Comp 324/424 - Client-side Web Design

Fall Semester 2019 - Week 3

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HTML5 - Extra elements - graphics - part 1

canvas

- graphics elements are particularly fun to use
- use them to create interesting, useful graphics renderings
- in effect, we can draw on the page
- `<canvas>` element acts as a placeholder for graphics
  - *allows us to draw with JavaScript*
- draw lines, circles, text, add gradients...
  - *e.g. draw a rectangle on the canvas*

HTML5 - Extra elements - graphics - part 2

canvas example

<canvas> will be created as follows,

```
<canvas id="canvas1" width="200" height="100">
  Your browser does not support the canvas element.
</canvas>
```

then use JavaScript to add a drawing to the canvas

```
<script type="text/javascript">
var can1 = document.getElementById("canvas1");
var context1 = can1.getContext("2d");
context1.fillStyle="#000000";
context1.fillRect(0,0,150,75);
</script>
```

Result is a rendered black rectangle on our web page.

- Demo - HTML5 Canvas - Rectangle

HTML5 - Extra elements - graphics - part 3

canvas example

A square can be created as follows,

```
<script type="text/javascript">
function draw() {
/*black square*/
var can1 = document.getElementById("canvas1");
var context1 = can1.getContext("2d");
context1.fillStyle="#000000";
context1.fillRect(0,0,50,50);
}
</script>
```

Again, we end up with the following rendered shape on our canvas.

- Demo - HTML5 Canvas - Square

HTML5 - Extra elements - graphics - part 4

canvas examples

- modify drawing for many different shapes and patterns
  - *simple lines, circles, gradients, images...*

1. shows different rendered shapes on a canvas.

- Demo - HTML5 Canvas - Assorted Shapes

2. little retro games

- Demo - HTML5 Canvas - Retro Breakout Game

HTML5 - Extra elements - graphics - part 5

canvas examples - basics

- basic drawing - rectangle & staircase
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic/*
- Example - basic drawing - stepped pyramid
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic2/*
- Example - various colours
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic3/*
- Example - basic drawing - rectangle outlines
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic4/*
- Example - draw lines - line & pyramid
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic5/*
- Example - draw a stickman
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic6/*
- Example - fill paths
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic7/*

HTML5 - Extra elements - graphics - part 6

canvas examples - curves & circles

- Example - arcs and circles
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic8/*
- Example - Bézier curves - quadratic
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic9-quadratic/*
- Example - Bézier curves - cubic
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic9-cubic/*
- Example - arcs and circles - combine shapes to create an *ankh*
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic10-ankh/*
- Example - circle function
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic11-function-circles/*

HTML5 - Extra elements - graphics - part 7

canvas examples - animation & fun

- Example - horizontal animation
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation1/*
- Example - animate size
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation2/*
- Example - variant mouse colours
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation3.1/*
- Example - variant mouse colours
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation3.2/*
- Example - random movement and animation
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-animation/animation3.3/*

HTML5 - Extra elements - graphics - part 8

canvas examples - images & files

- Example - draw image to canvas from local file
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-image/basic1/*
- Example - draw image to canvas from local file - `dw` & `dh`
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-image/basic2/*
- Example - draw image to canvas from local file - `dw` & `dh` plus source crop
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-image/basic3/*

HTML5 - Extra elements - graphics - part 9

canvas examples - move & control

- Example - move ball with keyboard control
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move1/*
- Example - update `move()` to check canvas boundaries
  - *ttp://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move2/*
- Example - move ball on 4-point axis
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move3/*
- Example - move sprite image
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-sprite-move1/*
- Example - move sprite image
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move4/*
- Example - check basic collision against blocks
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move5/*
- Example - check basic collision against blocks - horizontal
  - *http://linode4.cs.luc.edu/teaching/cs/demos/125/drawing/basic-game/basic-ball-move6/*

HTML5 - Extra elements - graphics - part 10

more fun canvas examples

Some fun examples of animations with HTML5 Canvas API.

- Destroy things in a video - http://www.craftymind.com/factory/html5video/CanvasVideo.html
- Particles - https://codepen.io/eltonkamami/pen/ECrKd
- Curtain - https://codepen.io/dissimulate/pen/KrAwx
- Jelly - https://codepen.io/dissimulate/pen/dJgMaO
- Canvas cycle - http://www.effectgames.com/demos/canvascycle/

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

CSS Basics - stylesheet

- add a link to our CSS stylesheet in the <head> element

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

- change will replicate throughout our site wherever the stylesheet is referenced

CSS Basics - `<style>` element

- embed the CSS directly within the `<head>` section of our HTML page
- embed using the `<style>` element
- then simply add standard CSS within this element
- limitations include lack of abstraction for site usage and maintenance
  - *styles limited to a single page...*

```
<style type="text/css">
body {
  color: #000;
}
</style>
```

CSS Basics - inline

- embed styles per element using **inline** styles
  - *limitations and detractors for this style of CSS*
  - *helped by the growth and popularity of React...*

e.g.

```
<!-- with styles -->
<p style="color:#cd0603">a trip to Luxor</p>
<!-- without styles -->
<p>a trip to Karnak</p>
```

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...*
- various CSS frameworks available
- 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, e.g.
- selector
  - *e.g. body or p*
- declaration
  - *property and value pairing*

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

- `body` is the selector, `color` is the property, and `black` is the value.

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

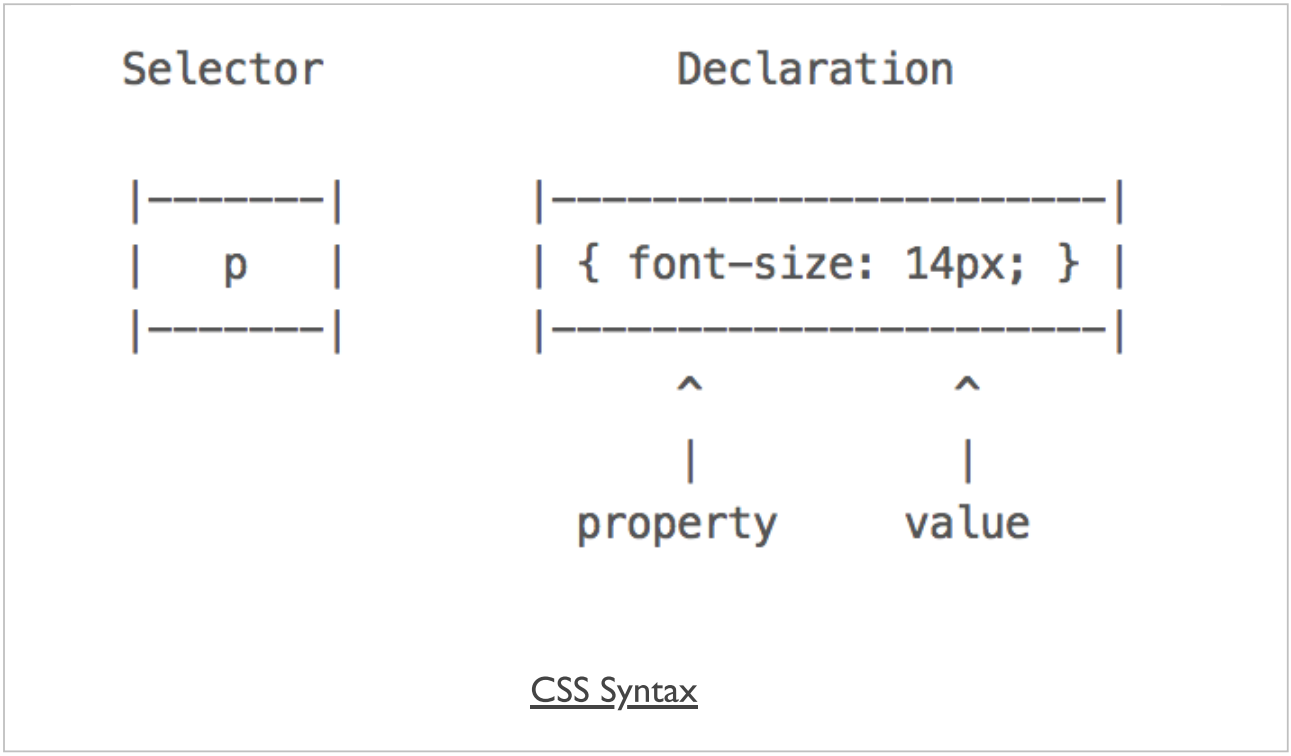
CSS Basics - comments

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

```
/* 'color' can be set to a named value, HEX value (e.g. #444) &c. */
p {
  color: blue;
  font-size: 14px;
  }
```

- comments can be added before the selector or within the braces
- Demo - CSS Basics

Image - CSS Syntax



CSS Syntax

CSS Basics - display

- display HTML elements in one of two ways
  - *inline - e.g. `<a>` or `<span>`*
  - *displays content on the same line*

```
<div class="content">
  <p>
    <a href="...">Philae</a> is a <span>Ptolemaic</span> era temple in Egypt.
  </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
- Demo - CSS Basics - Add a Class

CSS Basics - inline elements

Current inline elements include, for example:

- b | big | i | small
- abbr | acronym | cite | dfn | em | strong | var
- a | br | img | map | script | span | sub | sup
- button | input | label | select | textarea
- ...

Source - MDN - Inline Elements

n.b. not all inline elements supported in HTML5

CSS Basics - block-level elements

Current block-level elements include:

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

Source - MDN - Block-level Elements

n.b. *block-level* is not technically defined for new elements in HTML5

CSS Basics - HTML5 content categories - part I

- **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 by 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>*

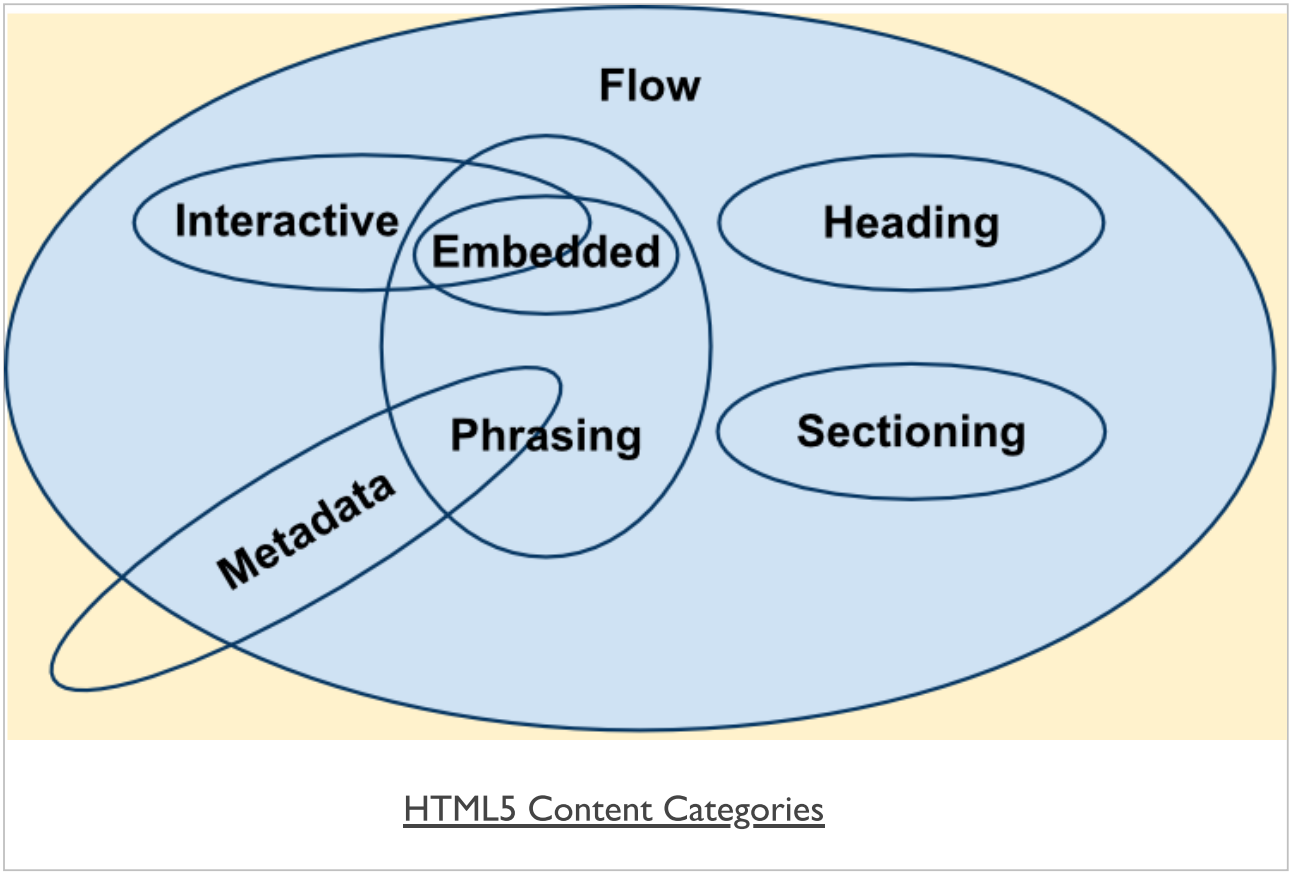
Source - MDN Content Categories

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. e.g.* `<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 a series of 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 - CSS 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 - CSS Box Model

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`*

Demo - CSS Box Model - Border

- JSFiddle - CSS Box Model

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)*

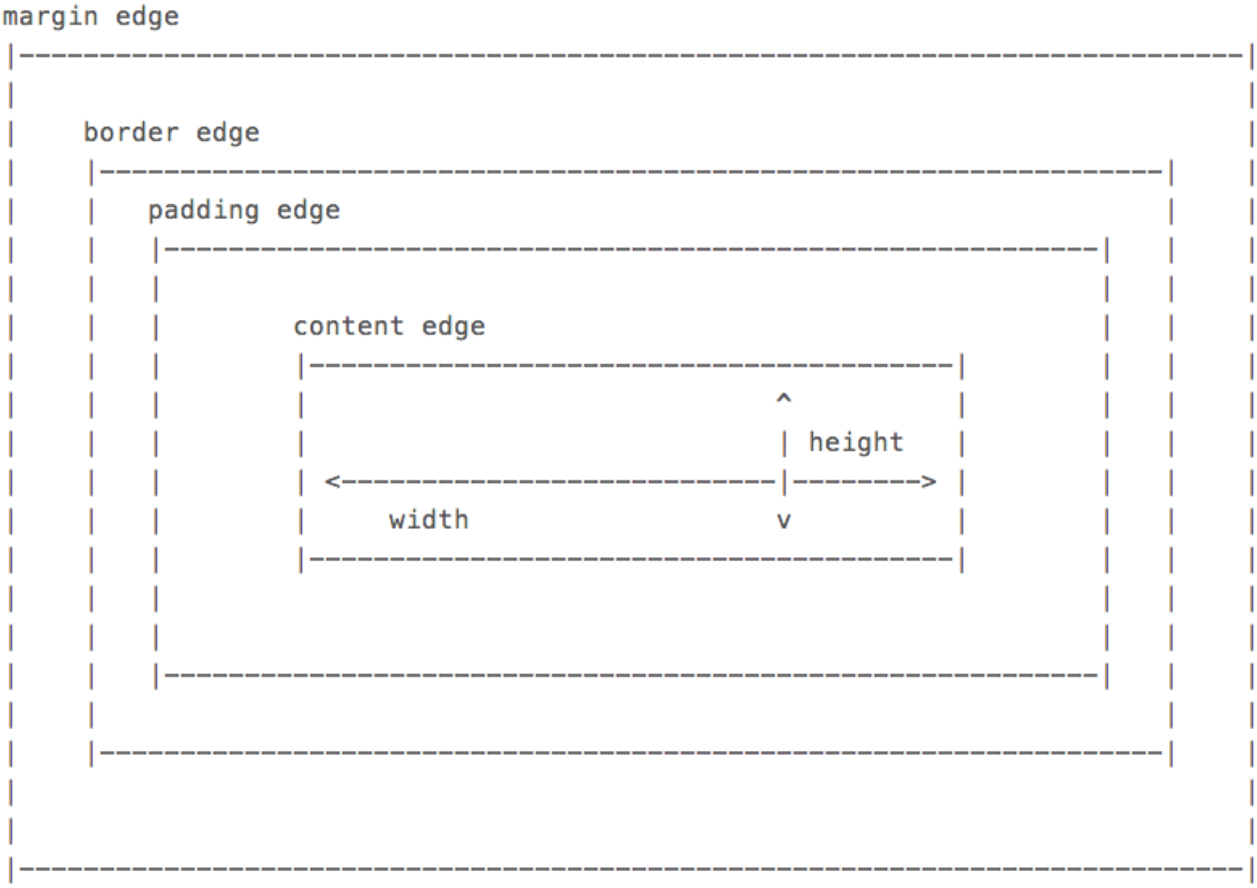
Demo - CSS Box Model - Margin

- JSFiddle - CSS Box Model

Demo - CSS Box Model

- Demo - CSS Box Model

Image - CSS Box Model



CSS Box Model

Source - MDN - CSS Box Model

Demo - CSS Box Model - Interactive

- interactive Box Model

CSS Box Model - structure and layout

fun exercise

Choose one of the following app examples,

- magazine or news reader
  - *e.g. a local newspaper, or perhaps a news aggregator*
- social media aggregator
  - *collect and display updates and news from various social media APIs*
- gaming portal for a community
  - *collect latest scores, news, comments, photos &c. for a chosen game*

Then, consider the following

- use of the box model to layout your example pages
  - *where is it being used?*
  - *why is it being used for a given part of the UI?*
- rendering of box model in the main content
  - *i.e. box model updates due to changes in content*
- which parts of the UI will not benefit from box model?

CSS Basics - selectors

- **selectors** are a crucial part of working with CSS, JS...
- 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
  - *e.g. 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
  - *e.g. 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 - 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 - 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
  - *e.g. 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 - Complex Selectors Part 3

CSS Basics - cascading rules - part 1

- CSS, or cascading style sheets, employs a set of **cascading** rules
- rules applied by each browser as a ruleset conflict arises
  - *e.g. 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
   - *e.g. 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*

CSS Basics - cascading rules - part 3

- 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 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*
  - *" " - quotation marks for names with spaces...*

n.b. " " added due to CSS validator requesting this standard - it's believed to be a legacy error with the validator...

CSS Basics - fonts - part 2

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

```css
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*
  - *relative to current element for required 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 - CSS Fonts
- JSFiddle - CSS Fonts

CSS Basics - fonts - part 3

- `rem` unit for font sizes
- size calculated against root of document

```css
body {
  font-size: 100%;
}
p {
  font-size: 1.5rem;
}
```

- element font-size will be `root size * rem size`
  - *e.g. body font-size is currently 16px*
  - *rem will be `16 * 1.5`*

CSS Basics - custom fonts

- using 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
  - *from the font options, select*
  - *required fonts*
  - *add a `<link>` reference for the font to our HTML document*
  - *then specify the fonts in our CSS*

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

Demo - CSS Custom Fonts

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

CSS Basics - reset options

- to help us reduce browser defaults, we can use a CSS reset
- reset allows us to start from scratch
- customise aspects of the rendering of our HTML documents in browsers
- often considered a rather controversial option
- 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*
- resets often part of CSS frameworks...

Demo - CSS Reset - Before

Browser default styles are used for

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

Demo - CSS Reset - After

Browser resets are implemented using the Eric Meyer stylesheet.

- Demo - CSS Reset After

CSS - a return to inline styles

- *inline* styles are once more gaining in popularity
  - *helped by the rise of React &c.*
- 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

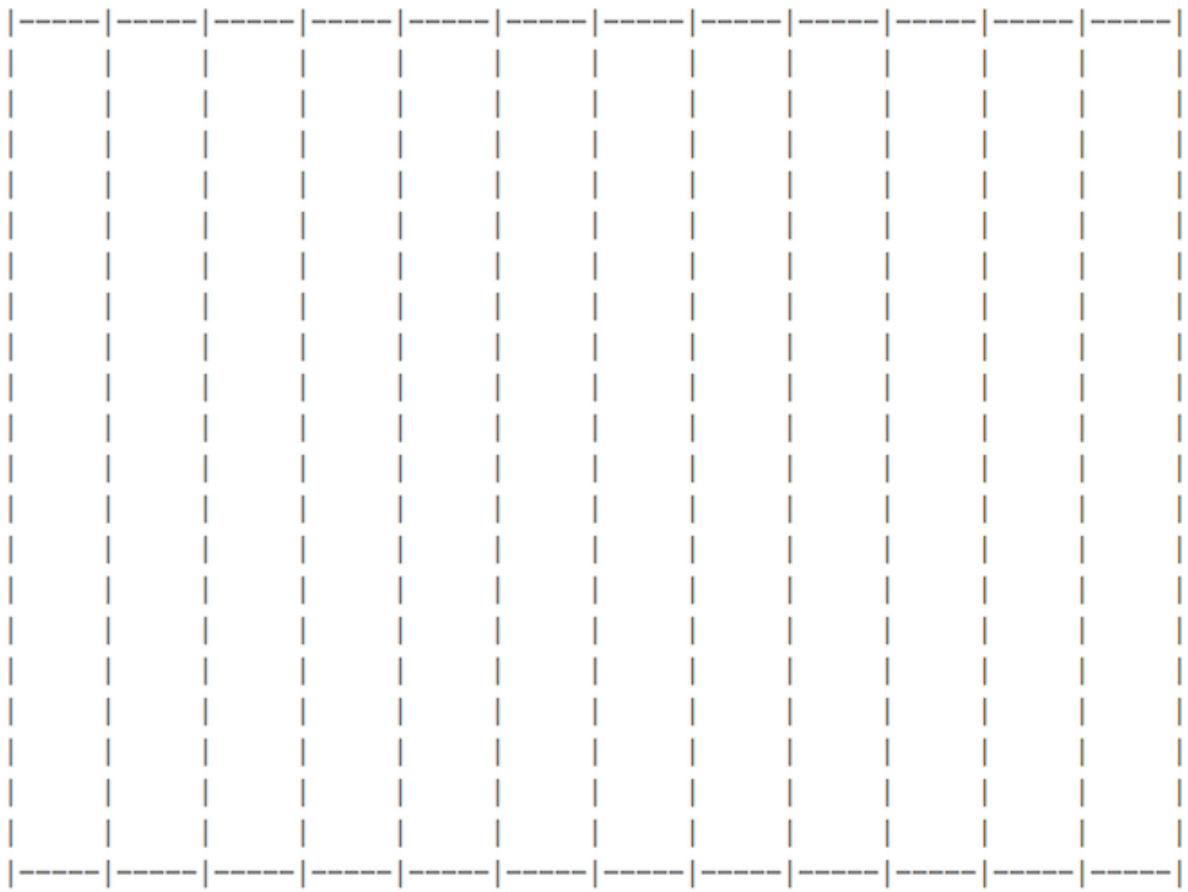
- CSS is designed for styling
  - *this is the extreme end of the scale - in effect, styling is only done with CSS*
- abstraction is a key part of CSS
  - *by separating out concerns, i.e. CSS for styling, our sites are easier to maintain*
- *inline* styles are too specific
  - *again, abstraction is 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 grid layout - part 1

intro

- grid designs for page layout, components...
  - *increasingly popular over the last few years*
  - *useful for creating responsive designs*
- quick and easy to layout a scaffolding framework for our structured content
- create boxes for our content
  - *then position them within our grid layout*
- content can be stacked in a horizontal and vertical manner
  - *creating most efficient layout for needs of a given application*
- another benefit of CSS grids is that they are framework and project agnostic
  - *thereby enabling easy transfer from one to another*
- concept is based upon a set number of columns per page with a width of 100%
- columns will increase and decrease relative to the size of the browser window
- also set break points in our styles
  - *helps to customise a layout relative to screen sizes, devices, aspect ratios...*
  - *helps us differentiate between desktop and mobile viewers*

Image - Grid Layout



Grid Layout - Columns and rows

CSS grid layout - part 2

grid.css

- build a grid based upon 12 columns
  - *other options with fewer columns as well*
- tend to keep our grid CSS separate from the rest of the site
  - *maintain a CSS file just for the grid layout*
- helps abstract the layout from the remaining styles
  - *makes it easier to reuse the grid styles with another site or application*
- add a link to this new stylesheet in the `head` element of our pages

```
<link rel="stylesheet" type="text/css" href="assets/styles/grid.css">
```

or

```
<link rel="stylesheet" href="assets/styles/grid.css">
```

- ensure padding and borders are included in total widths and heights for an element
  - *reset `box-sizing` property to include the `border-box`*
  - *resetting box model to ensure padding and borders are included*

```
* {
box-sizing: border-box;
}
```

CSS grid layout - example - part 3

grid.css

- set some widths for our columns, 12 in total
  - *each representing a proportion of the available width of a page*
  - *from a 12th to the full width of the page*

```
.col-1 {width: 8.33%;}
.col-2 {width: 16.66%;}
.col-3 {width: 25%;}
.col-4 {width: 33.33%;}
.col-5 {width: 41.66%;}
.col-6 {width: 50%;}
.col-7 {width: 58.33%;}
.col-8 {width: 66.66%;}
.col-9 {width: 75%;}
.col-10 {width: 83.33%;}
.col-11 {width: 91.66%;}
.col-12 {width: 100%;}
```

- classes allow us to set a column span for a given element
  - *from 1 to 12 in terms of the number of grid columns an element may span*

CSS grid layout - example - part 4

grid.css

- then set some further styling for each abstracted `col-` class

```
[class*="col-"] {
  position: relative;
  float:left;
  padding: 20px;
  border: 1px solid #333;
}
```

- create columns by wrapping our content elements into rows
- each row always needs 12 columns

```
<div class="row">
  <div class="col-6">left column</div>
  <div class="col-6">right column</div>
</div>
```

CSS grid layout - example - part 5

grid.css

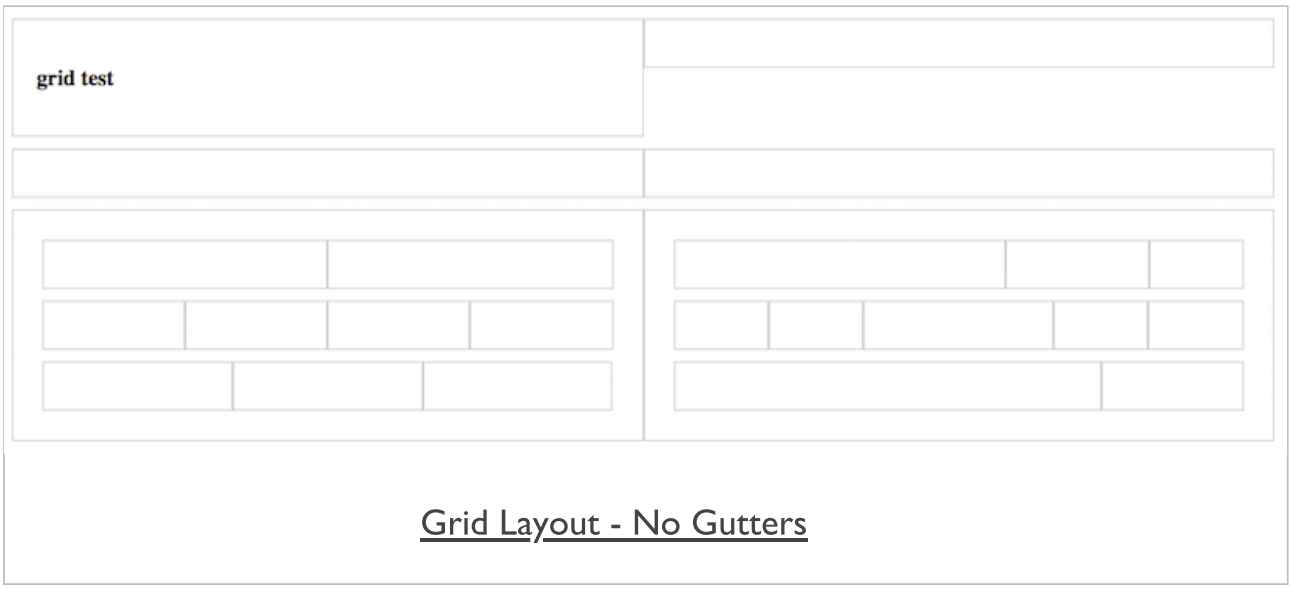
- due to the initial CSS of float left, each column is floated to the left
- columns are interpreted by subsequent elements in the hierarchy as non-existent
  - *initial placement will reflect this design*
- prevent this issue in layout, add the following CSS to grid stylesheet

```
.row:before, .row:after {
  content: "";
  clear: both;
  display: block;
}
```

- benefit of the clearfix, `clear: both`
  - *make row stretch to include columns it contains*
  - *without the need for additional markup*

DEMO - Grid Layout 1 - no gutters

Image - Grid Layout I



Grid Layout - No Gutters

CSS grid layout - example - part 6

grid.css

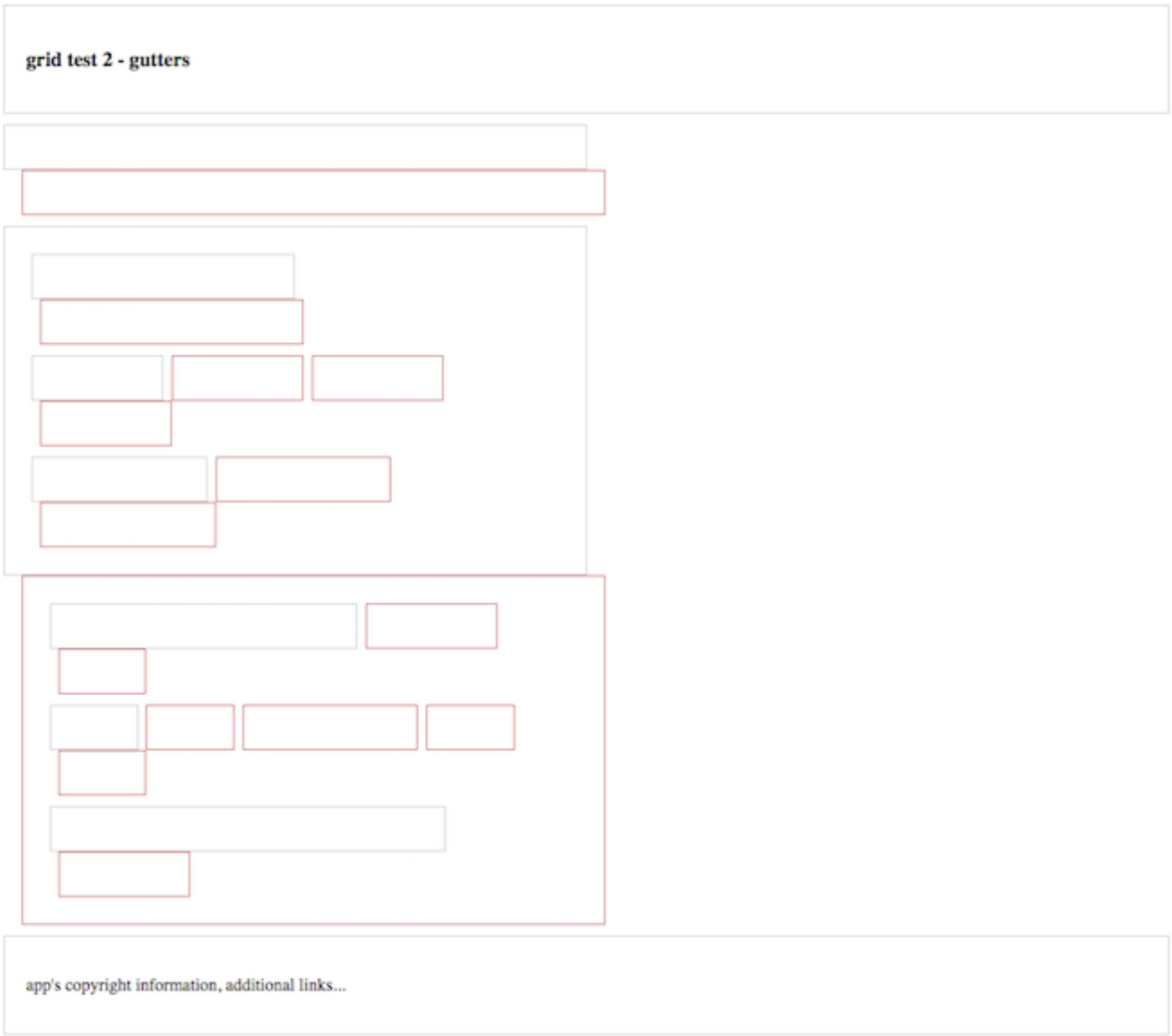
- add gutters to our grid to help create a sense of space and division in the content
- simplest way to add a gutter to the current grid css is to use padding
  - *rows can use padding, for example*

```
.row {
  padding: 5px;
}
```

- issue with simply adding padding to the columns
  - *margins are left in place, next to each other*
  - *column borders next to each with no external column gutter*
- fix this issue by targeting columns that are a sibling to a preceding column
- means we do not need to modify the first column, only subsequent siblings

```
[class*="col-"] + [class*="col-"] {
  margin-left: 1.6%;
}
```

Image - Grid Layout 2



Grid Layout - Gutters Overflow

CSS grid layout - part 7

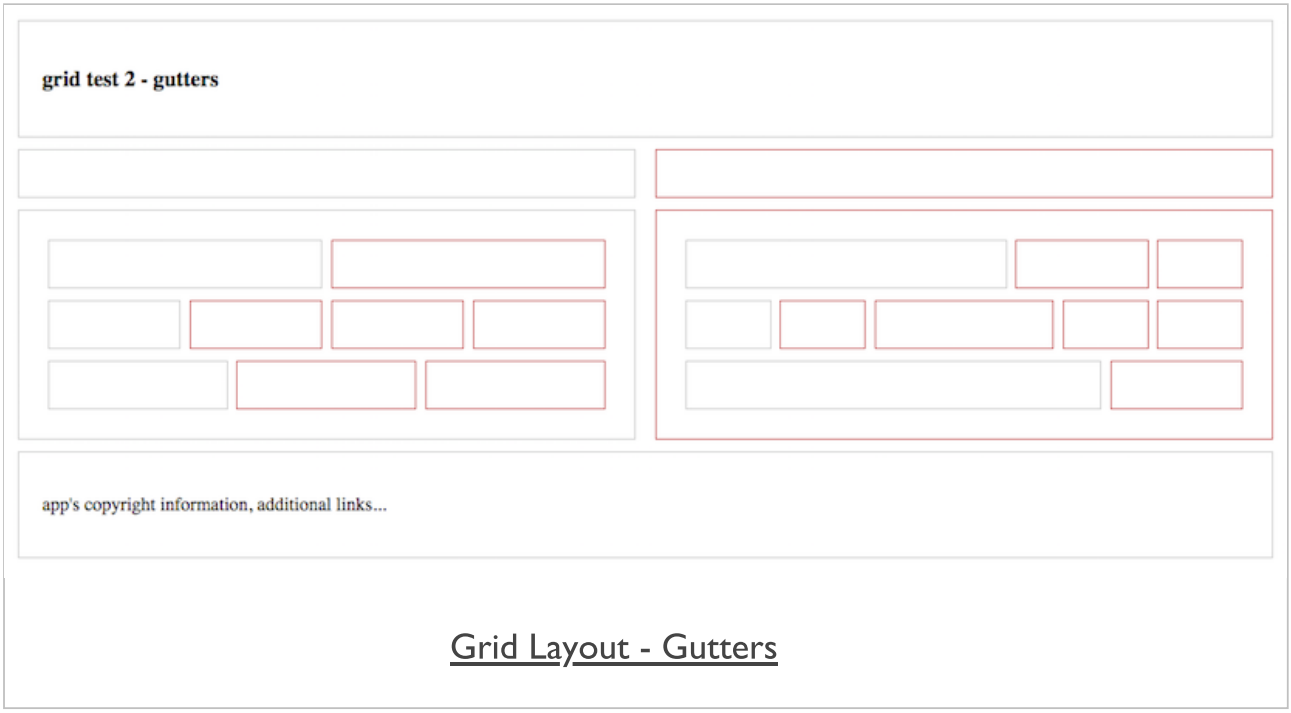
grid.css

- to fix this issue we recalculate permitted % widths for our columns in the CSS
  - *we now have % widths as follows*

```
.col-1 {width: 6.86%;}
.col-2 {width: 15.33%;}
.col-3 {width: 23.8%;}
.col-4 {width: 32.26%;}
.col-5 {width: 40.73%;}
.col-6 {width: 49.2%;}
.col-7 {width: 57.66%;}
.col-8 {width: 66.13%;}
.col-9 {width: 74.6%;}
.col-10 {width: 83.06%;}
.col-11 {width: 91.53%;}
.col-12 {width: 100%;}
```

- DEMO - Grid Layout 2 - gutters

Image - Grid Layout 3



Grid Layout - Gutters

CSS grid layout - part 8

media queries

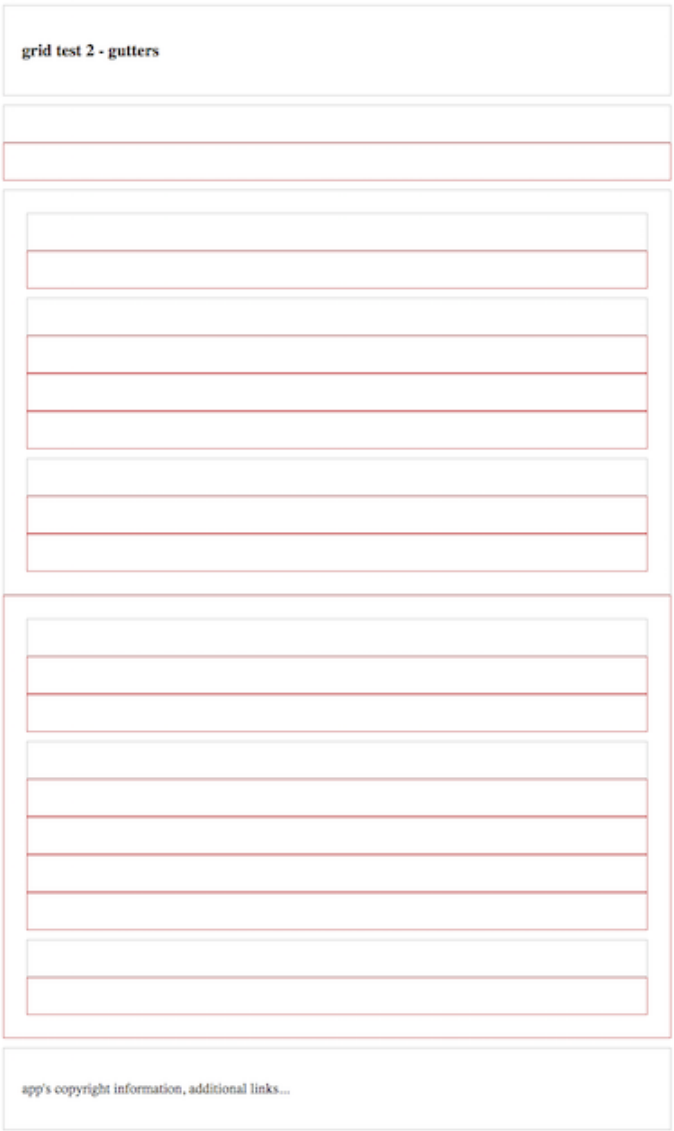
- often need to consider a mobile-first approach
- introduction of CSS3, we can now add **media queries**
- modify specified rulesets relative to a given condition
  - *eg: screen size for a desktop, tablet, and phone device*
- media queries allow us to specify a breakpoint in the width of the viewport
  - *will then trigger a different style for our application*
- could be a simple change in styles
  - *such as colour, font etc*
- could be a modification in the grid layout
  - *effective widths for our columns per screen size etc...*

```
@media only screen and (max-width: 900px) {
  [class*="col-"] {
  width: 100%;
  }
}
```

- gutters need to be removed
  - *specifying widths of 100% for our columns*

```
[class*="col-"] + [class*="col-"] {
  margin-left:0;
}
```

Image - Grid Layout 4



Grid Layout - Media Queries

Demos

- CSS Basics
- CSS Basics - Add a Class
- CSS - Box Model
- CSS - Complex Selectors Part 1
- CSS - Complex Selectors Part 2
- CSS - Complex Selectors Part 3
- CSS - Interactive Box Model
- CSS - Fonts
  - *CSS Fonts*
  - *CSS Custom Fonts*
  - *CSS Reset Before*
  - *CSS Reset After*
- JSFiddle tests - CSS
  - *CSS Box Model*
  - *CSS Box Model Padding*
  - *CSS Fonts*
  - *CSS Custom Fonts*
- HTML5 Canvas demos
  - *HTML5 Canvas - Rectangle*
  - *HTML5 Canvas - Square*
  - *HTML5 Canvas - Assorted Shapes*
  - *HTML5 Canvas - Retro Breakout Game*
  - *please see links in slides for further examples...*

Resources

- HTML5 Canvas - fun examples
  - *Destroy things in a video*
  - *Particles*
  - *Curtain*
  - *Jelly*
  - *Canvas cycle*
- HTML Colour Picker
- MDN - Block-level Elements
- MDN - Content Categories
- MDN - CSS Box Model
- MDN - CSS Selectors
- MDN - Inline Elements
- Google Web Fonts