Midterm exam on Tuesday, October 24
Midterm Exam

The format of the midterm exam is multiple-choice.

Questions will be both concept- and code-based.

You should be familiar with material from the lectures, slides, and reading.

You should also be able to read and answer questions about HTML and CSS code.

Be sure to arrive on time and bring your NYU ID and a pencil.
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CSCI-UA 4

Class 1
Introduction and Overview
What is the Internet?

A computer network consisting of a worldwide network of computer networks that use standardized network protocols to facilitate data transmission and exchange.
Introduction and Overview

1964, On Distributed Communications
Networks

Centralized, decentralized, and distributed

A decentralized network represents a less-hierarchical structure than a centralized network. Complete reliance on a single point is not required.

The foundational concept of decentralized networks would be deployed in tandem with what came to be known as “packet-switching,” which entails breaking up communications into small parts, sending them along, and reconstructing them at the end.
The Internet and the World Wide Web
The Internet and the World Wide Web

The Internet and the Web are separate but related things.

The Internet is a massive network of networks, a networking infrastructure that connects computers globally.

The Web is a way of accessing information over the medium of the Internet, an information sharing model that is built on top of the Internet.

The Web is just one of the ways that information can be disseminated over the Internet but it is the one we are focused on in this class.
Internet Access

1980s–Present

• Personal Computing
• Portable Computing
• Mobile Computing
• Ubiquitous Computing
• Ambient Computing
IBM 5150
1981
Apple PowerBook 540c
1993
Apple iPhone
2007
Ambient Computing
The digital revolution, which represented a shift from analog and electronic technology to digital, is now commonplace.

In many ways we are experiencing the afterglow of the digital revolution.

Digital tools and media still offer lots of possibilities but also problems.
Class 1
Introduction and Overview
Digital Media Storage
Modern vernacular of 1s and 0s

On/Off

Electrical impulses (+5v / -5v)

• Single 0 or 1 = 1 “bit”
• A group of 8 bits = 1 “byte”
• 1 million bytes ≈ 1 “megabyte”
• 1,024 megabytes = 1 “gigabyte”
• 1,000 gigabytes = 1 “terabyte”
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Class 1
Introduction and Overview

00101011
Class 1
Introduction and Overview
Digital Media Transfer

Megabits (Mb)

Internet connection speed is normally measured in megabits.

Megabits (Mb) are not the same as megabytes (MB).

8 bits = 1 byte; therefore, a megabyte is 8 times the size of a megabit.

The average Internet connection speed in the United States in 2015 was 12.6 Mb/second.
Introduction and Overview

The graph shows the trend of transistor count over time. The curve indicates that the transistor count doubles every two years. Various processor models are plotted on the graph, with the x-axis representing the date of introduction and the y-axis representing the transistor count.
Moore’s Law

Describes a constant rate of change in computer processor speed

The number of transistors that can be placed inexpensively on an integrated circuit doubles every two years.

The number of transistors is closely connected to processor speed, memory, etc.

Computer processor speed has doubled approximately every two years.

Moore’s Law seems to be plateauing but has held steady for the past 40 years.

Digital media is in a constant state of flux.
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Class 1
Introduction and Overview
Guiding Principles

Open Source

- Anyone is free to use it
- Usually free of charge
- Source code is made available
- Can be modified and redistributed
Guiding Principles

Net Neutrality

The principle that Internet service providers should enable access to all content and applications regardless of the source, and without favoring or blocking particular products or websites.
Guiding Principles

Web Standards

The formal, non-proprietary standards and technical specifications that define and describe aspects of the World Wide Web and its interoperability.

These include:

- HTML5
- CSS
- JavaScript
- SVG
- WOFF
Operating Systems

Software that manages a computer’s resources
Allocates resources among other programs
Resources include the central processing unit (CPU), computer memory, file storage, input/output (I/O) devices, and network connections
Runs indefinitely and terminates only when the computer is turned off
Operating Systems

Examples

- DOS (Generic term)
- Microsoft OS
- Mac OS
- Linux
- iOS
- Android
- Symbian OS
Operating Systems

History

First digital computers had no operating systems
Ran one program at a time, which had command of all system resources
A human operator would provide any special resources needed
First operating systems were developed in the mid-1950s
Command Line Interface / Graphical User Interface
Unix

Operating system by AT&T Bell Labs
Originally developed in 1969
Command line interface
Portable, multi-tasking, multi-user
Free distribution, open system
Servers, workstations, mobile devices
Basis of Linux and MacOS
See Reading section of course site for basic Unix commands.
Every file and directory has nine permissions associated with it.

Files and directories have three types of permissions (or none):
- r (read)
- w (write)
- x (execute)
- (no permission)

The above permissions occur for each of the following classes or users:
- u (user/owner)
- g (group)
- o (other/world)
<table>
<thead>
<tr>
<th>Permission</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>chmod 777 filename</td>
</tr>
<tr>
<td>G</td>
<td>chmod 775 filename</td>
</tr>
<tr>
<td>W</td>
<td>chmod 755 filename</td>
</tr>
<tr>
<td>rwX</td>
<td>chmod 664 filename</td>
</tr>
<tr>
<td>rwX</td>
<td>chmod 644 filename</td>
</tr>
<tr>
<td>rwX</td>
<td>rwX</td>
</tr>
<tr>
<td>rX</td>
<td>rX</td>
</tr>
<tr>
<td>rw-</td>
<td>rw-</td>
</tr>
<tr>
<td>r</td>
<td>r-</td>
</tr>
<tr>
<td>rw-</td>
<td>r--</td>
</tr>
<tr>
<td>r</td>
<td>r--</td>
</tr>
</tbody>
</table>

This table shows the different permission levels for users (U), groups (G), and others (W) along with the corresponding `chmod` commands.
Chmod

Files and folders

Standard file permission: 644
Owner can read and write file; group can read file; others can read file

Standard directory permission: 755
Owner can read, write and execute file; group can read and execute file; others can read and execute file
HTML

HyperText Markup Language

A language for describing Web pages

HTML is not a programming language, it is a markup language

A markup language is a set of markup tags

HTML uses markup tags to describe Web pages
HTML

Early history key dates

1990: Original HTML specification written by physicist, Tim Berners-Lee for cross-referencing documents

1993: First text-based browser, Lynx, released

1993: Mosaic browser released, adding images, nested lists, forms

1994: First World Wide Web conference held in Geneva

1994: Netscape is formed

1994: The World Wide Web Consortium is formed, w3.org
HTML Tag
Opening/Closing

Keywords surrounded by angle brackets, for example: `<html>`

HTML tags normally come in pairs, like `<h1>` and `</h1>`

The first tag in a pair is the “start tag,” the second tag is the “end tag”

Start and end tags are also called “opening” and “closing” tags
HTML Element

Everything from the start tag to the end tag

Example:
<p>This is a paragraph.</p>

Start tag:
<p>

Element content:
This is a paragraph.

End tag:
</p>
**Web Pages**

**HTML Documents**

HTML documents describe Web pages.

Contain HTML tags in plain text.

HTML documents are Web pages.

Recommended plain text editors:
Sublime Text, Atom, and Brackets.
Web Browsers

Render HTML Documents

Reads HTML documents and displays them as Web pages

Web browsers do not display HTML tags, but use them to interpret the content of the page

Recommended browsers: Firefox, Chrome, Safari, Edge
Example

Bare minimum

<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8">
  <title>Page Title</title>
</head>
<body>
</body>
</html>
Example Explained

```html
<!DOCTYPE html> tells browsers that they are interpreting an HTML document

Text between <html> and </html> describes the Web page

Text between <title> and </title> is displayed as the page title

Text between <body> and </body> is the visible page content
Web pages are usually created “locally” on a personal computer, then uploaded to a web server.

A web page is not publicly accessible until it’s published to a web server.

An FTP client is used to transfer files from a personal computer to a server.

Cyberduck, Fetch, WinSCP, Transmit, and FileZilla are good SFTP clients.

“Local” files are those on a personal computer, “remote” files are those on a web server—“live.”
HTML5
New standard for HTML

First version published in 2008
An official W3C recommendation as of October 2014

• New Elements
• New Attributes
• Full CSS3 Support
• Video and Audio
• 2D/3D Graphics
• Web Applications
• Smartphone Apps
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CSS
Cascading Style Sheets
CSS
Cascading Style Sheets

Defines a Web page’s appearance
CSS separates style and content
Consists of a plain text file with rules for the display of HTML elements
Formatting includes fonts and colors as well as layout and position
Can be created outside of your HTML and applied to multiple Web pages
Well-formed HTML is important for your CSS to work properly
CSS

History

Prior to CSS, Web pages were commonly styled with HTML tags and structured with tables.

This was both tedious and inefficient.

Nine different style sheet languages were proposed, two were chosen as the foundation.

CSS Level 1 emerged as a W3C Recommendation in December 1996.

Browsers began to support CSS over the next few years.
CSS can be applied in three different ways to a Web page:

• In an external .css file

• In the <head> section of an HTML document

• Inline with HTML code
CSS
Rule Set

Selector: Indicates which HTML element will be formatted

Declaration block: Describes the formatting to apply

Property/value pair: Specifies format

Style rules are separated by a semicolon

h1 {
    color: green;
    background: yellow;
}
The principle of the “cascade” is applied when style rules are in conflict.

Three primary factors determine which style rule wins out:

• Inheritance
• Specificity
• Location
CSS

Box Model

In a web page, every element is rendered as a rectangular box.

This box includes the following, changeable properties:

• Content
• Padding
• Border
• Margin
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CSCI-UA 4

CSS
Cascading Style Sheets
CSS

Units of Length

There are two types of length units in CSS, relative and absolute.

Relative units of length include:
• `em` (relative to font size)
• `%` (relative to the containing element)

Absolute units of length include:
• `px` (pixels)

Alternatively specifications:
• `auto` (browser calculates length)
• `inherit` (from the parent element)
CSS3

Latest standard for CSS

CSS2 is best supported

CSS3 is still evolving but offers new features for designers and developers

Modern browsers support many aspects of CSS3

Backwards compatible with CSS2
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Web Page Layout
HTML and CSS
Elements in HTML are primarily “inline” or “block” elements.

- An inline element allows content to flow around its left and right sides.
- A block element fills the entire line and nothing is displayed on its left or right side.

The CSS display property allows you to specify the type of box used for an HTML element.
The HTML `<div>` tag can be used to give your page structure.

Like the `<span>` tag, it has no specific meaning except to outline a section of content.

The `div` tag is only used in the body section of an HTML document.

Initially, this structure will not be visible to the user.

Used in conjunction with CSS, we will have more control over the form and layout of web pages.
Page Layout

There are several ways to design the layout of a web page with CSS.

- CSS float property
- CSS positioning
- CSS flexible box
- CSS grids
The CSS float property allows you to position block elements inline. This means that any element, block or inline, can be positioned alongside another element. The CSS float property is one of the main techniques of web page layout.
Page Layout

CSS Positioning

The CSS position property specifies the type of positioning used for an element on a page.

**static:** Elements are rendered in order, as they appear in the document flow (this is the default)

**absolute:** Element is positioned relative to its first positioned (not static) parent element

**fixed:** Element is positioned relative to the browser window

**relative:** Element is positioned relative to its normal position
Page Layout

CSS Flexible Box

Flexible box, or flexbox, is a new layout mode in CSS3 that is becoming increasingly common on web pages.

Flexbox consists of flexible containers and flexible items within.

A flex container expands items to fill available free space or shrinks them to prevent overflow.

In practice, flexbox can accommodate different screen sizes and different display devices more easily than the CSS float property.
Page Layout

CSS Grid

Web pages are often laid out using grid systems.

CSS grids are intended to make this process more intuitive by defining a grid and then specifying where content should be placed within it.

CSS grid layout is an experimental feature that is not widely supported across browsers yet.
Photoshop
1987

Created by Thomas Knoll, then a PhD student at the University of Michigan

Originally called “Display”

For displaying grayscale images, scanned into a computer

Acquired by Adobe in 1988

Released as Photoshop 1.0 for Macintosh in 1990
<table>
<thead>
<tr>
<th>Technological Basis</th>
<th>A grid of picture elements, “pixels,” each of which contain color and brightness information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitmap/raster graphics</td>
<td>Pixels can be changed individually or as a group with program algorithms</td>
</tr>
<tr>
<td></td>
<td>Contrast vector graphics which describe points and lines</td>
</tr>
<tr>
<td></td>
<td>Layer support introduced in version 3 (c. 1993)</td>
</tr>
</tbody>
</table>
Photomontage by: Mmxx
Thought
Thought

Design is a process that involves you.
Form

Photography
Illustration
Line and Shape
Texture
Color
Typography
Composition
<table>
<thead>
<tr>
<th>Form</th>
<th>Hue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Value</td>
</tr>
<tr>
<td></td>
<td>Intensity</td>
</tr>
</tbody>
</table>
Form
Typography

Font selection
Type size
Alignment
Letter spacing
Line spacing
Grammar
Form
   Composition

Rhythm
   Proportion
   Structure
   Variation
   Balance
   Boundary
   Space
Context
Context

Age
Ethnicity
Geography
Interest
Education
Market
Social Group
Cultivating a mindful design approach allows you to do more with less.
Wireframing

Website wireframing allows you to plan the layout of your website.

It is the process of making design decisions before they are implemented.

Wireframing can range from a simple skeletal framework to a detailed mockup of each page.

Spending time planning your site makes coding easier.
Wireframing
And Prototyping

Here is an approach to wireframing that can be adapted to a variety of design projects.

• Think
• Design
• Implement
• Revise

This sequence can be looped through as necessary.
Wireframing

Site Map
Midterm exam on Tuesday, October 24