Introduction to CSS

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Introducing CSS

- Recall that three primary technologies are used when implementing interactive web pages.
  - ***HTML***: which dictates the structure and content of a web page
  - ***JavaScript***: which implements animations and user interactivity and otherwise control the behavior of the elements
  - ***CSS***: short for ***C****ascading* ***S****tyle* ***S****heets*, controls layout, formatting, and presentation
- Any nontrivial web application will require a large amount of HTML, CSS, and JavaScript.
  - As web applications grow in complexity, it's important to decouple the HTML, CSS, and JavaScript as much as possible so that changes to an HTML document never break a CSS rule or compromise the execution of some JavaScript event handler.
  - Web applications that successfully separate content, presentation, and interactivity are much easier to maintain.

CSS Declarations

- Web designers control the presentation of a page using one or more CSS declarations, each of which is structured like this:

property-name`:` *property-value*`;`

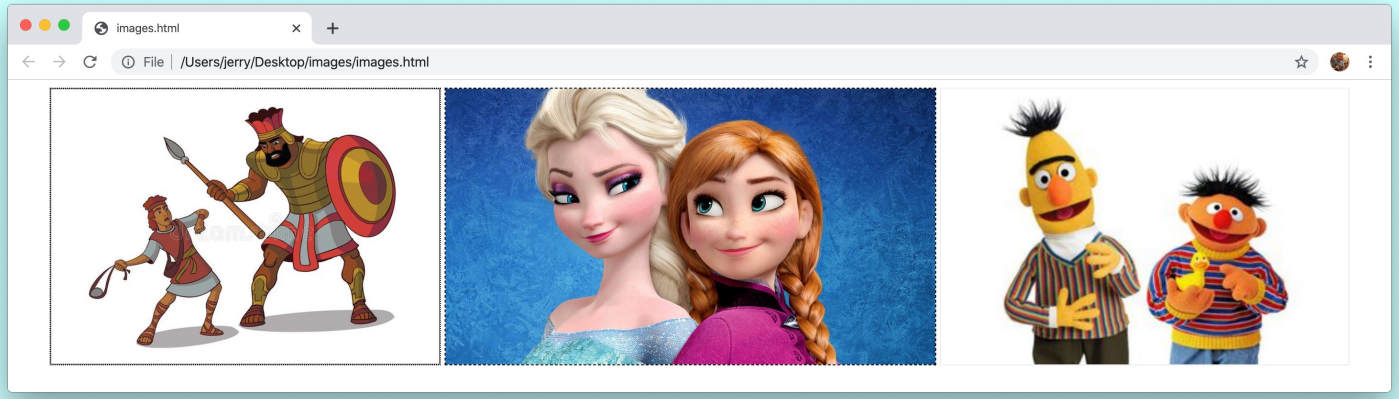
- A property name is one of several CSS keywords (583 according to **`https://www.w3.org/Style/CSS/all-properties.en.html`**) controlling some presentation detail.
- The set of possible property values depends on the name.
  - **`background-color`** can take on any legal JavaScript or CSS color, e.g., **`green`**, **`rgb(85, 172, 238)`**, or **`#E98725`**.
  - **`text-align`** governs the horizontal alignment of text and can be set to **`left`**, **`right`**, **`center`**, or **`justify`**.
  - **`display`** controls how an element is displayed and can be bound to **`inline`**, **`block`**, **`inline-block`**, **`flex`**, and **`none`**.

CSS Declarations: Photo Wall

- The easiest way to include a CSS declaration is to include a style attribute as part of a tag, as with:

```
<div style="text-align: center;">
    <img src="david-goliath.jpg"
         style="height: 144px; border: dotted 1px;"/>
    <img src="elsa-anna.jpg"
         style="height: 144px; border: dashed 1px;"/>
    <img src="bert-ernie.jpg"
         style="height: 144px; border: ridge 1px;"/>
</div>
```

- The above HTML fragment produces the following:



CSS Declarations

- In the last example, each **`img`** tag is decorated with its own **`style`** attribute.
  - All values share the same **`height`** property value, so the displayed images are scaled to the specified height and are vertically aligned.
  - Unless otherwise specified, image elements are **`inline-block`**, which means they flow left to right just as text does (that's the **`inline`** part) and their width and height can be specified (that's the **`block`** part).
  - Each value specifies its own **`border`** property value. The border width is 1px everywhere, but each chooses its own border style.
- The **`div`** tag is styled so all text under its jurisdiction (or rather, all inline elements like **`img`**) are horizontally centered.
- You don't need to memorize all 583 property names and the spectrum of possible property values for each. You just need to be able to read CSS declarations and understand them.

CSS Declarations: The Bad

- While adding **`style`** attributes to HTML tags is relatively straightforward, it's rarely the best approach.
- One obvious drawback is that the styling is isolated to just the one tag. In the images example, we repeated portions of the **`style`** attribute value for each of the three **`img`** tags.
  - If the image height needs to change—perhaps you decide it should be 96 pixels instead of 144—then you'd need to change the property value in three separate places.
  - It's a form of code replication—yes, CSS is code!—that's borderline forbidden no matter the language.
- A more serious drawback is that placing CSS in an HTML file violates a core web software engineering principle that HTML, CSS, and JavaScript remain separate.
  - The engineer writing the HTML shouldn't be responsible for inline CSS style attributes if CSS isn't their expertise.

CSS Rules

- To mitigate the code replication problem, we define styles that apply not to a single element but to an entire document. The most common practice for doing so is defining a set of ***CSS rules***, each of which takes the following form:

```
selector {
    property-name-1 : property-value-1 ;
    property-name-2 : property-value-2 ;
    property-name-3 : property-value-3 ;
    etc…
}
```

- To help mitigate **both** problems, CSS declarations are typically placed in separate files and referenced by the HTML file that depends on them. These files are called ***stylesheets***.
- HTML and CSS can't be completely decoupled, since each impacts the other. We rely on the two mechanisms above to make a web application's architecture as modular as possible.

CSS Rules

- The *selector* portion of the rule can take on many forms, the most basic of which take on the following structure:
  - A hash followed by the DOM id of an element, which states the rule should be applied to the element with that id.

```
#keyboard {
    font: 12px Courier;
    color: #080019
}
```

  - A period followed by a name, which defines a rule that HTML tags adopt by defining a **`class`** attribute whose value includes the name. So, **`<span class="answer incorrect final">43</span>`** would ensure the 43 of interest would be presented in **bold**, angry red.

```
.incorrect {
    font-style: bold
    color: red
}
```

  - An HTML tag name, which specifies all elements of that type respect the rule. The rule to the right would mandate **all** images be 72px square unless a more specific rule exits elsewhere to override it.

```
img {
    width: 72px;
    height: 72px;
}
```

Photo Wall, Take II

- Here is an implementation of the photo wall application that makes proper use of CSS rules and stylesheets.

File: **images.html**

```
<!DOCTYPE html>
<html>
   <head>
      <meta charset="UTF-8">
      <title>Photo Wall, Take II</title>
      <link rel="stylesheet"
            type="text/css"
            href="images.css"/>
   </head>
   <body>
      <div id="photo-wall">
         <img src="david-goliath.jpg"
              class="portrait dotted-frame"/>
         <img src="elsa-anna.jpg"
              class="portrait dashed-frame"/>
         <img src="bert-ernie.jpg"
              class="portrait ridge-frame"/>
      </div>
   </body>
</html>
```

File: **images.css**

```
#photo-wall {
   text-align: center;
}

.portrait {
   height: 288px;
   border-width: 1px;
}

.dotted-frame {
   border-style: dotted;
}

.dashed-frame {
   border-style: dashed;
}

.ridge-frame {
   border-style: ridge;
}
```

The Cascade of CSS

- The selector component is often a waterfall of selectors that telescope to identify a specific category of HTML elements.

```
#keyboard span.highlighted {
   color: #CC3333; /* Persian red */
}

#lampset span.highlighted {
   color: #FF9999; /* Light salmon pink */
}
```

- The first rule applies to **`span`** elements that:
  - are below the element with id **`"keyboard"`** in the DOM tree
  - include **`"highlighted"`** in its list of **`class`** attribute values
- The second rule also applies to **`span`**s satisfying the same two constraints, but replace **`"keyboard"`** with **`"lampset"`**
- The ***cascade*** is the algorithm browsers use to decide what rules apply to what elements, particularly in the face of conflicts.

CSS and JavaScript

- JavaScript can be used to modify the presentation of existing elements.
- The JavaScript standard recognizes that per-element style manipulation is so common that it exposes the **`class`** attribute via *element*.**`classList`**.
- The **`classList`** attribute stores its class names in an array-like object. So, the element representing:

```
<span class="answer incorrect final">43</span>
```

would include a **`classList`** attribute with three classes. The only three **`classList`** methods of interest are illustrated here:

```
function regradeQuestion(elem) {
   if (elem.classList.contains("incorrect")) {
      elem.classList.remove("incorrect"));
      elem.classList.add("correct");
   }
}
```

The End