Cascading Style Sheets (CSS)

Mendel Rosenblum
Driving problem behind CSS

What font type and size does `<h1>Introduction</h1>` generate?

Answer: Some default from the browser (HTML tells what browser how)

Early HTML - Override defaults with attributes

```html
<table border="2" bordercolor="black">
```

**Style sheets** were added to address this:

Specify style to use rather than browser default

Not have to code styling on every element
Key concept: Separate style from content

Content (what to display) is in HTML files

Formatting information (how to display it) is in separate style sheets (.css files).

Use an element attribute named **class** to link (e.g. `<span class="test">`)

Result: define style information once, use in many places

    Consider can you make all the text in the app slightly bigger?
    Or purple is our new company color.

**DRY principle: Don't Repeat Yourself**
Style sheet contain one or more **CSS Rules**

```css
body {
  font-family: Tahoma, Arial, sans-serif;
  color: black;
  background: white;
  margin: 8px;
}
```
<table>
<thead>
<tr>
<th><strong>CSS Selector</strong></th>
<th><strong>CSS</strong></th>
<th><strong>HTML</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tag name</td>
<td>h1 {</td>
<td></td>
</tr>
<tr>
<td></td>
<td>color: red;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>}</td>
<td>&lt;h1&gt;Today’s Specials&lt;/h1&gt;</td>
</tr>
<tr>
<td>Class attribute</td>
<td>.large {</td>
<td></td>
</tr>
<tr>
<td></td>
<td>font-size: 16pt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>}</td>
<td>&lt;p class=&quot;large&quot;&gt;...&lt;/p&gt;</td>
</tr>
<tr>
<td>Tag and Class</td>
<td>p.large {...}</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;p class=&quot;large&quot;&gt;...&lt;/p&gt;</td>
</tr>
<tr>
<td>Element id</td>
<td>#p20 {</td>
<td></td>
</tr>
<tr>
<td></td>
<td>font-weight: bold;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>}</td>
<td>&lt;p id=&quot;p20&quot;&gt;...&lt;/p&gt;</td>
</tr>
</tbody>
</table>
CSS Pseudo Selectors

**hover** - Apply rule when mouse is over element (e.g. tooltip)

```css
p:hover, a:hover {
    background-color: yellow;
}
```

**a:link, a:visited** - Apply rule when link has been visited or not visited (link)

```css
a:visited {
    color: green;
}
a:link {
    color: blue;
}
```
CSS Properties

Control many style properties of an element:

- Coloring
- Size
- Position
- Visibility
- Many more: (e.g. `p: { text-decoration: line-through; }`)  
- Also used in animation
Color - Properties: color & background_color

Must ultimately turn into red, green, and blue intensities between 0 and 255:

- Predefined names: red, blue, green, white, etc.
- 8-bit hexadecimal numbers for red, green, blue: #ff0000
- 0-255 decimal intensities: rgb(255, 255, 0)
- Percentage intensities: rgb(80%, 80%, 100%)

Example: h1: { color: red; }
CSS Box Model

Total element width = width + left padding + right padding + left border + right border + left margin + right margin

Margin & Padding

Transparent
## CSS distance units

<table>
<thead>
<tr>
<th>Absolute</th>
</tr>
</thead>
<tbody>
<tr>
<td>2px</td>
</tr>
<tr>
<td>1mm</td>
</tr>
<tr>
<td>2cm</td>
</tr>
<tr>
<td>0.2in</td>
</tr>
<tr>
<td>3pt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relative</th>
</tr>
</thead>
<tbody>
<tr>
<td>2em</td>
</tr>
<tr>
<td>3rem</td>
</tr>
</tbody>
</table>
Size Properties - Element, pad, margin, border

width - Override element defaults
height

padding-top
padding-right
padding-bottom
padding-left

margin-top
margin-right
margin-bottom
margin-left

border-bottom-color
border-bottom-style
border-bottom-width
border-left-color
border-left-style
border-left-width
border-right-color
border-right-style
border-right-width
etc.

p {
  border: 5px solid red;
}

position property

position: static;  (default) - Position in document flow

position: relative;  Position relative to default position via top, right, bottom, and left properties

position: fixed;  Position to a fixed location on the screen via top, right, bottom, and left properties

position: absolute;  Position relative to ancestor absolute element via top, right, bottom, and left properties

Fixed position (0,0) is top left corner
Some more common properties

background-image: image for element's background

background-repeat: should background image be displayed in a repeating pattern (versus once only)

font, font-family, font-size, font-weight, font-style: font information for text

text-align, vertical-align: Alignment: center, left, right

cursor - Set the cursor when over element (e.g. help)
Element visibility control properties

display: none; - Element is not displayed and takes no space in layout.
display: inline; - Element is treated as an inline element.
display: block; - Element is treated as a block element.
display: flex; - Element is treated as a flex container.
display: grid; - Element is treated as a grid container.

visibility: hidden; - Element is hidden but space still allocated.
visibility: visible; - Element is normally displayed
Flexbox and Grid layout

- `display: flex;` (Flexbox)
- `display: grid;` (Grid) newer layout method
  - Items flex to fill additional space and shrink to fit into smaller spaces.
  - Useful for web app layout:
    - Divide up the available space equally among a bunch of elements
    - Align of different sizes easily
    - Key to handling different window and display sizes

- Flexbox - Layout one dimension (row or column) of elements
- Grid - Layout in two dimensions (rows and columns) of elements
- Covered in discussion section
Some other CSS issues

- Inheritance
  - Some properties (e.g. font-size) are inherited from parent elements
  - Others (border, background) are not inherited.

- Multiple rule matches
  - General idea: most specific rule wins

```html
<span>Text1</span>               span.test { color: green }
<span class="test">Text2</span>  span { color: red }
```
Adding Styles to HTML

<head>
    <link rel="stylesheet" type="text/css" href="myStyles.css" />
    <style type="text/css">
        body {
            font-family: Tahoma, Arial, sans-serif;
        }
    </style>
</head>
<body>
    <div style="padding:2px; ... ">
    </div>
</body>
body {
  font-family: Tahoma, Arial, sans-serif;
  font-size: 13px;
  color: black;
  background: white;
  margin: 8px;
}
h1 {
  font-size: 19px;
  margin-top: 0px;
  margin-bottom: 5px;
  border-bottom: 1px solid black
}
.shaded {
  background: #d0d0ff;
}

**CSS:**

HTML:

```html
<body>
  <h1>First Section Heading</h1>
  <p>
    Here is the first paragraph, containing text that really doesn't have any use or meaning; it just prattles on and on, with no end whatsoever, no point to make, really no purpose for existence at all.
  </p>
  <div class="shaded">
    <h1>Another Section Heading</h1>
    <p>
      Another paragraph.
    </p>
  </div>
</body>
```
Example Output

First Section Heading

Here is the first paragraph, containing text that really doesn't have any use or meaning; it just prattles on and on, with no end whatsoever, no point to make, really no purpose for existence at all.

Another Section Heading

Another paragraph.
CSS in the real world

● **CSS preprocessors (e.g. less) are commonly used**
  ○ Add variable and functions to help in maintaining large collections of style sheets
  ○ Apply scoping using the naming conventions

● **Composition is a problem**
  ○ It can be really hard to figure out what rule from which stylesheet is messing things up