Comp 324/424 - Client-side Web Design

Spring Semester 2020 - Week 4

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Project outline & mockup assessment

Course total = 15%

- begin outline and design of a web application
  - *built from scratch*
    - HTML5, CSS…
  - *builds upon examples, technology outlined during first part of semester*
  - *purpose, scope &c. is group's choice*
  - *NO blogs, to-do lists, note-taking…*
    - chosen topic requires approval
  - *presentation should include mockup designs and concepts*

Project mockup demo

Assessment will include the following:

- brief presentation or demonstration of current project work
  - *~5 to 10 minutes per group*
  - *analysis of work conducted so far*
  - *presentation and demonstration*
    - outline current state of web app concept and design
    - show prototypes and designs
  - *due Monday 10th February 2020 @ 4.15pm*

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

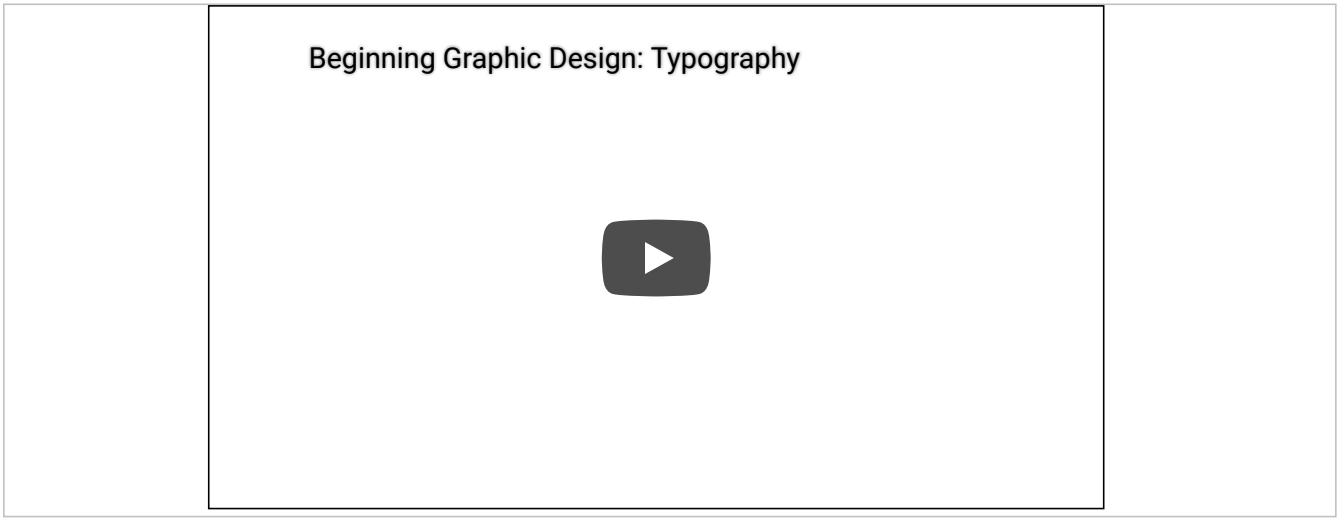
- CSS includes inheritance for its styles
- descendants will inherit properties from their ancestors
- style an element
  - *descendants of that element within the DOM inherit that style*

```
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**

Video - CSS and Fonts

Typography considerations - part 1



Typography - up to 2:13

Source - Typography - YouTube

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

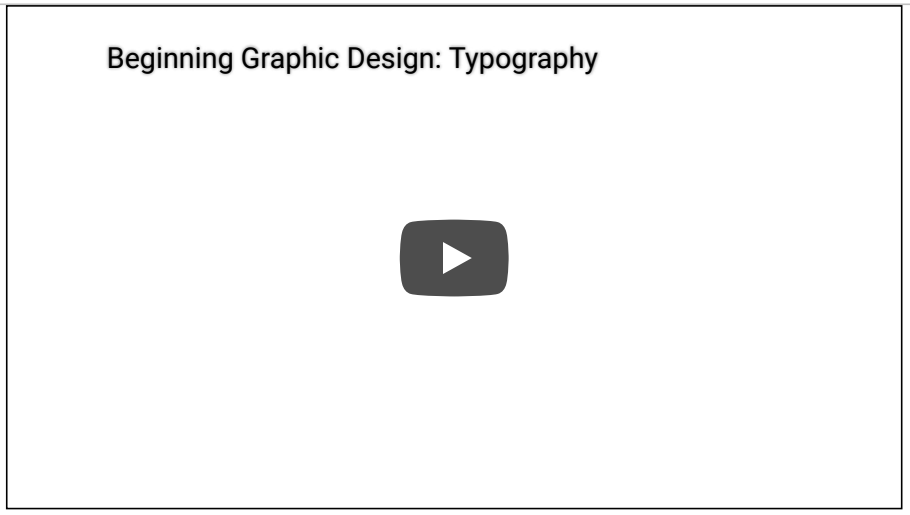
```
font-family: 'Roboto';
```

Demo - CSS Custom Fonts

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

Video - CSS and Fonts

Typography considerations - part 2



Typography - up to 3:33

Source - Typography - YouTube

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

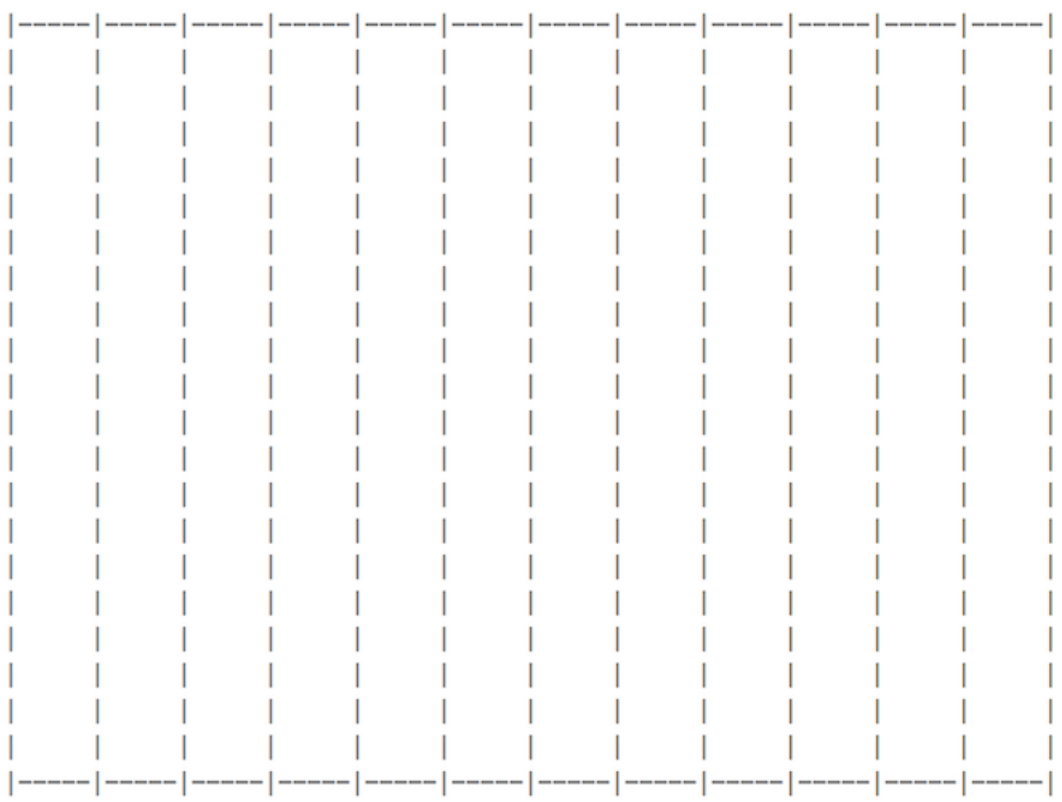
- CSS is designed for styling
  - *this is the extreme end of the scale - in effect, styling is only done with CSS*
- abstraction is a key part of CSS
  - *by separating out concerns, i.e. CSS for styling, our sites are easier to maintain*
- *inline* styles are too specific
  - *again, abstraction is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

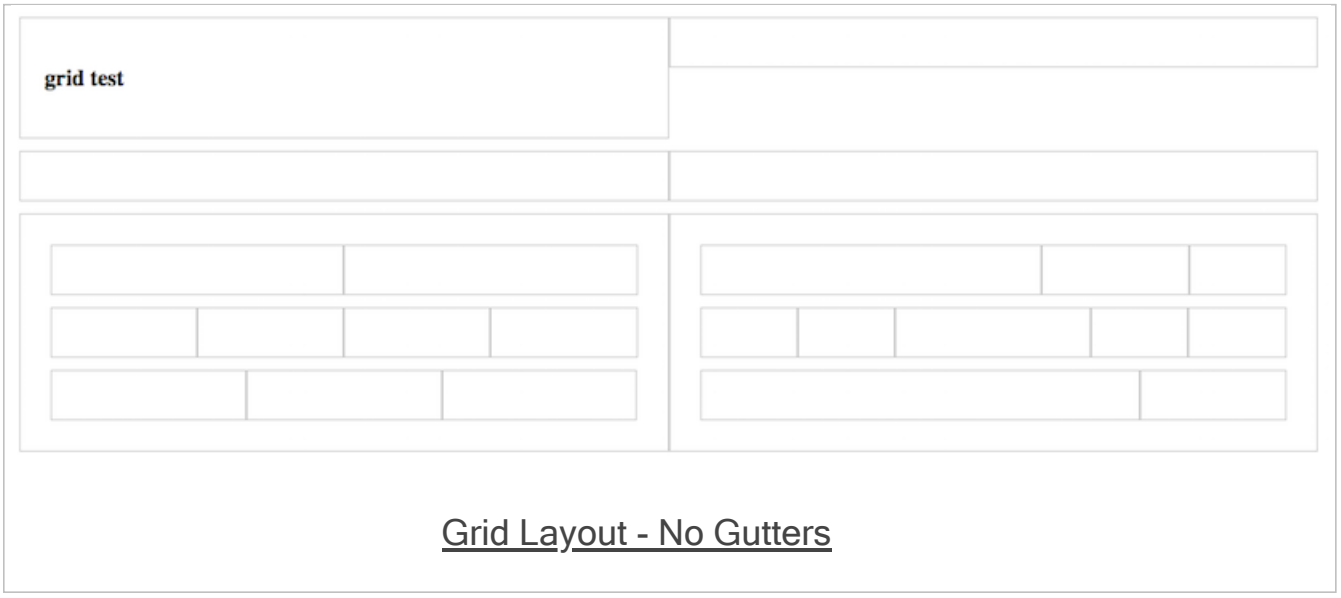
- due to the initial CSS of float left, each column is floated to the left
- columns are interpreted by subsequent elements in the hierarchy as non-existent
  - *initial placement will reflect this design*
- prevent this issue in layout, add the following CSS to grid stylesheet

```
.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 1



Grid Layout - No Gutters

CSS grid layout - example - part 6

grid.css

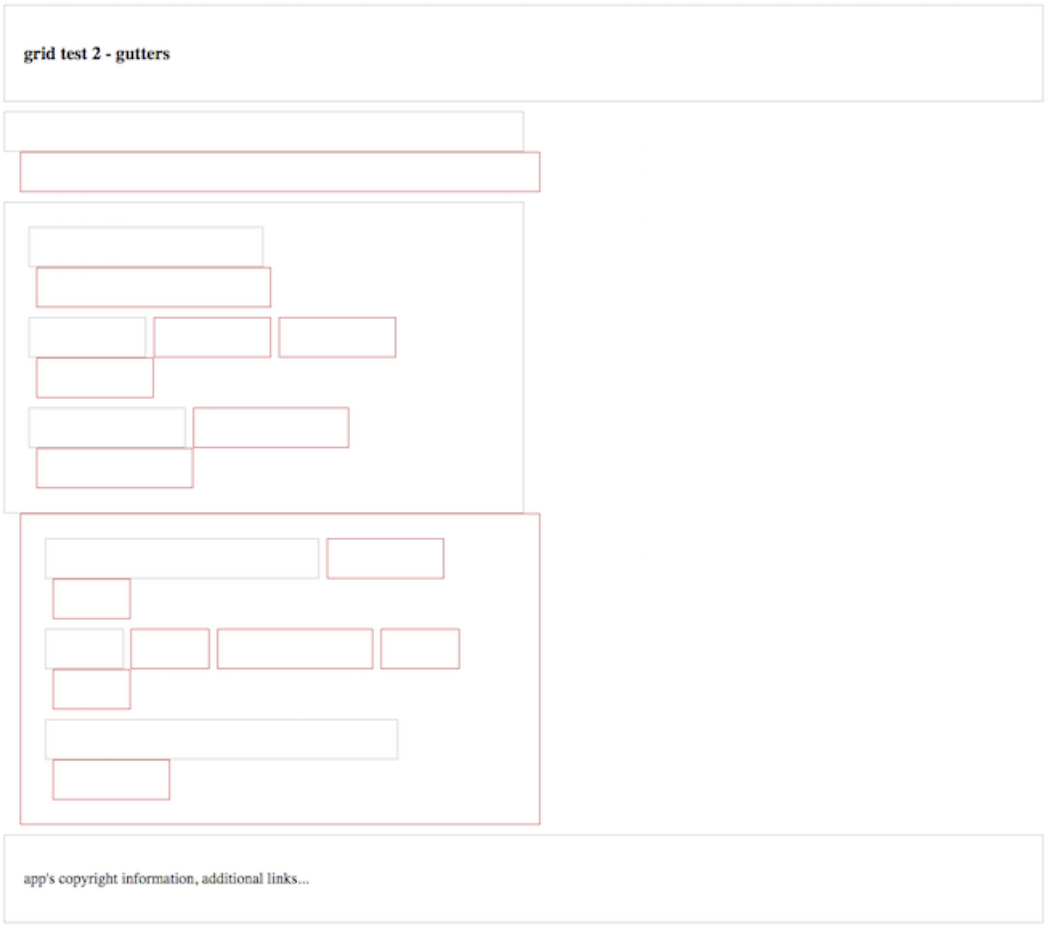
- add gutters to our grid to help create a sense of space and division in the content
- simplest way to add a gutter to the current grid css is to use padding
  - *rows can use padding, for example*

```
.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

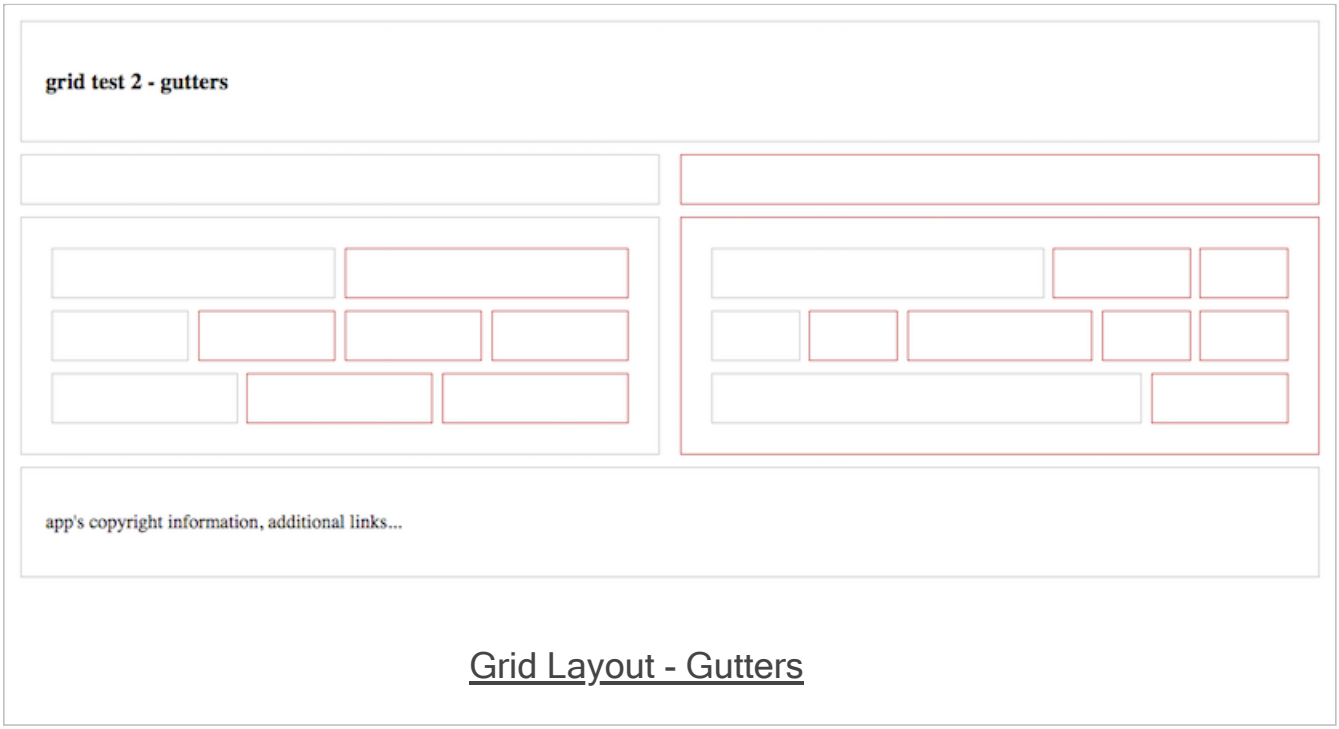
grid.css

- 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

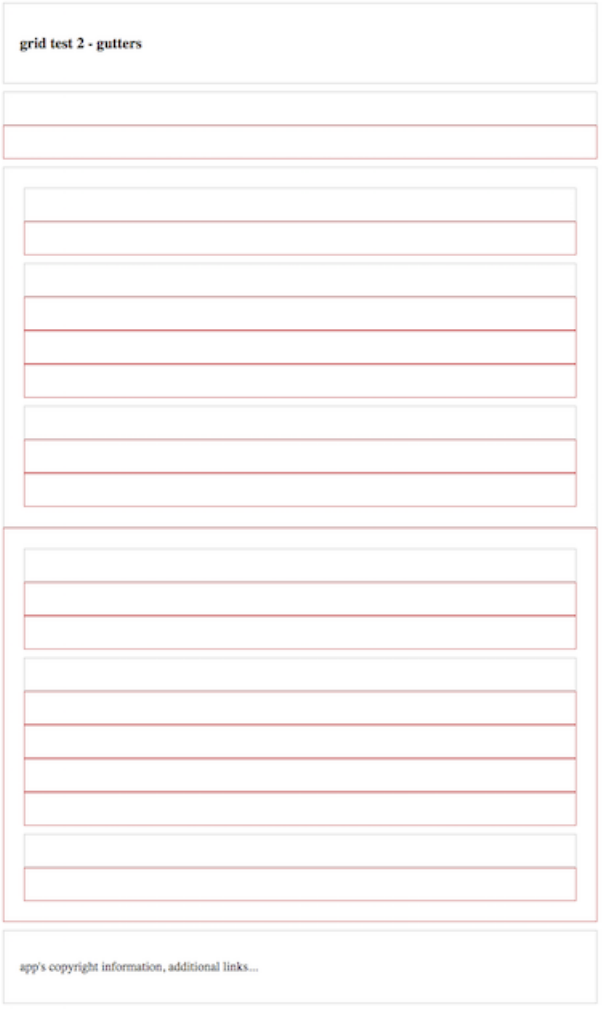
- often need to consider a mobile-first approach
- introduction of CSS3, we can now add **media queries**
- modify specified rulesets relative to a given condition
  - *eg: screen size for a desktop, tablet, and phone device*
- media queries allow us to specify a breakpoint in the width of the viewport
  - *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;
}
```

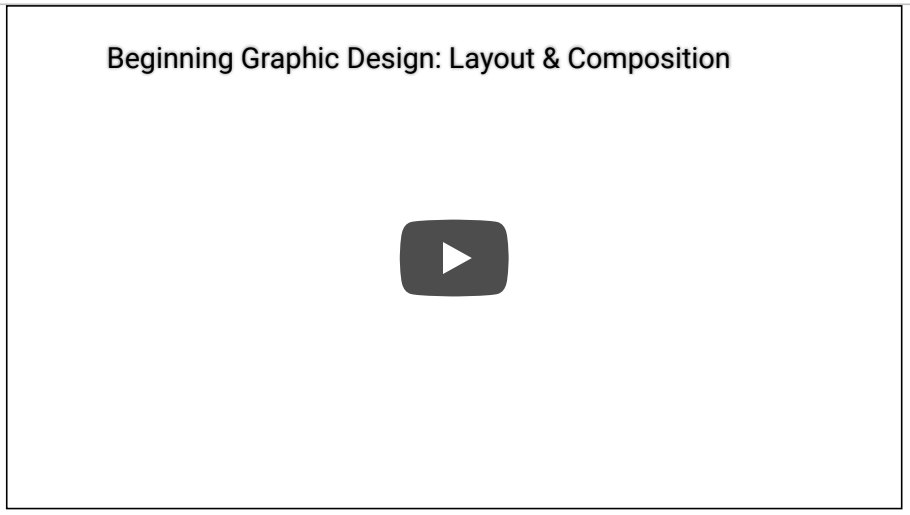
Image - Grid Layout 4



Grid Layout - Media Queries

Video - CSS grid

Layout considerations



Layout and composition - up to 2:45

Source - Layout and composition - YouTube

CSS3 Grid - intro

- gid layout with CSS is useful for structure and organisation
  - *applied to HTML page*
- usage similar to table for structuring data
- in its basic form
  - *enables developers to add columns and rows to a page*
- grid layout also permits more complex, interesting layout options
  - *e.g. overlap and layers…*
- further information on MDN website,
  - *MDN - CSS Grid Layout*

CSS3 Grid - general concepts & usage

- grid may be composed of rows and columns
  - *thereby forming an intersecting set of horizontal and vertical lines*
- elements may be added to the grid with reference to this structured layout

Grid layout in CSS includes the following general features,

- additional tracks for content
  - *option to create more columns and rows as needed to fit dynamic content*
- control of alignment
  - *align a grid area or overall grid*
- control of overlapping content
  - *permit partial overlap of content*
  - *an item may overlap a grid cell or area*
- placement of items - explicit and implicit
  - *precise location of elements &c.*
  - *use line numbers, names, grid areas &c.*
- variable track sizes - fixed and flexible, e.g.
  - *specify pixel size for track sizes*
  - *or use flexible sizes with percentages or new `fr` unit*

CSS3 Grid - grid container

- define an element as a grid container using
  - *`display: grid` or `display: inline-grid`*
- any children of this element become *grid items*
  - *e.g.*

```
.wrapper {
  display: grid;
}
```

- we may also define other, child nodes as a `grid` container
  - *any direct child nodes to a grid container are now defined as grid items*

CSS3 Grid - what is a grid track?

- rows and columns defined with
  - *`grid-template-rows` and `grid-template-columns` properties*
- in effect, these define *grid tracks*
- as MDN notes,
  - *"a grid track is the space between any two lines on the grid.""*
  - *(https://developer.mozilla.org/en-US/docs/Web/CSS/CSS_Grid_Layout/Basic_Concepts_of_Grid_Layout)*
- so, we may create both row and column tracks, e.g.

```
.wrapper {
  display: grid;
  grid-template-columns: 200px 200px 200px;
}
```

- `wrapper` class now includes three defined columns of width 200px
  - *thereby creating three tracks*
- *n.b.* a track may be defined using any valid length unit, not just px…

CSS3 Grid - `fr` unit for tracks - part 1

- CSS Grid now introduces an additional length unit for tracks, `fr`
- `fr` unit represents fractions of the space available in the current grid container
  - *e.g.*

```
.wrapper {
  display: grid;
  grid-template-columns: 1fr 1fr 1fr;
}
```

- we may also apportion various space to tracks, e.g.

```
.wrapper {
  display: grid;
  grid-template-columns: 2fr 1fr 1fr;
}
```

- creates three tracks in the grid
  - *but overall space effectively now occupies four parts*
  - *two parts for `2fr`, and one part each for remaining two `1fr`*

CSS3 Grid - `fr` unit for tracks - part 2

- we may also be specific in this sub-division of parts in tracks, e.g.

```
.wrapper {
  display: grid;
  grid-template-columns: 200px 1fr 1fr;
}
```

- first track will occupy a width of `200px`
  - *remaining two tracks will each occupy 1 fraction unit*

CSS3 Grid - `repeat()` notation for `fr` - part 1

- for larger, repetitive grids, easier to use `repeat()`
  - *helps define multiple instances of the same track*
  - *e.g.*

```
.wrapper {
  display: grid;
  grid-template-columns: repeat(4, 1fr);
}
```

- this creates four separate tracks - each defined as `1fr` unit's width

CSS3 Grid - `repeat()` notation for `fr` - part 2

- `repeat()` notation may also be used as part of the track definition
  - *e.g.*

```
.wrapper {
  display: grid;
  grid-template-columns: 200px repeat(4, 1fr) 100px;
}
```

- this example will create
  - *one track of `200px` width*
  - *then four tracks of `1fr` width*
  - *and finally a single track of `100px` width*
- `repeat()` may also be used with multiple track definitions
  - *thereby repeating multiple times*
  - *e.g.*

```
.wrapper {
  display: grid;
  grid-template-columns: repeat(4, 1fr 2fr);
}
```

- this will now create eight tracks
  - *the first four of width `1fr`*
  - *and the remaining four of `2fr`*

CSS3 Grid - implicit and explicit grid creation

- in the above examples
  - *we simply define tracks for the columns*
  - *and CSS grid will then apportion content to required rows*
- we may also define an explicit grid of columns and rows
  - *e.g.*

```
.wrapper {
  display: grid;
  grid-template-columns: repeat(2 1fr);
  grid-auto-rows: 150px;
}
```

- this slightly modifies an implicit grid to ensure each row is `200px` tall

CSS3 Grid - track sizing

- a grid may require tracks with a minimum size
  - *and the option to expand to fit dynamic content*
- e.g. ensuring a track does not collapse below a certain height or width
  - *and that it has the option to expand as necessary for the content…*
- CSS Grid provides a `minmax()` function, which we may use with rows
  - *e.g.*

```
.wrapper {
  display: grid;
  grid-template-columns: repeat(2 1fr);
  grid-auto-rows: minmax(150px, auto);
}
```

- ensures each row will occupy a minimum of `150px` in height
  - *still able to stretch to contain the tallest content*
  - *whole row will expand to meet the `auto` height requirements*
  - *thereby affecting each track in the row*

CSS3 Grid - grid lines

- a grid is defined using *tracks*
  - *and not lines in the grid*
- created grid also helps us with positioning by providing numbered lines
- e.g. in a three column, two row grid we have the following,
  - *four lines for the three vertical columns*
  - *three lines for the two horizontal rows*
- such lines start at the left for columns, and at the top for rows
- *n.b.* line numbers start relative to written script
  - *e.g left to right for western, right to left for arabic…*

CSS3 Grid - positioning against lines

- when we place an item in a grid
  - *we use these lines for positioning, and not the tracks*
- reflected in usage of
  - *`grid-column-start`, `grid-column-end`, `grid-row-start`, and `grid-row-end` properties.*
- items in the grid may be positioned from one line to another
  - *e.g. column line 1 to column line 3*
- *n.b.* default span for an item in a grid is one track,
  - *e.g. define column start and no end - default span will be one track…*
  - *e.g.*

```
.content1 {
  grid-column-start: 1;
  grid-column-end: 4;
  grid-row-start: 1;
  grid-row-end: 3;
}
```

CSS3 Grid - grid cell & grid area

grid cell

- a *cell* is the smallest unit on the defined grid layout
- it is conceptually the same as a cell in a standard table
- as content is added to the grid, it will be stored in one cell

grid area

- we may also store content in multiple cells
  - *thereby creating grid areas*
- grid areas must be rectangular in shape
- e.g. a grid area may span multiple row and column tracks for required content

CSS3 Grid - add some gutters

- gutters may be created using the *gap* property
  - *available for either column or row*
  - *`column-gap` and `row-gap`*
  - *e.g.*

```
.wrapper {
  display: grid;
  grid-template-columns: repeat(4, 1fr 2fr);
  column-gap: 5px;
  row-gap: 10px;
}
```

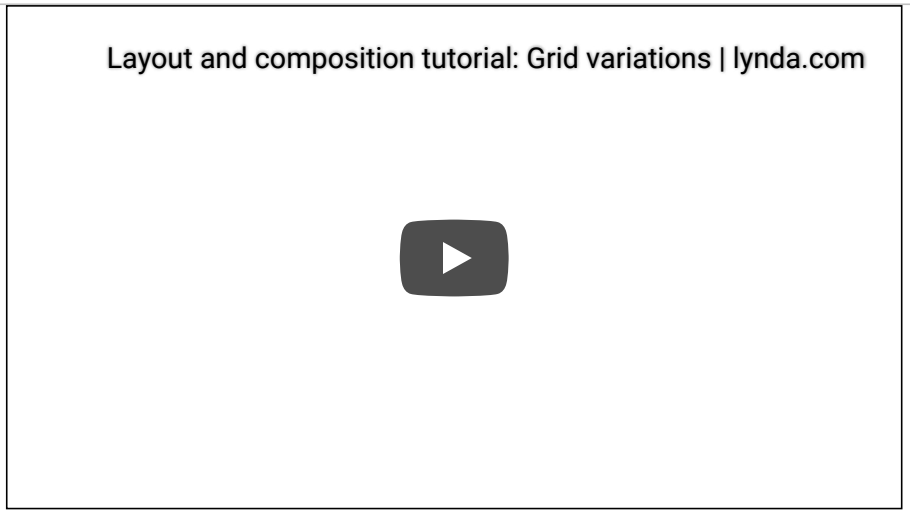
- *n.b.* any space used for gaps will be determined prior to assigned space for `fr` tracks

CSS3 Grid - working examples

- grid basic - page zones and groups
- grid basic - article style page
- grid layout - articles with scroll

Video - CSS grid

Grid and layouts



Layout and Composition: Grid Variations

Source - Layout and Composition - YouTube

CSS3 Grid - sample layouts

intro

- grid layout enables more complex and interesting layout options
  - *overlap, layers...*
- sample layouts using CSS grid structure
  - *common layout options and designs*
  - *useful repetition of design*
  - *modify base layouts for various site requirements*
- sample layouts
  - *responsive layouts*
  - *auto placement for dynamic content and media*
  - *platform agnostic designs*
  - *useful with SPA, SVG, async patterns &c.*

CSS3 Grid - responsive layout

intro

- display a layout with a variety of patterns and structures, e.g.
  - *single column for a phone*
  - *add a sidebar for a tablet of lower window resolution*
  - *full width view with dual sidebars &c.*
- use responsive designs and structures for various games, media playback...
- responsive works with variety of markup
  - *e.g. transform SVG designs*

CSS3 Grid - responsive layout

page structure

- start with a sample page structure for a HTML page

```
<!doctype html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <title>CSS Grid - Responsive Layout</title>
    <link rel="stylesheet" type="text/css" href="./assets/style.css">
  </head>
  <body>
    <div class="wrapper">
            ...
        </div>
    </body>
</html>
```

CSS3 Grid - responsive layout

page structure - HTML5

- add some HTML5 markup for a `header`, `navigation`, `footer`, and some `main` content

```
<div class="wrapper">
    <header class="site-header">
        <h3>Spire & the Signpost</h3>
        <h5>Shine through the gloom, and point to the stars...</h5>
    </header>
    <nav class="site-nav">
        <ul>
            <li><a href="">Home</a></li>
            <li><a href="">Charts</a></li>
            <li><a href="">Data</a></li>
            <li><a href="">Views</a></li>
        </ul>
    </nav>
    <!-- use aside for tangentially related content for parent section... -->
    <aside class="content-side">
        <header>
            <h5>sidebar...</h5>
        </header>
    </aside>
    <main class="content">
        <article class="content-article">
            <header class="article-header">
                <h5>Welcome</h5>
            </header>
            <p>...</p>
        </article>
    </main>
    <section class="site-links">
        <h6>social links...</h6>
    </section>
    <footer class="site-footer">
        <h6>footer...</h6>
    </footer>
</div>
```

- demo - basic responsive

CSS3 Grid - responsive layout

CSS and structure - part 1

- for the page structure
  - *need to define some template areas for our grid in the CSS*
  - *e.g.*

```
/* CONTENT */
.content {
    grid-area: content;
}
```

- use such template area names
  - *defined with the `grid-area` property*
  - *define a layout for the overall page or part of a page*

CSS3 Grid - responsive layout

CSS and structure - part 2

- template areas may then be used with the parent for the grid structure
  - *e.g. `wrapper` for the overall page*

```
.wrapper {
    display: grid;
    grid-gap: 10px;
    grid-template-areas:
        "site-header"
        "site-nav"
        "content-side"
        "content"
        "site-links"
        "site-footer"
}
```

- `wrapper` class will display as a grid
  - *with a gap between each area of the grid*
  - *has a single column in this example*
  - *includes the required order for the grid areas*

CSS3 Grid - responsive layout

define media query

- current example would be suitable for a collapsed phone view
  - *single column view*
  - *will also render for other resolutions and devices*
- then add a media query for alternative layouts and displays
  - *may be triggered using a check of current width for screen*
  - *check width of window...*

```
/* min 700 */
@media (min-width: 700px) {
    .wrapper {
        grid-template-columns: 1fr 3fr;
        grid-template-areas:
        "site-header site-header"
        "site-nav site-nav"
        "content-side content"
        "site-links site-footer"
    }
}
```

CSS3 Grid - responsive layout

specific media query

- add further media queries to handle various rendering requirements
  - *e.g. add `height` property to fix footer at bottom of page*

```
@media (min-width: 700px) {
    .wrapper {
        grid-template-columns: 1fr 3fr;
        grid-template-rows: 120px 60px calc(98vh - 240) 60px;
        grid-template-areas:
        "site-header site-header"
        "site-nav site-nav"
        "content-side content"
        "site-links site-footer";
        height: 98vh;
    }
}
```

- specify height of current *viewport* using a relative unit, `vh`
- add `grid-template-rows` to define known heights for three of the four rows
- add a variant height for the main content
  - *main content is only given a height corresponding to available space in viewer window*
  - *height achieved using the `calc()` function*
- demo - responsive with specific media query

CSS3 Grid - responsive layout

relative lengths

- use relative lengths and calculations for CSS property values
- for example,
  - `vw` - *variable width relative to 1% of width of current viewport*
  - `vh` - *variable height relative to 1% of height of current viewport*
  - `vmin` - *relative to 1% of viewport's smaller dimension*
  - `vmax` - *relative to 1% of viewport's larger dimension*

CSS3 Grid - responsive layout

sample updates - part 1

- after testing this type of responsive layout
  - *we might add various updates*
  - *e.g. create a parent banner area for a header, user login, site search, and site nav*

```
.banner {
    grid-area: site-banner;
    display: grid;
    grid-template-columns: auto 300px;
    grid-template-rows: 120px 60px;
    grid-template-areas:
        "site-header banner-extras"
        "site-nav site-nav";
}
```

- helps manage layout and relative sizes of banner content
  - *regardless of page width and height*

CSS3 Grid - responsive layout

sample updates - part 2

- `banner-extras` might be styled as follows,

```
.banner-extras {
    grid-area: banner-extras;
    display: grid;
    grid-template-areas:
        "site-user"
        "site-search";
    padding: 5%;
}
```

- use of a child grid helps us manage fixed places within the parent `banner` area

CSS3 Grid - responsive layout

sample updates - part 3

- update our current media query for a `min-width` of 900px

```
/* min 900 */
@media (min-width: 900px) {
    .wrapper {
        grid-template-areas:
        "site-banner site-banner"
        "content-side content"
        "site-links site-footer";
        height: 98vh;
        grid-template-columns: 250px 3fr;
        grid-template-rows: 180px auto 60px;
    }
}
```

- demo - responsive layout - part 1
- demo - responsive layout - part 2

CSS3 Grid - auto placement

dynamic content and media - part 1

- also use CSS grid with Flexbox to create content layouts
  - *e.g. similar to placing cards in the UI*
- we might create a layout to dynamically render images for a photo album
  - *or a series of products in a brochure &c.*
- start by defining a simple list with various list items

```
<ul class="items">
    <li>One</li>
    <li>Two</li>
    <li>Three</li>
    <li>Four</li>
    <li>Five</li>
    <li>Six</li>
    <li>Seven</li>
    <li>Eight</li>
    <li>Nine</li>
</ul>
```

CSS3 Grid - auto placement

dynamic content and media - part 2

- then render these list items in flexible columns within our grid layout
  - *define a minimum size*
  - *then ensure they expand to equally fill available space*
- ensures rendered layout includes equal width columns regardless of available content

```
/* content items */
.items {
    display: grid;
    grid-gap: 5px;
    grid-template-columns: repeat(auto-fill, minmax(200px, 1fr));
    list-style: none;
}
```

- and render individual items using flexbox

```
.items li {
    border: 1px solid #3b8eb4;
  display: flex;
  flex-direction: column;
}
```

- demo - dynamic content - part 1
- demo - dynamic content - part 2

CSS3 Grids - fun layout

a game board

- also use a grid layout for internal uses
  - *e.g. design a game board*
- basic HTML list use for 3x3 game board
  - *each list item as a square on the board*

```
<main class="content">
    <ul class="items">
        <li>
            <h5>One</h5>
        </li>
        <li>
            <h5>Two</h5>
        </li>
        <li>
            <h5>Three</h5>
        </li>
        <li>
            <h5>Four</h5>
        </li>
        <li>
            <h5>Five</h5>
        </li>
        <li>
            <h5>Six</h5>
        </li>
        <li>
            <h5>Seven</h5>
        </li>
        <li>
            <h5>Eight</h5>
        </li>
        <li>
            <h5>Nine</h5>
        </li>
    </ul>
</main>
```

CSS3 Grids - fun layout

a game board - part 2

- then create the grid for the `content` class

```css
/* CONTENT */
.content {
    grid-area: content;
    display: grid;
    grid-template-areas:
        "items";
    grid-template-columns: 1fr;
    align-self: center;
    justify-self: center;
    align-items: center;
    padding: 50px;
    border: 1px solid #aaa;
}
```

- we can embed this content area within other grids
  - *then add child items for the grid content itself*
- `content` container will be aligned and justified to the centre of the parent
- each child column will occupy the same proportion of available space
  - *using `grid-template-columns: 1fr`*
- each item will also be aligned to the centre of the available space
- properties such as padding and border are optional
  - *e.g. dictated by aesthetic requirements...*

CSS3 Grids - fun layout

grid items for the board - part 1

- each square will be a child list item to the parent `ul`
  - *e.g. style `ul` as follows*

```
.items {
    grid-area: items;
    display: grid;
    grid-gap: 10px;
    grid-template-columns: repeat(3, 150px);
  grid-template-rows: 150px 150px 150px;
}
```

CSS3 Grids - fun layout

grid items for the board - part 2

- then style each item, which creates the squares on the game board

```
.items li {
    margin: 0;
    list-style-type: none;
    border: 1px solid #333;
    background-color: #333;
    color: #fff;
    padding: 10%;
}
```

- styling is for aesthetic purposes
  - *e.g. to render a list item as a square without the default list style*
- also define an alternating colour scheme for our squares, e.g.

```
.items li:nth-child(even) {
    border: 1px solid #ccc;
    background-color: #ccc;
    color: #333;
}
```

- demo - Fun with Squares

CSS3 Grid - structure and layout

fun exercise

Choose one of the following app examples,

- **sports** website for latest scores and updates
  - *e.g. scores for current matches, statistics, team data, player info &c.*
- **shopping** website
  - *product listings and adverts, cart, reviews, user account page &c.*
- **restaurant** website
  - *introductory info, menus, sample food images, user reviews &c.*

Then, consider the following

- use of a **grid** to layout your example pages
  - *where is it being used?*
  - *why is it being used for a given part of the UI?*
- how is the defined **grid** layout working with the **box model**?
- rendering of **box model** in the main content relative to **grid** usage
  - *i.e. box model updates due to changes in content*

Demos

- CSS Basics - Add a Class
- CSS - Complex Selectors Part 1
- CSS - Complex Selectors Part 2
- CSS - Complex Selectors Part 3
- CSS - Fonts
  - *CSS Fonts*
  - *CSS Custom Fonts*
  - *CSS Reset Before*
  - *CSS Reset After*
- CSS - Grids
  - *grid basic - page zones and groups*
  - *grid basic - article style page*
  - *grid layout - articles with scroll*
  - *grid layout - basic responsive*
  - *grid layout - responsive with specific media query*
  - *grid layout - responsive layout - part 1*
  - *grid layout - responsive layout - part 2*
  - *grid layout - dynamic content - part 1*
  - *grid layout - dynamic content - part 2*
  - *grid layout - Fun with Squares*
- JSFiddle tests - CSS
  - *CSS Fonts*
  - *CSS Custom Fonts*

Resources

- Google Web Fonts
- MDN - CSS Box Model
- MDN - CSS3 Grid
- MDN - CSS Selectors
- W3 Schools - CSS Grid View