CSSE280: Introduction to Web Programming

Introductions, Internet, WWW, HTML Intro

Rose-Hulman Institute of Technology

Intro to Course

Front-end development

Back-end development

    Node.js

Data-driven application

    MongoDB

    REST API

Agenda

Roll call, course introduction

In-class partners

Visual Studio Code installation

The Internet and the World Wide Web

HTML Intro

Roll call, Introductions

Student Introductions (Name, Hometown, Web development experience)

❖ Listen to other students' Web dev background

❖ One of them will be your in-class partner

❖ You should partner with someone with similar experience

Student Assistants Introductions

❖ Jake, Stefan (Section 1)

❖ Steven, Zach (Section 2)

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More Introductions, partner selection

Instructor Introductions

❖ Why I am doing this course (passion for Web dev, learn by teaching)

❖ We will all learn from each other

❖ Teach web services development

In-class partner selection, sign contract

Course intro

Course Schedule Page

- ❖ https://www.rose-hulman.edu/class/csse/csse280/201710/Schedule/Schedule.htm

- ❖ Resource column is of paramount importance

- ❖ Due date column is also very important

Course Piazza Page

- ❖ https://piazza.com/rose-hulman/fall2016/csse280

- ❖ Announcements, Q&A, bug reports (earn extra points!)

Course Syllabus

Course Grades

Weight	Grade Component
10%	Attendance, participation in-class, online, & with in-class partner
10%	Quizzes
25%	Graded Homework Assignments (6 to 8)
30%	Exams (Thursday of weeks 3, 6, & 9), no finals
25%	Term Project

Read the syllabus before next class

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Install Visual Studio Code

http://code.visualstudio.com/Download

❖ Installation instructions:
   https://www.rose-hulman.edu/class/csse/csse280/201710/Software/vscodeInstallation.pdf

❖ Launch from Terminal/Command Prompt

❖ Install extensions to add themes, languages, debuggers, additional services
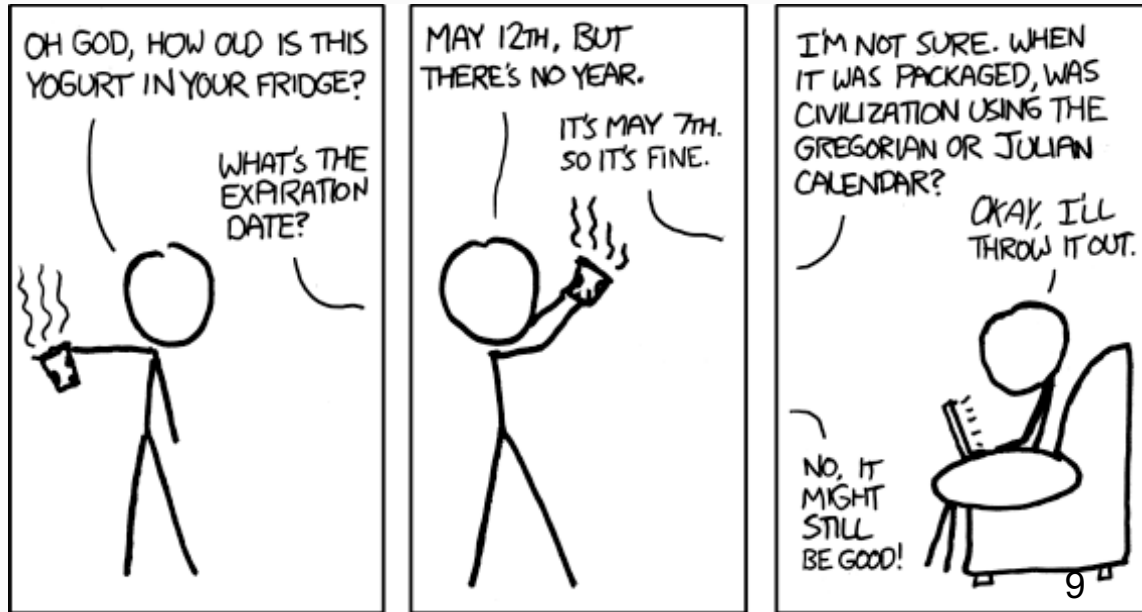
❖ Built-in support for Git

❖ IntelliSense

5-mins break

Break every class

Get help finishing installation of VS Code

Can use other editor if you prefer

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Internet vs World Wide Web

The Internet

❖ Network of networks that use the Internet protocol suite to link billions of devices worldwide

❖ Consists of millions of private, public, academic, business, government networks

❖ Networks linked together by electronic, wireless, & optical networking technologies

❖ Carries information resources and services, e.g. WWW

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Brief history of the Internet

The Internet

❖ Began as a US Department of Defense network called ARPANET (1960s-70s)

❖ Initial services: electronic mail, file transfer

❖ Opened to commercial interests and most universities in late 80s

❖ WWW created in 1989-91 by Tim Berners-Lee

❖ Early web browsers released: Mosaic 1992, Netscape 1994, Internet Explorer 1995

❖ Amazon.com opens in 1995; Google January 1996

Internet: Layered Network Architecture

- ❖ Physical layer: devices such as Ethernet, coaxial cables, fiber-optic lines, modems

- ❖ Data link layer: basic hardware protocols (ethernet, wifi, DSL PPP)

- ❖ Network / internet layer: basic software protocol (IP)

- ❖ Transport layer: adds reliability to network layer (TCP, UDP)

- ❖ Application layer: implements specific communication for each kind of program (HTTP, POP3/IMAP, SSH, FTP)

5	Application
4	Transport
3	Network
2	Data link
1	Physical
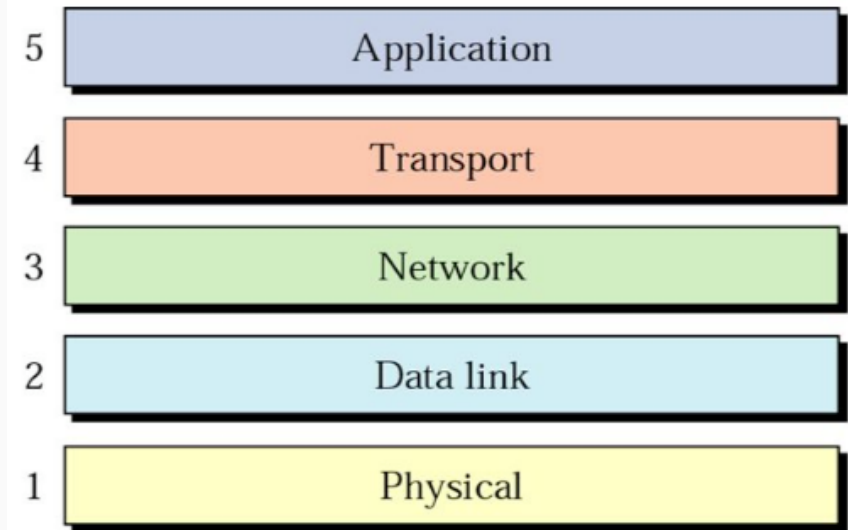
Internet Protocol (IPv4)

- ❖ Simple protocol for attempting to exchange 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://ip-lookup.net/

- ❖ Find out your local IP address:
  in a terminal window, type: ipconfig (**Windows**) or
  ifconfig (**Mac/Linux**)

- ❖ Rose-Hulman's IP addresses begin with 137.112

0	7	15	23	31
10010001	00001010	00001010	00000011	
145	10	34	3	

145.10.34.3
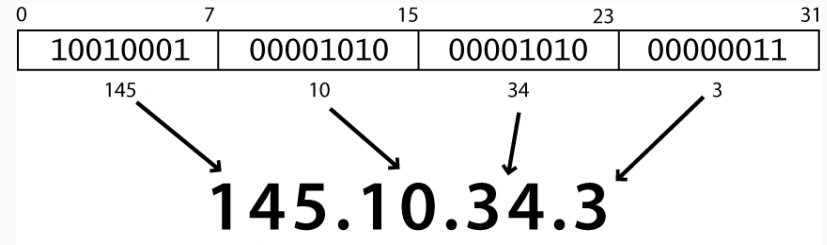
Transport Control Protocol (TCP)

❖ Adds multiplexing and guaranteed packet delivery on top of IP

❖ Multiplexing: multiple programs using the same IP

   port: a number given to each program or service
   port 80: web client (port 443 for secure web browsing)
   port 25: email
   port 22: ssh and sftp
   port 27017: mongoDB

❖ Some programs (games, streaming media programs) use simpler **UDP** protocol instead of **TCP**

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World Wide Web

The WWW comprises Web Servers and Web Browsers

❖ **Web Server:** software that listens for Web page requests and serves up the requested pages

Apache - http://www.apache.org
Microsoft Internet Information Server (IIS) - http://www.iis.net/
Express - https://expressjs.com
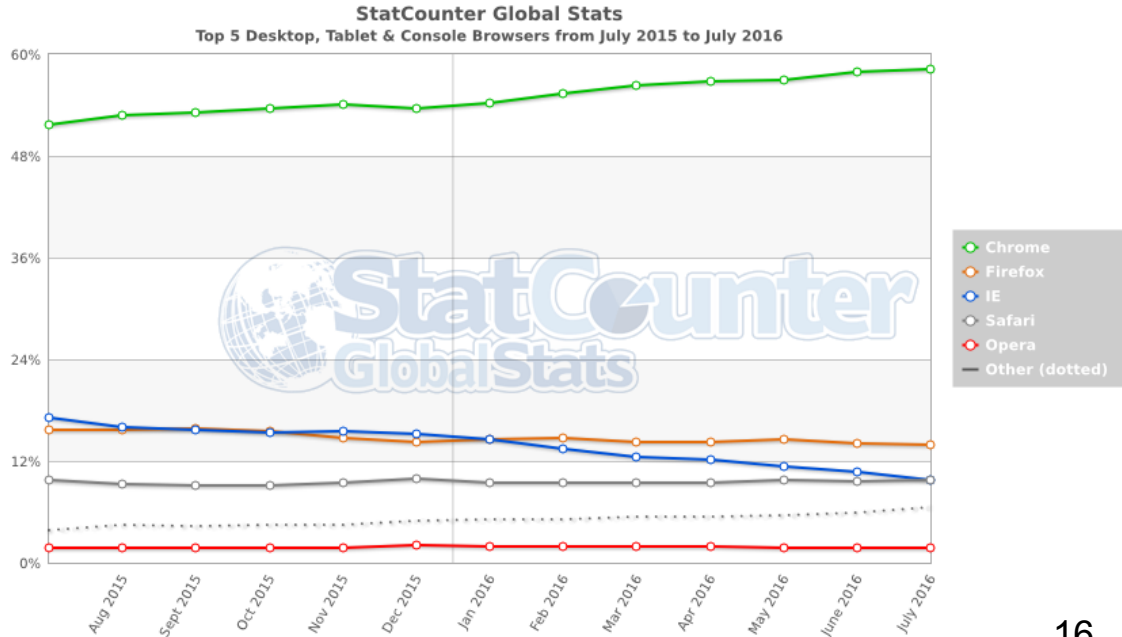Phusion Passenger - https://www.phusionpassenger.com

World Wide Web

The WWW comprises Web Servers and Web Browsers

❖ **Web browser**: gets and renders documents from servers

Popular browsers

StatCounter Global Stats
Top 5 Desktop, Tablet & Console Browsers from July 2015 to July 2016
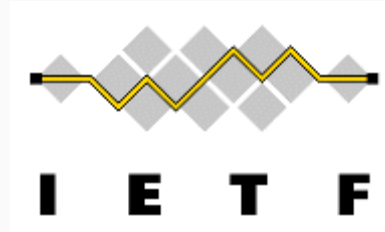
- Chrome
- Firefox
- IE
- Safari
- Opera
- Other (dotted)

Organizations you should know

Internet Engineering Task Force (IETF)

❖ internet protocol standards

Internet Corporation for Assigned Names and Numbers (ICANN)

❖ decides top-level domain names

World Wide Web Consortium (W3C)

❖ web standards

Domain Name System (DNS)

Set of servers that map domain names to IP addresses

❖ **Example:**

www.rose-hulman.edu ➔ 137.112.18.53

❖ DNS Lookup Tool

http://mxtoolbox.com/DNSLookup.aspx

Uniform Resource Locator (URL)

Web Address OR an ID for the location of a Web resource on a computer network

- ❖ http://www.rose-hulman.edu/class/csse/csse280/index.html
  protocol   **host**   **path**

When this URL is entered in the browser, it would:

- ❖ Ask the DNS server for the IP address of www.rose-hulman.edu

- ❖ Connect to that IP address at port 80

- ❖ Ask the server to GET /class/csse/csse280/index.html and display the result in the browser

Advanced URLs

Anchor: jumps to a given section of a page

❖ http://en.wikipedia.org/wiki/HTML_element**#Anchor**
  Fetches the HTML_element document, then jumps to the part of the page labeled Anchor

Port: for web servers on ports other than the default port 80

❖ http://portquiz.net**:8080**/index.php

Advanced URLs

Query string: a set of parameters passed to a web application

http://www.google.com/search**?q=miserable+failure&start=10**

❖   parameter named q is set to value miserable+failure

❖   Parameter named start is set to value 10

Hypertext Transfer Protocol (HTTP)

Defines a set of commands understood by a Web server and sent from a browser
Some HTTP commands (your browser sends these internally)

❖ GET resource -- requests data from a specified resource

❖ POST resource -- submits data to be processed to a specified resource

❖ PUT resource -- uploads a representation of the specified URL

❖ DELETE resource -- deletes the specified resource

HTTP status codes

When a request is made by the browser, a response is sent back by the server with a status code, possibly followed by a Web resource

Number	Meaning
200	OK
301-303	Page has moved (temporarily or permanently)
403	It is forbidden to access this page
404	Page not found
500	Internal server error
Complete list of HTTP status codes	

Internet Media Types (MIME)

Sometimes when including other resources in a Web page (stylesheet, image, multimedia object), we specify their type of data

MIME Type	File Extension
text/html	.html
text/plain	.txt
image/gif	.gif
image/jpeg	.jpg
videeo/quicktime	.mov
application/octec-stream	.exe

Basic HTML

Defines the **content** and **structure** of information on a page

❖ Not the same a **presentation** (appearance in the browser)

Surrounds text content with opening and closing **tags**

Each tag's name represents an HTML **element**

❖ Syntax: \<tagname\>Content goes here...\</tagname\>

Most whitespace is collapsed or ignored in HTML

We will use HTML5 syntax

Structure of HTML page

DOCTYPE tells browser to interpret code as HTML5

HTML page is save in a file with extension .html

The **header** describes the page, and the body holds the page's content

```
<!DOCTYPE html>
<html>
    <head>
        information about the page
    </head>

    <body>
        page contents
    </body>
</html>
```

Page title: <title>

Describes the title of the page

Displayed in the Web browser's title bar and when bookmarking a page

```
<!DOCTYPE html>
<html>
    <head>
        <title>Introduction to HTML </title>
    </head>

    <body>
        page contents
    </body>
</html>
```

Paragraph: \<p\>

Describes a paragraph of text (block element)

This is placed within the body of the page

Examples:

❖ http://www.w3schools.com/tags/tryit.asp?filename=tryhtml_paragraphs2

```
<!DOCTYPE html>
<html>
    <head>
        <title>Introduction to HTML </title>
    </head>

    <body>
        <p>This is        a paragraph of text </p>
    </body>
</html>
```

Headings: <h1>, <h2>, … <h6>

Separate major areas of a page
(block element)

This is placed within the body of
the page

Examples:

- ❖ http://www.w3schools.com/tags/tryit.asp?filename=tryhtml_headers

```
<!DOCTYPE html>
<html>
    <head>
        <title>Introduction to HTML </title>
    </head>

    <body>
        <p>This is      a paragraph of text </p>
        <h1>University of Smart People</h1>
        <h2>Department of Computer Science</h2>
        <h3>Sponsored by Big Rich Corporation</h3>
        <h6>We teach the best stuff here!</h6>
    </body>
</html>
```

Questions?