# Comp 388/424 - Client-side Web Design

Fall Semester 2015 - Week 3

Dr Nick Hayward

## Contents

## Group projects

- add project details to Trello organisation
- create channels on Slack for group communication
- start working on an idea for your project
- plan weekly development up to and including DEV Week
  - *5th to 9th October*
  - *DEV week demo on 15th October*

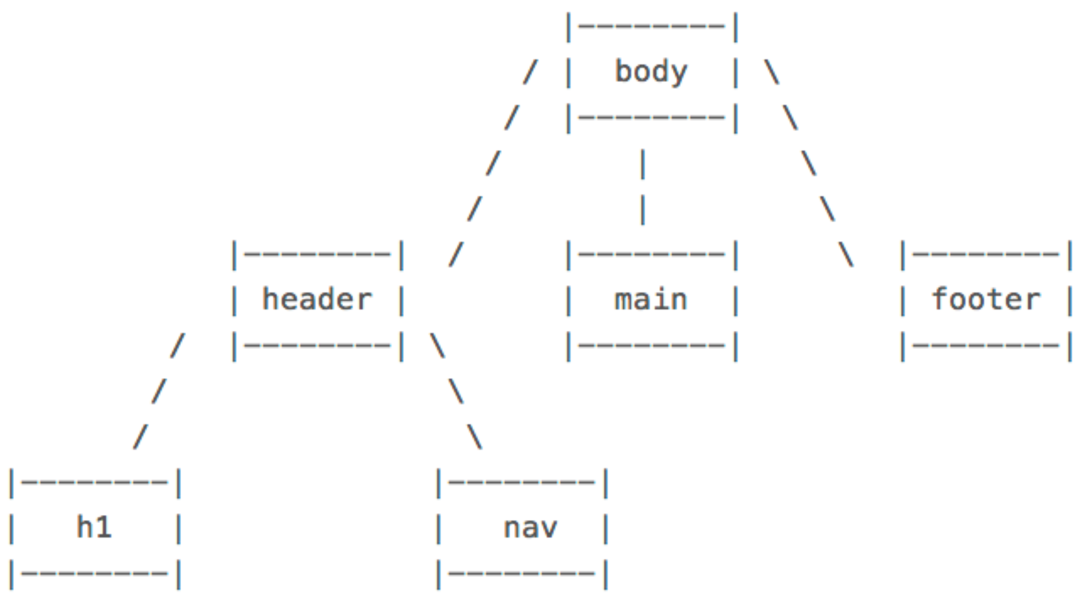
## DOM Basics - intro

A brief introduction to the document object model (DOM). This is particularly useful for CSS styling, and manipulating an underlying HTML document with JavaScript.

## DOM Basics - what is DOM?

- presents a platform and language independent way to access and manipulate the underlying structure of our HTML document
- structured as a representation of a tree data structure
  - *its manipulation follows this same, standard principle*
- DOM tree is constructed using a set of nodes
  - *tree is designed as a hierarchical representation of the underlying document*
- each node on our tree is an element within our HTML document
- inherent hierarchical order originates with the *root* element
  - *at the top of our tree*
  - *descends down following lineage from node to node*
- each node is a child to its parent
  - *we can find many siblings per node as well*

## Image - HTML DOM



HTML DOM

## DOM Basics - useful elements

| element tag | usage & description |
|---|---|
| `<html>` | container element for a HTML document |
| `<head>` | contains metadata and document information |
| `<body>` | contains main content rendered as the HTML document |
| `<header>` | page header... |
| `<nav>` | navigation, stores and defines a set of links for internal or external navigation |
| `<main>` | defined primary content area of document |
| `<footer>` | page footer... |
| `<section>` | a section of a page or document |
| `<article>` | suitable for organising and containing independent content |
| `<aside>` | defines content aside from the content which contains this element |
| `<figure>` | logical grouping of image and caption |
| `<img>` | image - can be local or remote using url in `src` attribute |
| `<figcaption>` | image caption |
| `<h1>, <h2>...` | headings from 1 to 6 (1 = largest) |
| `<a>` | anchor - link to another anchor, document, site... |
| `<ul>, <ol>, <dl>` | unordered, ordered, definition lists |
| `<li>` | list item, used with `<ul>, <ol>...` |
| `<dt>` | definition term, used with `<dl>` |

| **element tag** | **usage & description** |
|---|---|
| `<dd>` | definition description, used with `<dl>` |
| `<table>` | standard table with rows, columns... |
| `<tr> >` | table row, used with `<table>` |
| `<th>` | table heading, used with `<table>` and child to `<tr>` |
| `<td>` | table cell, used with `<table>` and child to `<tr>` |
| `<div>` | non-semantic container for content, similar concept to `<section>` |
| `<span>` | group inline elements in a HTML document |
| `<canvas>` | HTML5 element for drawing on the HTML page |
| `<video>` | HTML5 element for embedding video playback |
| `<audio>` | HTML5 element for embedding audio playback |

***NB:*** *`<div>` and `<span>` can be used as identifiers when there is no other suitable element to define parts of a HTML document.*

## DOM Basics - sample

```
<!DOCTYPE html>
<html>
<head>
<base href="media/images/">
<meta charset="UTF-8">
<!-- week 3 - demo 1 -->
<title>Week 3 - Demo 1</title>
</head>
<body>
  <header>
  <h1>Ancient Egypt</h1>
  </header>
  <nav></nav>
  <main>
    <section>
      <p>
        Welcome to the Ancient Egypt information site.
      </p>
      <figure>
        <img src="philae-demo2.jpg" alt="philae temple" 
        height="200px">
        <figcaption>Ptolemaic temple at Philae, Egypt</f
      </figure>
    </section>
    <aside>
      Temple at Philae in Egypt is Ptolemaic era of Egyp
    </aside>
  </main>
  <footer>
    foot of the page...
  </footer>
</body>
</html>
```

## Demo 1 - DOM Sample

## HTML - `<head>` element

- part of a HTML document's metadata
- allows us to set metadata for a HTML page
- customised just for that page or replicated as a site-wide implementation
- we can add numerous additional elements to `<head>`
- add similar links and code for JavaScript
  - *use the `<script>` element & attributes such as `type` and `src`*

```
<script type="text/javascript" src="script.js">
```

- add a `<title>` element with text added as the element content
- set a default base address for all relative URLs in links within our HTML

```
<base href="/media/images/" target="_blank">
```

- links now simply use the base URL or override with full URL

```
<img src="image.jpg">
<a href="http://www.flickr.com">Flickr</a>
```

## HTML - <head> element example

```
<head>
  <meta charset="utf-8">

  <title>Sample...</title>
  <meta name="description" content="sample metadata">
  <meta name="author" content="COMP424">

  <link rel="stylesheet" type="text/css" href="style.css
  <script type="text/javascript" src="script.js">

</head>
```

## CSS Basics - intro

- CSS allows us to define stylistic characteristics for our HTML
  - *helps us define how our HTML is displayed and rendered*
  - *colours used, font sizes, borders, padding, margins, links...*
- CSS can be stored
  - *in external files*
  - *added to a `<style>` element in the `<head>`*
  - *or embedded as inline styles per element*
- CSS not intended as a replacement for encoding semantic and stylistic characteristics with elements
- add a link to our CSS stylesheet using the `<link>` element.

```
<link rel="stylesheet" type="text/css" href="style.css"
```

- change will replicate throughout our site wherever the stylesheet is referenced
- embed styles per element using **inline** styles
  - *limitations and detractors for this style of CSS*
  - *helped by the growth and popularity of React...*

## CSS Basics - pros

### Pros

- inherent option and ability to abstract styles from content
- isolating design styles and aesthetics from semantic markup and content
- cross-platform support offered for many aspects of CSS
  - *CSS allows us to style once, and apply in different browsers*
  - *a few caveats remain...*
- useful frameworks such as Bootstrap
- support many different categories of device
  - *mobile, screen readers, print, TVs...*
- accessibility features

## CSS Basics - cons

### Cons

- still experience issues as designers with rendering quirks for certain styles
  - *border styles, wrapping, padding, margins...*
- everything is global
  - *CSS matches required selectors against the whole DOM*
  - *naming strategies can be awkward and difficult to maintain*
- CSS can become a mess very quickly
  - *we tend to add to CSS instead of deleting*
  - *can grow very large, very quickly...*

## CSS Basics - intro to syntax

- simple, initial concepts for CSS syntax
- follows a defined syntax pattern, eg:
- selector
  - *eg: body or p*
- declaration
  - *property and value pairing*

```
body {
  color: black;
  font-family: "Times New Roman", Georgia, Serif;
  }
```

## CSS Basics - rulesets

- a CSS file is a group of rules for styling our HTML documents
- rules form **rulesets**, which can be applied to elements within the DOM
- rulesets consist of the following,
  - *a selector - `p`*
  - *an opening brace - {*
  - *a set of rules - `color: blue`*
  - *a closing brace - }*
- for example,

```
body {
  width: 900px;
  color: #444;
  font-family: "Times New Roman", Georgia, Serif;
  }
```

- HTML Colour Picker

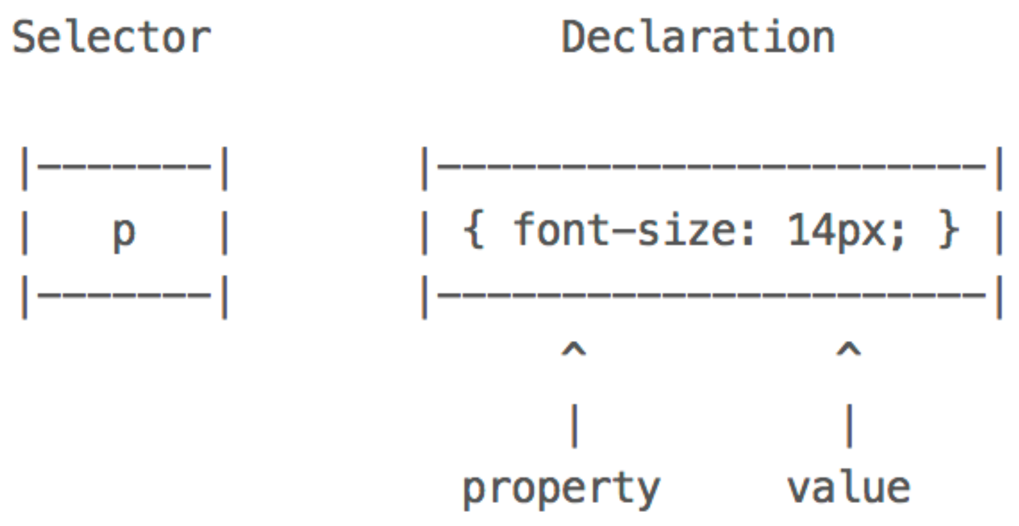
## CSS Basics - comments

- add comments to help describe the selector and its properties,

```
/* color can be set to a named value or HEX value (eg: #
p {
  color: blue;
  font-size: 14px;
  }
```

- comments can be added before the selector or within the braces

## Image - CSS Syntax



```
Selector                Declaration

|-------|       |----------------------|
|   p   |       | { font-size: 14px; } |
|-------|       |----------------------|
                      ^          ^
                      |          |
                   property    value
```

CSS Syntax

## CSS Basics - display

- display HTML elements in one of two ways
  - *inline - eg: a or `span`*
  - *displays content on the same line*

```
<div class="content">
  <p>
    <a href="...">Philae</a> is a <span>Ptolemaic</span>
  </p>
</div>
```

- more common to display elements as `block-level` instead of `inline` elements
- element's content rendered on a new line outside flow of content
- a few sample block elements include,
  - *article, div, figure, main, nav, p, section...*
- *block-level* is not technically defined for new elements in HTML5

## CSS Basics - inline elements

Current inline elements include:

- b | big | i | small | tt
- abbr | acronym | cite | code | dfn | em | kbd | strong | samp | var
- a | bdo | br | img | map | object | q | script | span | sub | sup
- button | input | label | select | textarea

Source - MDN - Inline Elements

## CSS Basics - block-level elements

Current block-level elements include:

- address | article | aside | blockquote | canvas | dd | div | dl
- fieldset | figure | figcaption | footer | form
- h1 | h2 | h3 | h4 | h5 | h6
- header | hgroup | hr | main | nav | noscript
- ol | output | p | pre | section | table | tfoot | ul | video

Source - MDN - Block-level Elements

## CSS Basics - HTML5 content categories - part 1

- *block-level* is not technically defined for new elements in HTML5
- now have a slightly more complex model called **content categories**
- includes three primary types of content categories

These include,

- **main content categories** - describe common content rules shared bu many elements
- **form-related content categories** - describe content rules common to form-related elements
- **specific content categories** - describe rare categories shared by only a small number of elements, often in a specific context

## CSS Basics - HTML5 content categories - part 2

- Metadata content - modify presentation or behaviour of document, setup links, convey additional info...
  - *`<base>`, `<command>`, `<link>`, `<meta>`, `<noscript>`, `<script>`, `<style>`, `<title>`*
- Flow content - typically contain text or embedded content
  - *`<a>`, `<article>`, `<canvas>`, `<figure>`, `<footer>`, `<header>`, `<main>`...*
- Sectioning content - create a section in current outline to define scope of `<header>` elements, `<footer>` elements, and *heading* content
  - *`<article>`, `<aside>`, `<nav>`, `<section>`*
- Heading content - defines title of a section, both explicit and implicit sectioning
  - *`<h1>`, `<h2>`, `<h3>`, `<h4>`, `<h5>`, `<h6>`, `<hgroup>`*

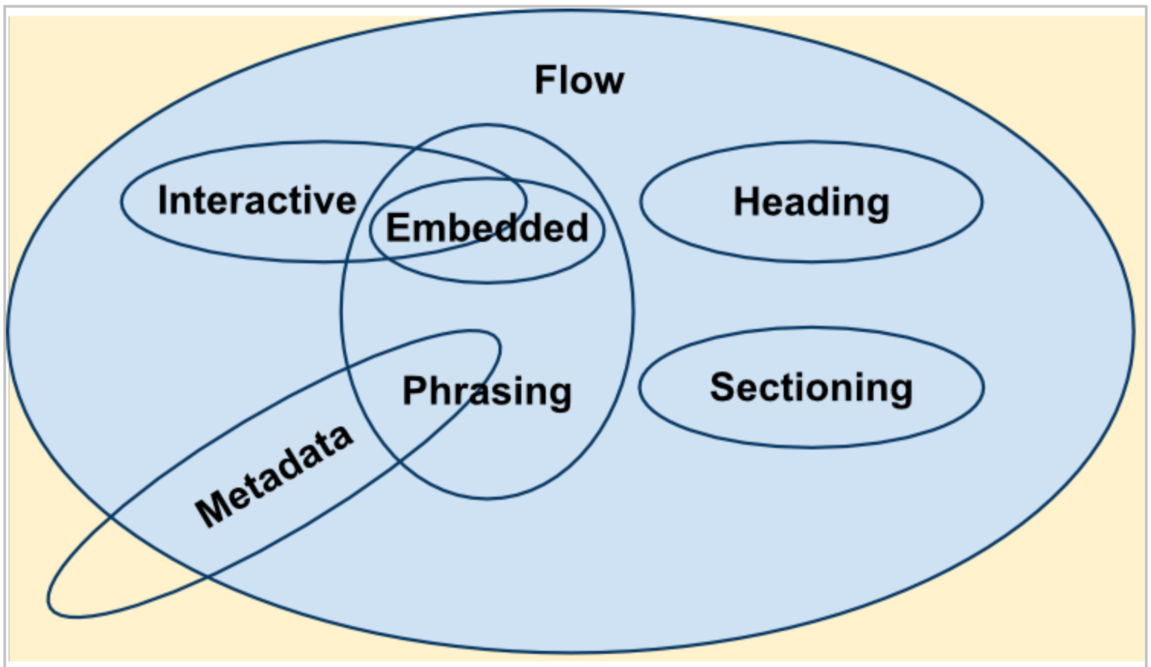
### Source - MDN Content Categories

## CSS Basics - HTML5 content categories - part 3

- Phrasing content - defines the text and the mark-up it contains
  - `<audio>`, `<canvas>`, `<code>`, `<img>`, `<label>`, `<script>`, `<video>`...
  - *other elements can belong to this category if certain conditions are met. eg: `<a>`*
- Embedded content - imports or inserts resource or content from another mark-up language or namespace
  - `<audio>`, `<canvas>`, `<embed>`, `<iframe>`, `<img>`, `<math>`, `<object>`, `<svg>`, `<video>`
- Interactive content - includes elements that are specifically designed for user interaction
  - `<a>`, `<button>`, `<details>`, `<embed>`, `<iframe>`, `<keygen>`, `<label>`, `<select>`, `<textarea>`
  - *additional elements, available under specific conditions, include*
  - `<audio>`, `<img>`, `<input>`, `<menu>`, `<object>`, `<video>`
- Form-associated content - elements contained by a form parent element
  - `<button>`, `<input>`, `<label>`, `<select>`, `<textarea>`...
  - *there are also several sub-categories, including listed, labelable, submittable, resettable*

## Source - MDN Content Categories

## Image - HTML5 Content Categories



HTML5 Content Categories

Source - MDN - Content Categories

## CSS Basics - box model - part 1

- consideration of the CSS box model
- a document's attempt to represent each element as a rectangular box
- boxes and properties determined by browser rendering engine
- browser calculates size, properties, and position of these required boxes
- properties can include, for example,
  - *colour, background features, borders, width, height...*
- box model designed to describe an element's required space and content
- each box has the standard four edges,
  - ***margin*** *edge*
  - ***border*** *edge*
  - ***padding*** *edge*
  - ***content*** *edge*

## CSS Basics - box model - part 2

### Content

- box's **content area** describes element's actual content
- Properties can include `color`, `background`, `img`...
  - *apply inside the **content** edge*
- dimensions include **content width** and **content-height**
- content size properties (assuming that the `box-sizing` property remains default) include,
  - *`width`, `min-width`, `max-width`, `height`, `min-height`, `max-height`*

## Demo - CSS Box Model

- Demo 2 - Box Model

## CSS Basics - box model - part 3

### Padding

- box's **padding area** includes the extent of the padding to the surrounding border
- background, colour etc properties for a content area extend into the padding
  - *we often consider the padding as extending the content*
- padding itself is located in the box's **padding edge**
- dimensions are the width and height of the **padding-box**.
- control space between padding and content edge using the following properties,
  - *`padding-top`, `padding-right`, `padding-bottom`, `padding-left`*
  - *`padding` (sizes calculated clock-wise)*

## Demo - CSS Box Model Padding

- JSFiddle - Demo

## CSS Basics - box model - part 4

### Border

- **border area** extends **padding area** to area containing the borders
- it becomes the area inside the **border edge**
- define its dimensions as the width and height of the **border-box**
- calculated area depends upon the width of the `border` we set in the CSS
- set size of our border using the following properties in CSS,
  - *`border-width`*
  - *`border`*
- **margin area** can extend this border area with an empty area
  - *useful to create a defined separation of one element from its neighbours*
- dimensions of area defined as width and height of the **margin-box**
- control size of our margin area using the following properties,
  - *`margin-top`*, *`margin-right`*, *`margin-bottom`*, *`margin-left`*

- *`margin` (sizes calculated clock-wise)*

## Demo - CSS Box Model Border

- JSFiddle - Demo

## CSS Basics - box model - part 5

### Margin

- **margin area** can extend this border area with an empty area
  - *useful to create a defined separation of one element from its neighbours*
- dimensions of area defined as width and height of the **margin-box**
- control size of our margin area using the following properties,
  - *`margin-top`, `margin-right`, `margin-bottom`, `margin-left`*
  - *`margin` (sizes calculated clock-wise)*

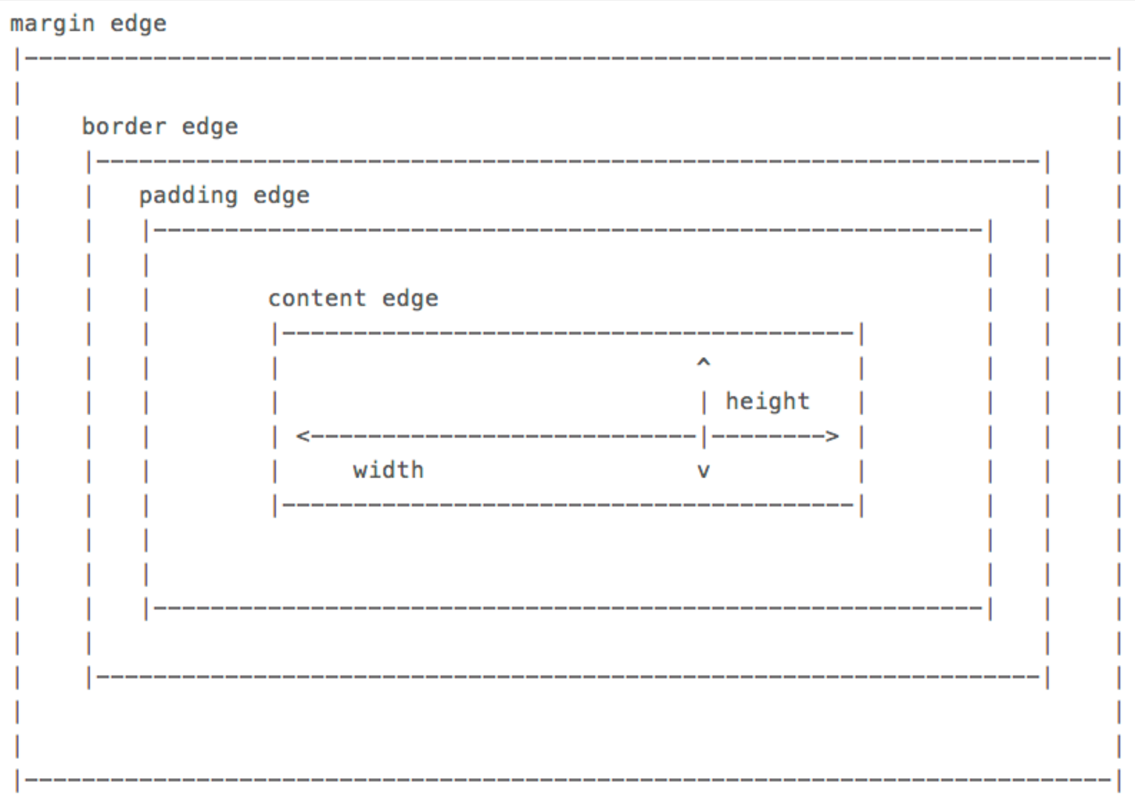
## Demo - CSS Box Model Margin

- JSFiddle - Demo

## Demo - CSS Box Model

- Demo 2 - Box Model

## Image - CSS Box Model



CSS Box Model

Source - MDN - CSS Box Model

## CSS Basics - selectors

- **selectors** are a crucial part of working with CSS
- basic selectors such as

```
p {
  color: #444;
}
```

- above ruleset adds basic styling to our paragraphs
  - *sets the text colour to HEX value 444*
- simple and easy to apply
  - *applies the same properties and values to all paragraphs*
- specificity requires classes, pseudoclasses...

## CSS Basics - classes

- add a **class** attribute to an element, such as a <p>
    - *can help us differentiate elements*
- also add a **class** to any DOM element
    - *eg: add different classes to multiple <p> elements*

```
<p class="p1">paragraph one...</p>
<p class="p2">paragraph two...</p>
```

- we can now select our paragraphs by class name within the DOM
- then apply a **ruleset** for each class
- style this class for a specific element

```
p.p1 {
  color: #444;
}
```

- style all elements with the class `p1`, and not just <p> elements

```
.p1 {
  color: #444;
}
```

## CSS Basics - pseudoclasses

- add a class to links or anchors, styling all links with the same ruleset
- we might also want to add specific styles for different link states
- styling links with a different colour
  - *eg: whether a link has already been used or not*

```
a {
  color: blue;
  }

a:visited {
  color: red;
  }
```

- `visited` is a CSS **pseudoclass** applied to the <a> element
- browser implicitly adds this pseudoclass for us, we add style

```
a:hover {
  color: black;
  text-decoration: underline;
}
```

- pseudoclass for link element, <a>, `hover`

## CSS Basics - complex selector - part 1

- our DOM will often become more complicated and detailed
- depth and complexity will require more complicated selectors as well
- lists and their list items are a good example

```
<ul>
  <li>unordered first</li>
  <li>unordered second</li>
  <li>unordered third</li>
</ul>
<ol>
  <li>ordered first</li>
  <li>ordered second</li>
  <li>ordered third</li>
</ol>
```

- two lists, one unordered and the other ordered
- style each list, and the list items using rulesets

```
ul {
  border: 1px solid green;
}
ol {
  border: 1px solid blue;
}
```

## Demo - Complex Selectors - Part 1

- Demo 3 - Complex Selectors Part 1

## CSS Basics - complex selector - part 2

- add a ruleset for the list items, `<li>`
- applying the same style properties to both types of lists
- more specific to apply a ruleset to each list item for the different lists

```
ul li {
  color: blue;
}
ol li {
  color: red;
}
```

- also be useful to set the background for specific list items in each list

```
li:first-child {
  background: #bbb;
}
```

- pseudoclass of `nth-child` to specify a style for the second, fourth etc child in the list

```
li:nth-child(2) {
  background: #ddd;
}
```

## Demo - Complex Selectors - Part 2

- Demo 4 - Complex Selectors Part 2

## CSS Basics - complex selector - part 3

- style odd and even list items to create a useful alternating pattern

```
li:nth-child(odd) {
  background: #bbb;
}
li:nth-child(even) {
  background: #ddd;
}
```

- select only certain list items, or rows in a table etc
  - *eg: every fourth list item, starting at the first one*

```
li:nth-child(4n+1) {
  background: green;
}
```

- for **even** and **odd** children we're using the above with convenient shorthand
- other examples include
  - *`last-child`*
  - *`nth-last-child()`*
  - *many others...*

## Demo - CSS Complex Selectors - Part 3

- Demo 5 - Complex Selectors Part 3

## CSS Basics - cascading rules - part 1

- CSS, or cascading style sheets, employs a sets of **cascading** rules
- rules applied by each browser as a ruleset conflict arises
  - *eg: issue of specificity*

```
p {
  color: blue;
  }
p.p1 {
  color: red;
  }
```

- the more specific rule, the class, will take precedence
- issue of possible duplication in rulesets

```
h3 {
  color: black;
}

h3 {
  color: blue;
}
```

- **cascading** rules state the later ruleset will be the one applied
  - *blue heading instead of black...*

## CSS Basics - cascading rules - part 2

- simple styling and rulesets can quickly become compounded and complicated
- Different styles, in different places, can interact in complex ways
- a powerful feature of CSS
  - *can also create issues with logic, maintenance, and design*
- three primary sources of style information that form this cascade
  1. default styles applied by the browser for a given markup language
     - *eg: colours for links, size of headings...*
  2. styles specific to the current user of the document
     - *often affected by browser settings, device, mode...*
  3. styles linked to the document by the designer
     - *external file, embedded, and as inline styles per element*
- basic cascading nature creates the following pattern
  - *browser's style will be default*
  - *user's style will modify the browser's default style*
  - *styles of the document's designer modify the styles further*

## CSS Basics - inheritance

- CSS includes inheritance for its styles
- descendants will inherit properties from their ancestors
- style an element
  - *descendants of that element within the DOM inherit that style*

```
body {
  background: blue;
}
p {
  color: white;
}
```

- p is a descendant of body in the DOM
  - *inherits background colour of the body*
- this characteristic of CSS is an important feature
  - *helps to reduce redundancy and repetition of styles*
- useful to maintain outline of document's DOM structure
- most styles follow this pattern but not all
- margin, padding, and border rules for block-level elements not inherited

## CSS Basics - fonts - part 1

- Fonts can be set for the body or within an element's specific ruleset
- we need to do specify our font-family,

```
body {
font-family: "Times New Roman", Georgia, Serif;
}
```

- value for the font-family property specifies preferred and fall-back fonts
  - *Times New Roman, then the browser will try Georgia and Serif*

## CSS Basics - fonts - part 2

- useful to be able to modify the size of our fonts as well

```
body {
  font-size: 100%;
}
h3 {
  font-size: x-large;
}
p {
  font-size: larger;
}
p.p1 {
  font-size: 1.1em;
}
```

- set base font size to 100% of font size for a user's web browser
- scale our other fonts relative to this base size
  - *CSS absolute size values, such as `x-large`*
  - *font sizes relative to the current context, such as `larger`*
  - *em are meta-units, which represent a multiplier on the current font-size*
  - *1.5em of 12px is effective 18px*
- em font-size scales according to the base font size
  - *modify base font-size, em sizes adjust*
- try different examples at
  - *W3 Schools - font-size*

## Demo - CSS Fonts

- Demo 6 - CSS Fonts
- JSFiddle - CSS Fonts

## CSS Basics - custom fonts

- fonts and CSS has traditionally been a limiting experience
- reliant upon the installed fonts on a user's local machine
- JavaScript embedding was an old, slow option for custom fonts
- web fonts are a lot easier
  - *Google Fonts*
- pick and choose our custom fonts by selecting *Quick-use*
- from the options, select
  - *required character sets*
  - *add a `<link>` reference for the font to our HTML document*
  - *then specify the fonts in our CSS*

```css
font-family: 'Roboto';
```

## Demo - CSS Custom Fonts

- Demo 7 - CSS Custom Fonts
- JSFiddle - CSS Custom Fonts

## CSS Basics - reset options

- help us reduce browser defaults, we can use a CSS reset
- often considered a rather controversial option
- reset allows us to start from scratch
- customise aspects of the rendering of our HTML documents in browsers
- considered controversial for the following primary reasons
  - *accessibility*
  - *performance*
  - *redundancy*
- use resets with care
- notable example of resets is Eric Meyer
  - *discussed reset option in May 2007 blog post*

## Demo - CSS Reset - Before

Browser default styles are used for

- `<h1>`, `<h3>`, and `<p>`
- Demo 8 - CSS Reset Before

## Demo - CSS Reset - After

Browser resets are implemented using the Eric Meyer stylesheet.

- Demo 9 - CSS Reset After

## CSS - a return to inline styles

- *inline* styles are oncemore gaining in popularity
  - *helped by the rise of React*
- for certain web applications they are now an option
  - *allow us to dynamically maintain and update our styles*
- their implementation is not the same as simply embedding styles in HTML
  - *dynamically generated*
  - *can be removed and updated*
  - *can form part of our maintenance of the underlying DOM*
- inherent benefits include
  - *no cascade*
  - *built using JavaScript*
  - *styles are dynamic*

## CSS - against inline styles

- CSS is designed for styling
  - *this is the extreme end of the scale - in effect, styling is only done with CSS*
- abstraction is a key part of CSS
  - *by separating out concerns, ie: CSS for styling, our sites are easier to maintain*
- *inline* styles are too specific
  - *again, abstraction is the key here*
- some styling and states are easier to represent using CSS
  - *psuedoclasses etc, media queries...*
- CSS can add, remove, modify classes
  - *dynamically update selectors using classes*

## CSS - test and try out

- JSFiddle - CSS Basics

## Next week - Quiz

Next week's quiz will include the following,

- everything covered in the first three weeks of the course
  - *includes today's lecture*
  - *further details on the course website as part of this week's assignment*

## Demos

- Demo 1 - DOM Basics
- Demo 2 - Box Model
- Demo 3 - Complex Selectors Part 1
- Demo 4 - Complex Selectors Part 2
- Demo 5 - Complex Selectors Part 3
- Demo 6 - CSS Fonts
- Demo 7 - CSS Custom Fonts
- Demo 8 - CSS Reset Before
- Demo 9 - CSS Reset After

## References

- CSS Tricks - nth child recipes
- Eric Meyer - reset CSS
- JSFiddle - CSS Basics
- MDN - CSS
  - *CSS box model*
  - *Cascading and inheritance*
- MDN - HTML developer guide
  - *Block-level elements*
  - *Content categories*
  - *Inline elements*
- W3 CSS
- W3 Web Style Sheets - Even & Odd
- W3 Schools - CSS
  - *W3 Schools - font-size*
  - *W3 Schools - HTML Block and Inline Elements*
  - *W3 Schools - HTML Colour Picker*