sshnuke 10.2.2.2 -rootpw="Z10H0101"
Connecting to 10.2.2.2:ssh ... successful.
Attempting to exploit SSHv1 CRC32 ... successful.
IP Resetting root password to "Z10H0101".
System open: Access Level <9>
# ssh 10.2.2.2 -l root
root@10.2.2.2's password: 
RTF CONTROL
ACCESS GRANTED
```



Getting to Know Our Browsers

Find Developer Mode

- Chrome: View > Developer
- FireFox: <https://getfirebug.com/>
- Safari: Preferences > Advanced > Show Develop Menu



Dr. Chuck's Awesome Home

www.dr-chuck.com

Gratipay Select Language

New: Tsugi: A PHP framework for IMS LTI Tools
New: MOOCs: Charles Severance at TEDxKalamazoo

Free Courses / Educational Material:

- Coursera: Programming for Everybody (Python)
- Coursera: Internet History, Technology and Security
- SI 502 - Networked Computing
- See also www.pythونlearn.com, www.php-intro.com and www.appspotenginelearn.com

Books

- Python For Informatics: Exploring Information (2010, 2014)
- Sakai: Building an Open Source Community (2011, 2014)
- Raspberry Pi (21st Century Skills Innovation Library) (2013)
- Using Google App Engine (O'Reilly 2009)
- High Performance Computing (O'Reilly 1998, Connexions 2010)

Tweets

Jason Cidras (@JasonCidras) 4h
@drchuck I just signed up for your Python class, I am very excited to finally learn it! Thanks for the opportunity!

drchuck (@drchuck) 56m
I wrote a quiz question

School of Information
[Rate this Professor](#)

Blog
@drchuck Twitter
Keynote Speaker

Web/Multimedia sites

Elements Network Sources Timeline Profiles Resources Audits Console

Preserve log Disable cache

Name	Method	Status	Type	Initiator	Size	Time	Timeline	10.00 s	15.00 s
Path		Text			Content	Latency			
www.dr-chuck.com	GET	200 OK	text/...	Other	10.8 KB 10.6 KB	173 ms 172 ms			
csev_ian_dolphin_small.jpg	GET	200 OK	imag...	www.dr-ch...	18.3 KB 18.1 KB	115 ms 58 ms			
rate-my-professor.jpg	GET	200 OK	imag...	www.dr-ch...	11.8 KB 11.5 KB	114 ms 113 ms			
ir?t=drchuck02-20&l=ur2&o=1		200		www.dr-ch...	159 R	31 ms			

58 requests | 697 KB transferred | 17.14 s (load: 1.36 s, DOMContentLoaded: 585 ms)

Console Search Emulation Rendering

01quiz.zip Show All

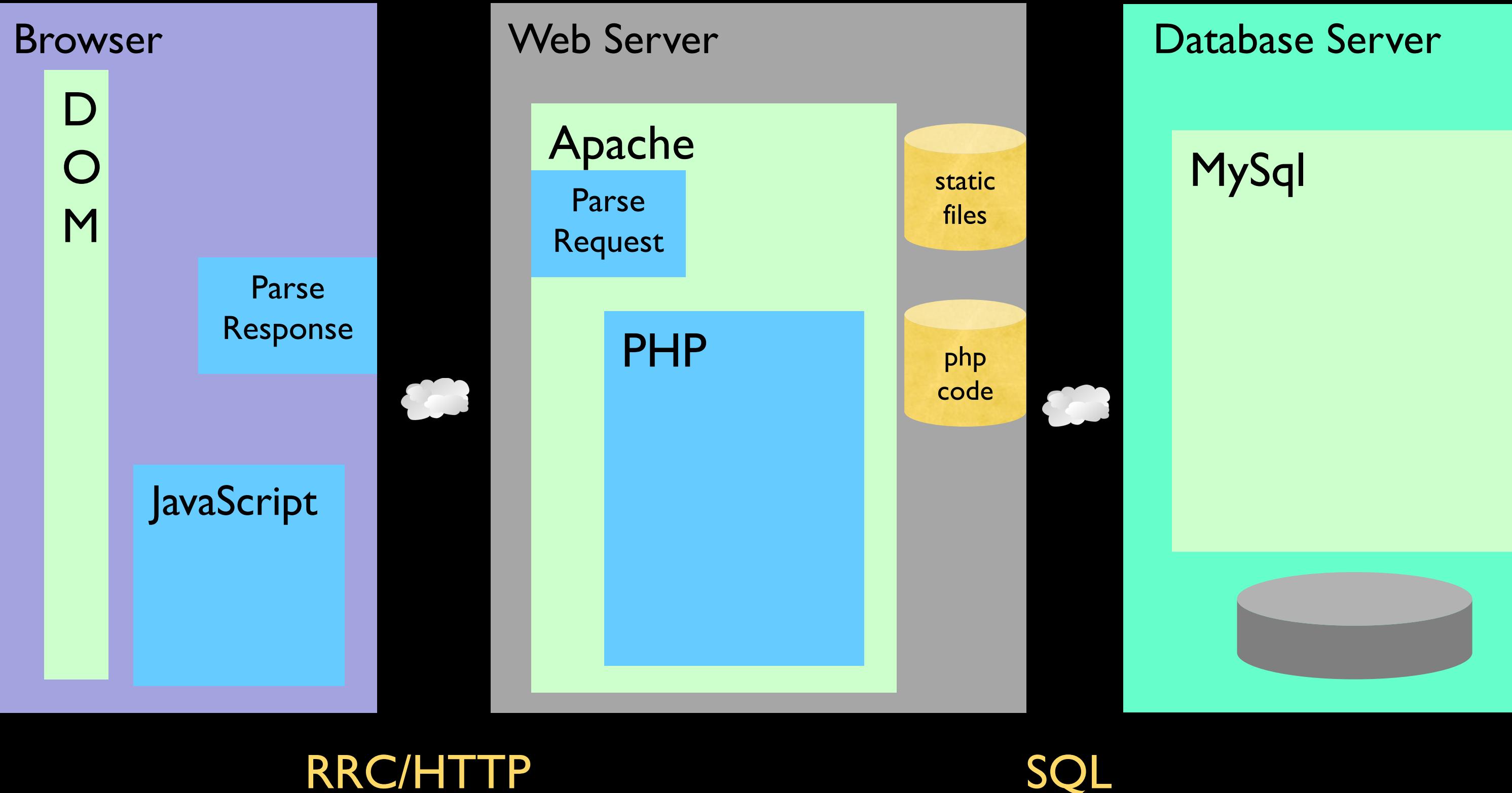
DEMO



This is Only the Beginning...

- In the Browser – HTML, CSS, Document Object Model (the DOM) and JavaScript
- In the Web Server – Apache (or similar) web server with a PHP extension installed
- In the Database Server running MySQL - PostgreSQL, Oracle, SQL Server, or similar

Time





Summary

- Many modern web applications use a stack of open source software working together.
- While you can use frameworks to accelerate productivity, this course focuses on what is really going on so you can fully understand what frameworks are doing on your behalf.

Acknowledgements / Contributions



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School of Information

Insert new Contributors and Translators here including names and dates

Continue new Contributors and Translators here