Introduction to Internet Technology and Web Programming

Computer Science 103
Boston University
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These notes are based on the lecture notes provided by Professor Susan Worst.

Lecture 5-1

BU CS 103, Spring 2019

Today's Materials!

- Internet security (Part 3)
  - The origins of malware: spam, botnets
  - Password Theft: Two-Factor Authentication & Password Managers
- More about Cascading Style Sheets (CSS)

Assignments

- **New Assignments:**
  - ✓ **HW 2:** Posted today and due on Tuesday Feb. 26 at 6pm.
- **Deadlines**
  - ✓ **Lab 3 Assignment**: due Thursday 02/21/2019 at 6 pm.
- **Grades:**
  - ✓ The grades for **HW1**, **Lab 1, 2 & 3 Challenges** and **Lab 0, 1 & 2 Assignments** have been posted on BB.

Final Exam

- CS 103 final exam will be held
  - at Wednesday, 05/08/2019 at 6:00 - 8:00 PM
  - on CAS B18 (our regular classroom)
- You need to send me your exam schedule by email if there is an exam conflict.

Some questions regarding Creative Commons Licenses

- Are works with Creative Commons licenses in the public domain?
  - ✓ Answer: No, works in public domain do not have any license. You can freely use them for any purpose.
- How do you decide which Creative Commons license to use?
  - ✓ Answer: It depends on the application of your work.
    - Do you like that your work is shared (distributed) in the same format?

Your CSS Isn't Working? Possible reasons:

- **Reasons due to HTML file:**
  - ✓ Check the href attribute of your <link> tag.

    <link rel="stylesheet" type="text/css" **href="file1.css"**>
  - ✓ Did you transfer the CSS file to the same directory as your html file in your web-host?
  - ✓ Check the **CSS file name** and **the value of the href attribute** in the <link> tag. They need to be the same.
  - ✓ Are all attributes and values of the link tag **spelled** correctly?
- **Reasons due to CSS file:**
  - ✓ Is there any syntax error in your CSS coding?
    - ➢ Check colons, semicolons, curly brackets, units etc.
  - ✓ Could your browser be looking at a cached version of the page? (If so, clear the cache or try a different browser.)

Internet Security (Part 3)

Why Are Hacking and Malware So Common?

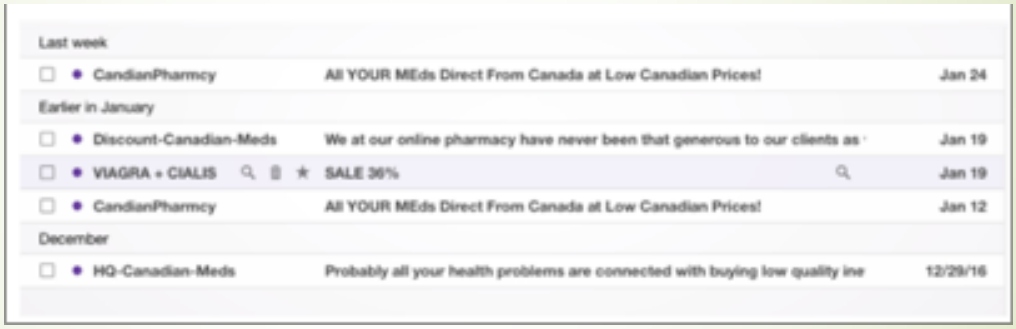
- According to an article in KrebsOnSecurity.com:
  - **it all started with spam**

Difference between Phishing & Spam

- Spam is unwanted email that is attempting to sell you something.
  - ✓Usually annoying but not really dangerous.
- Phishing is unwanted email that attempts to trick you into surrendering private information.

Spear Phishing or Spam? Hard to Tell

A Personal Spam Folder



- What do these messages have in common?

Spam-Based Businesses

- Most business that rely on spam for marketing sell **prescription drugs** or **counterfeit merchandise**.
- Selling prescription drugs without a prescription is illegal in the United States.

Getting Around Spam Protection

- Most Internet Service Providers block email from known senders of spam, making it harder for the senders of spam to do business
- But, companies that send spam found new ways to keep getting their message through such as **botnets**

Botnets

- A **botnet** is a network of private computers infected with malicious software and controlled as a group without the owners' knowledge, e.g., to send spam messages.
- Botnet owners are able to control the machines in their botnet issuing commands to perform malicious activities such as **sending spam emails**

Botnet Attacks: Prevention and Definition", radware.com

Botnets, cont.

- Botnets are an incredibly valuable tool to the senders of spam.
- Email from computers in botnets is unlikely to be traced or blocked.
  - ✓ Why?
- However, anti-virus and anti-malware software can detect and remove the "bot" software, taking that computer out of the botnet.

Consequences

- The makers of spam need to constantly come up with new kinds of malware to add computers to their botnets. Thus, more malware is created every day.
- Once botnets were created, they could then be rented out for more nefarious (criminal) purposes
  - ✓ Distributed Denial of Service attacks (DDoS)
  - ✓ Looking for software vulnerabilities
  - ✓ Harvesting of usernames, passwords, and email contacts

Denial of Service Attack (optional)

- An attempt to shut down a computer, website, or network by flooding it with requests
- Motivation can be:
  - ✓ Commercial (shut down a competitor)
  - ✓ Political (activism)
  - ✓ Criminal
- How DDOS requests work: https://www.youtube.com/watch?v=OhA9PAfkJ10
- Map of real-time DDOS attacks: http://map.norsecorp.com/

Protect Yourself from Password Theft

- Use great passwords
- Don't give truthful answers to security questions – treat them just like passwords
- Use different passwords
- Don't keep passwords in your email
- Don't use public WiFi for sensitive transactions
- Use a **password manager** (e.g. LastPass) to store your passwords
- Try **two-factor authentication** if available

Password Managers

- Password managers are secure applications that store your passwords.
- You need to **memorize** one master password for your password manager. The password manager stores the rest of the passwords.
- Password managers improve security by:
  - ✓ Allowing you to use longer, more complicated passwords because you don't need to remember them (or type them)
  - ✓ Altering you to fake websites, because they will only autofill your passwords on real sites

Two-Factor Authentication

- A password is **something you know**.
- Two-factor authentication requires a password plus another factor: either **something you have** (usually a phone or token) or **something you are** (fingerprint, retinal scan)
- Why is this more secure?

Cascading Style Sheets (Continue…)

A Sample CSS Syntax

- ✓Selector
- ✓Property
- ✓Value
- ✓Unit

```
h1 { margin: 1em; font-size: 64px; color: blue;}
```

selector

property

value

unit

Separator between property and value

Separator between two property-value pair

Curly bracket

Various CSS Properties

- **A Reference for CSS Properties:**

https://www.w3schools.com/cssref/

Rules of CSS

- The rule of Inheritance
- The rule of Cascade

The rule of Inheritance …

- CSS properties follow the rules of "**inheritance**".

1. When one element is nested inside another, the outer element is called the "parent" and the inner one is called the "child".
2. Applying a style to the "parent" means that the child will "inherit" it as well.
3. Inheritance can be overridden by setting specific values on the child elements.

The rule of Cascade …

- CSS files can contain multiple style rules for the same element
- What happens when they conflict?
- The "cascade" determines which rule is applied as follows:
  1. Our style sheets override the default browser style sheets
  2. More specific rules override more general rules
  3. If the specificity is the same, the later rule will override the earlier one

Time to experience!

Different Styling Methods

- There are **3** ways to apply CSS to an HTML page:
  1. External style sheet (.css file)
  2. Internal style sheet
     I. <style> tag in <head> of document
     II. style attribute in individual HTML tags
- Method 1 is used in the vast majority of cases.
- In CS 103, we are going to use **external** style sheet

Method 1: External CSS

- This method allows you to apply the same styles to multiple web pages.
- Add this code to the <head> of the HTML file:

```
<link rel="stylesheet" type="text/css" href="my-stylesheet.css">
```

- Change "my-stylesheet.css" to the name of your file.
- Everything else stays the same from document to document.

Method 2.1: Internal CSS using Style Element

- This is a way to apply styles to all elements on one HTML page.
- Place styles within a <style> tag in the <head> of your HTML file:

```
<style>
    h2 { background-color: yellow; }
</style>
```

Method 2.2: Internal CSS using Style Attribute

- This is a way to apply CSS to one particular instance of an HTML element.

```
<p style="margin-top: 1em;"> This paragraph has a top margin of 1 em.</p>
```

- This affects only that particular occurrence of one element on one page.

Time to experience!

CSS colors: Review

Method 1: Color names

```
h1 {color: red;}
```

Method 2: Hex (Hexadecimal) Codes

```
h2 {color: #00ff00;}
```

Method 3: RGB Codes

```
h3 {color: rgb(0,0,255);}
```

Method 4: HSL Codes

```
p {color: hsl(0,100%,0%);}
```

CSS colors: Review

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Method 4: HSL

```
p {background-color: hsl(0,100%,0%);}
```

CSS colors: errors (bugs)

```
h1 {color: yello;}
h2 {color: #1a5d9g;}
h3 {color: rgb(0,0,500);}
p {color: hsl(120,%50,%50);}
```

→

Nothing will apply (default value black)
Nothing will apply (default value black)
equivalent to rgb(0,0,255)
Nothing will apply (default value black)

```
h1 {background-color: yello;}
h2 {background-color: 1a5d9f;}
h3 {background-color: rgb(-200,0,255);}
p {background-color: hsl(480,50%,50%);}
```

→

Nothing will apply (default value white)
Nothing will apply (default value white)
equivalent to rgb(0,0,255)
equivalent to hsl(120,50%,50%)

Transparency in HTML Colors

- The new **rgba()** and **hsla()** methods include a fourth parameter, called "**the alpha channel**" to specify transparency
- The value of the alpha channel ranges from 0 to 1
- 0 = completely transparent
- 1 = completely opaque
  - ✓ Example: rgba(255, 0, 0, 0.5) is red at 50% opacity
  - ✓ Example: hsla(120, 50%, 50%, 1) is green at 100% opacity

- See a Great Color Picker: http://hslpicker.com/

Hints regarding units of size and length

- No unit required if the number is 0
- For nonzero numbers, make sure there is no space between the value and the unit (e.g., ***20px*** not ***20 px***)
- Most common fixed unit is **px**, meaning pixel
- Relative units are used most often:
  - ✓ **em**: Relative to the font-size of the element (2em means 2 times the size of the current font)
  - ✓ **%:** Relative to the width of the element
  - ✓ **vw**: Relative to 1% of the width of the browser window.
  - ✓ **vh**: Relative to 1% of the height of the browser window.

Time to experience!

Class-Activity

Go to the following Codepen webpage and do the activity:

https://codepen.io/azadeh83/pen/gqEvLv

Review from Last Lecture

To open a link in a new tab or window, use which attribute of the <a> tag?

A. window
B. destination
C. target
D. location

To open a link in a new tab or window, set the target attribute to:

A. _new
B. _blank
C. _tab
D. _window

In the acronym "CSS," what does "C" stand for?

A. Creative
B. Compound
C. Cascading
D. Cascade

What software is used to create CSS files?

A. Image editor (e.g. GIMP, Photoshop)
B. Text editor (e.g. Notepad++, BBEdit)
C. Drawing program (e.g. Adobe Illustrator)
D. None of the above

In the CSS rule p { margin-top: 1em; }, margin-top is the

A. Selector
B. Property
C. Value
D. unit

Which of the following can NOT be used to specify colors in CSS?

A. CMYK values
B. Hex codes
C. HSL values
D. Name of color
E. RGB values

When specifying colors using hex codes, "hex" stands for

A. Hex (it's not an abbreviation)
B. Hexadecimal
C. Hexagonal
D. Hexametric

For Next Time

- See you on Wednesday!