Comp 324/424 - Client-side Web Design

Spring Semester 2024 Week 9

Dr Nick Hayward

Dev week demo & assessment

Course total = 25 credits

- continue development of a web application
  - built from scratch
  - HTML5, CSS, plain JavaScript…
- continue design and development of initial project outline and design
- working app (as close as possible…)
  - **NO** content management systems (CMSs) such as Drupal, Joomla, WordPress…
  - **NO** PHP, Python, Ruby, C# & .Net, Java, Go, XML…
  - **NO** CSS frameworks, such as Bootstrap, Foundation, Materialize…
  - **NO** CSS preprocessors such as Sass…
  - **NO** template tools such as Handlebars.js &c.
- data may be implemented from either
  - self hosted (MongoDB, Redis…)
  - APIs
  - cloud services (Firebase…)
  - **NO** SQL…e.g. (you may **NOT** use MySQL, PostgreSQL &c.)
- outline research conducted
- describe data chosen for application
- show any prototypes, patterns, and designs

Dev week demo & assessment

DEV week assessment will include the following:

- brief presentation or demonstration of current project work
  - ~ 10 minutes per group
  - analysis of work conducted so far
    - e.g. during semester & DEV week
  - presentation and demonstration
    - outline current state of web app
    - explain what works & does not work
    - show implemented designs since project outline & mockup
    - show latest designs and updates
  - due Monday 18th March 2024 @ 4.15pm

HTML5, CSS, & JS - example - part 1

add grid layout - option 1

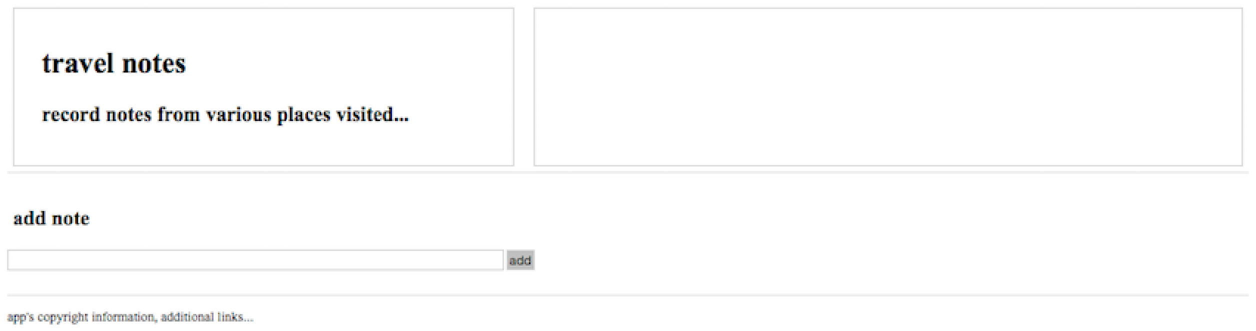
- update the layout of our Travel Notes application to include a grid layout
- apply this grid layout to the overall application
  - organisation and presentation of the notes
- remove the centred, fixed width for the `body` in our style.css stylesheet
- removes centre styling, results in content spanning full width of browser window
- add the grid layout to help us control this layout

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

- then modify content categories, child elements to use new grid css

```
<!-- document header -->
<header>
  <div class="row">
    <div class="col-5">
      <h3>travel notes</h3>
      <h5>record notes from various places visited...</h5>
    </div>
    <div class="col-7"></div>
  </div>
</header>
```

Image - HTML5, CSS, & JS - grid layout


travel notes

record notes from various places visited...

add note

app's copyright information, additional links...

Figure 1: Grid Layout - Updated Header - option 1

HTML5, CSS, & JS - example - part 1

add grid layout - option 2

- alternative layout option

```
<!-- grid banner -->
<div class="banner">
    <!-- logo -->
    <div class="logo">
        <img src="/assets/images/travel-notes-logo2.png" alt="site logo" width="80" height="80">
    </div>
    <!-- document header -->
    <header class="site-header">
        <h3>travel notes</h3>
        <!--<h5>record notes from various places visited...</h5>-->
    </header>
    <!-- banner extras -->
    <div class="banner-extras">
    </div>
</div> <!-- end of grid banner -->
```

- a few extra *places* added to layout
  - logo, header, and banner extras

Image - HTML5, CSS, & JS - grid layout

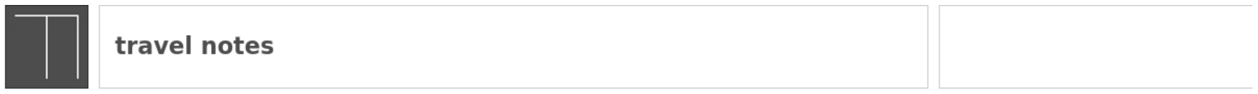


Figure 2: Grid Layout - Updated Header - option 2

HTML5, CSS, & JS - example - part 2

add grid layout - option 1

- update our main content to position the `note-input` and `note-controls`

```
<!-- note input -->
<section class="note-input">
  <div class="row">
    <div class="col-12">
      <h5>add note</h5>
      <input><button>add</button>
    </div>
  <div>
</section>
<!-- note controls for delete... -->
<section class="note-controls">
  <div class="row">
    <div class="col-12">
      <button id="notes-delete">Delete all</button>
    </div>
  </div>
</section>
```

- still need to amend style.css to remove additional fixed styling

---

Image - HTML5, CSS, & JS - grid layout 2

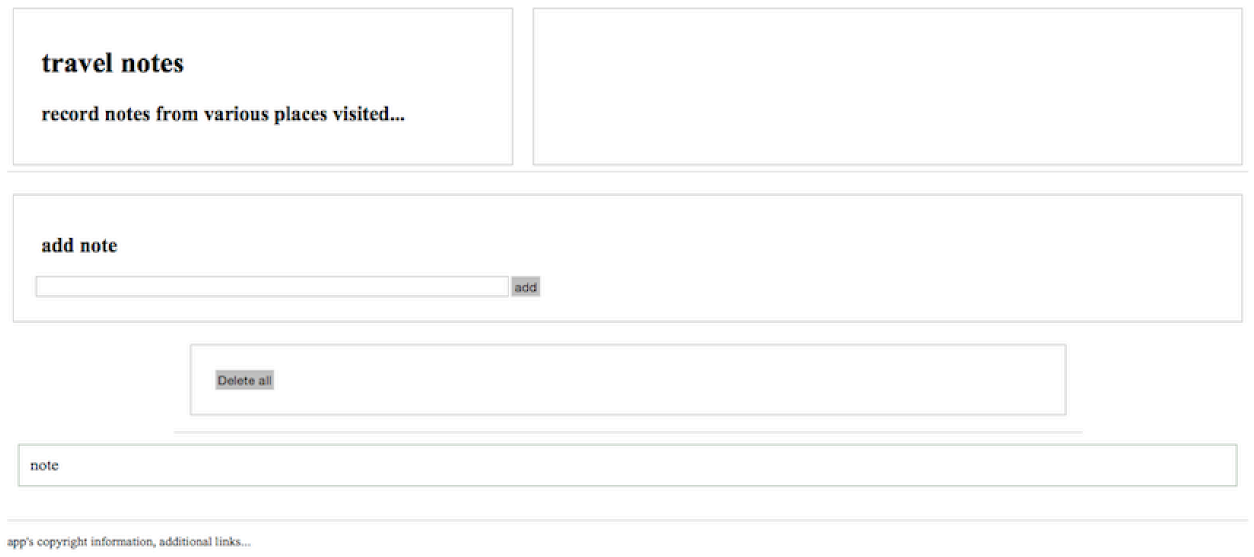

travel notes
record notes from various places visited...
add note
add
Delete all
note
app's copyright information, additional links...

Figure 3: Grid Layout - mixed grid and fixed - option 1

HTML5, CSS, & JS - example - part 2

add grid layout - option 2

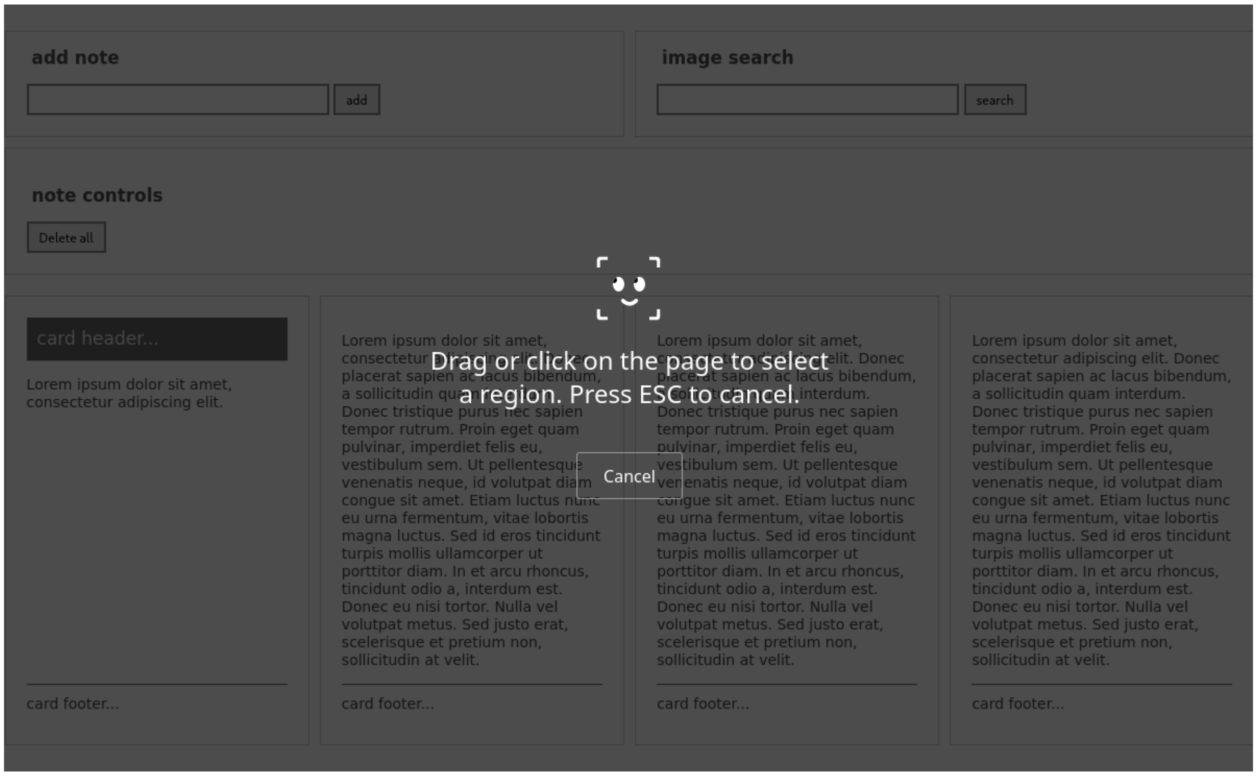
- modify `main` to include unique content

```html
<!-- document main - unique to current page -->
<main class="site-content">
    <div class="page-heading">
        <!-- note input -->
        <section class="note-input">
            <h5>add note</h5>
        <input type="text" id="input-note" />
        <button id="add-note">add</button>
        </section>
        <!-- image search -->
        <section class="image-search">
            <h5>image search</h5>
        <input type="text" id="input-image" />
        <button id="search-images">search</button>
        </section>
        <!-- note controls for delete... -->
        <section class="note-controls">
            <h5>note controls</h5>
        <button id="notes-delete" class="delete-all">Delete all</button>
        </section>
    </div><!-- end of page-heading -->
    <!-- note output -->
    <section class="note-output">
    </section>
</main>
```

- add `page-heading` with sections
  - note-input, image-search, note-controls

- add section for note-output
  - update dynamically with notes

Image - HTML5, CSS, & JS - grid layout 2



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Drag or click on the page to select a region. Press ESC to cancel.

Figure 4: Grid Layout - mixed grid and fixed - option 2

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;
}
```

```css
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

```css
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 - 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

HTML5, CSS, & JS - example - part 3

add grid layout - option 1

- fix mixed rendering by removing width, margin, and padding for `.note-controls`

```
/* note controls */
.note-controls {
  border-bottom: 1px solid #dedede;
  display: none;
}
```

- continue to update Travel Notes app
  - modify output for notes
  - add further options for users

DEMO - Travel Notes - grid layout with media queries

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
- 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

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HTML5, CSS, & JS - example - part 3

add grid layout - option 2

- use CSS3 grids to structure page
  - add wrapper for grid in body
- content places for grid structure
  - banner, site-content, site-footer
  - e.g. banner for heading structure

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.

```css
.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` ...

HTML5, CSS, & JS - example - part 3

```css

div.wrapper {
    display: grid;
    grid-gap: 0;
    grid-template-rows: 80px auto 80px;
    grid-template-areas:
        "site-banner"
        "site-content"
        "footer";
    margin: 20px 5% 0 5%;
    padding: 0;
    height: calc(99vh - 20px);
}
```

add grid layout - option 2 - wrapper

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.

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

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

```css
.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.

```css
.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.

```css
.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

HTML5, CSS, & JS - example - part 3

```css

div.banner {
    grid-area: site-banner;
    display: grid;
    grid-template-columns: 90px 1fr auto;
    grid-template-rows: 80px;
    grid-template-areas:
        "site-logo site-header banner-extras";
}
```

add grid layout - option 2 - banner

HTML5, CSS, & JS - example - part 3

add grid layout - option 2 - banner components

- various nested UI components
- banner
  - logo, site-header, banner-extras

```css
.logo {
    grid-area: site-logo;
    margin: 0;
}

.site-header {
    grid-area: site-header;
    margin: 0 5px 0 0;
    border: 1px solid #ccc;
    padding: 10px;
}

.banner-extras {
    grid-area: banner-extras;
    display: grid;
    grid-template-columns: 150px 150px;
    grid-template-areas:
        "extra-left extra-right";
    margin: 0 0 0 5px;
    border: 1px solid #ccc;
}
```

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

HTML5, CSS, & JS - example - part 3

```
.site-content {
    grid-area: site-content;
    display: grid;
    grid-template-areas:
        "page-heading"
        "content";
}
```

add grid layout - option 2 - site content

HTML5, CSS, & JS - example - part 3

add grid layout - option 2 - site content components

- main app structure and components
- page-heading grouping for grid structure
  - note-input, image-search
  - note-controls

```
.note-input {
    grid-area: add-note;
    margin: 10px 5px 0 0;
    border: 1px solid #ccc;
    padding: 0 20px 20px 20px;
}

.image-search {
    grid-area: search-images;
    margin: 10px 0 0 5px;
    border: 1px solid #ccc;
    padding: 0 20px 20px 20px;
}

.note-controls {
    grid-area: note-controls;
    margin: 10px 0 0 0;
    border: 1px solid #ccc;
    padding: 20px;
}
```

- note-input & image-search rendered as 50/50 split
- note-controls moved to separate row in page-heading

HTML5, CSS, & JS - example - part 3

```
.site-footer {
    grid-area: footer;
    margin: 0;
    border-top: 1px solid #dddddd;
}
```

add grid layout - option 2 - site footer

- site banner and footer rendered equivalent to fixed
  - main site content uses internal scroll for page

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.

HTML5, CSS, & JS - example - part 4

add flex to grid layout

- an additional option to consider - flex layouts
  - aims to provide efficient way to align and proportion content
- known as **Flexbox Layout**
  - idea is to apportion width and height for content
  - proportions relative to container even when their size is unknown or dynamic
- flex layout could, in theory, replace a full grid layout
  - considered more a complement to overall grid structure
- defined flex container expands items to fill the container's available space
  - can also shrink them to prevent any possible overflow
- think of a flex layout as supporting multiple directions
  - direction agnostic
- many properties available for **flex**
  - focus upon styling flex container and any flex items

CSS - Flexbox

intro

- helps solve many issues that have continued to plague layout and positioning
- used with HTML elements and components
  - both client-side and cross-platform apps
- a few issues it tries to solve
  - vertical and horizontal alignment
  - defining a centred position for child elements relative to their parent
  - equal spacing and proportions for child nodes regardless of available space
  - equal heights and widths for varied content
  - & lots more…

CSS - Flexbox

basic usage

- for any app layout, we need to define specific elements as *flexible boxes*
- i.e. those allowed to use flexbox in a given app
  - e.g.

```css
section {
  display: flex;
}
```

- ruleset will define a `section` element as a parent flex container
  - child elements may now accept flex declarations
- initial declaration, `display: flex`
  - also includes default values for flexbox layout of child elements
- e.g. `<div>` elements in a section
  - by default now arranged as equal sized columns with the same initial height

---

CSS - Flexbox

axes

- elements arranged using flexbox are laid out on two axes
- main axis
  - axis running in the direction of the currently laid out flex items
  - e.g. rows or columns
  - start and end of axis = *main start* & *main end*
- cross axis
  - axis running perpendicular to the current main axis
  - start and end of axis = *cross start* & *cross end*
- each child element laid out inside flex container called a *flex item*

CSS - Flexbox

flex direction

- set a property for the flex direction
  - defines direction of flex items relative to main axis
  - i.e. layout direction for child elements
- default setting is `row`
  - direction will be relative to current browser language setting
  - e.g. for English language browsers = left to right

```css
section {
  flex-direction: column;
}
```

- override the default `row` setting
  - arrange child items in a column

```css
section {
  display: flex;
  flex-direction: column;
}
```

- ensures child flex items were laid out in a single column
- then override specific `section` elements
  - allow child flex items in a `row` direction

```
#tabs {
  flex-direction: row;
}
```

Image - CSS Flexbox

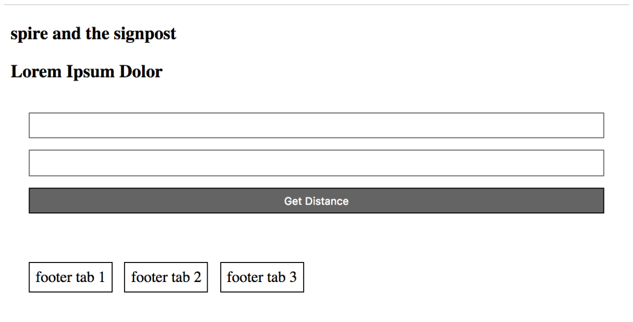


Figure 5: CSS Flexbox - flex direction

flex direction

CSS - Flexbox

flex item wrapping

- ensure child items do not overlap their parent flex container
  - add a declaration for `flex-wrap` to a required ruleset
  - e.g.

```
#tabs {
  flex-direction: row;
  flex-wrap: wrap;
}
```

Image - CSS Flexbox

without wrap

Image - CSS Flexbox

with wrap

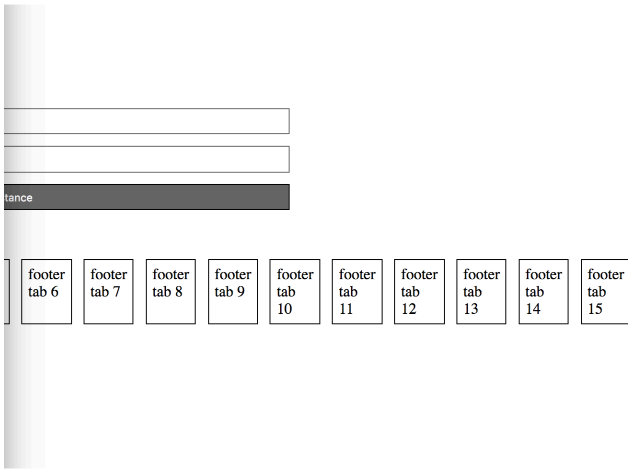


Figure 6: CSS Flexbox - no flex wrap

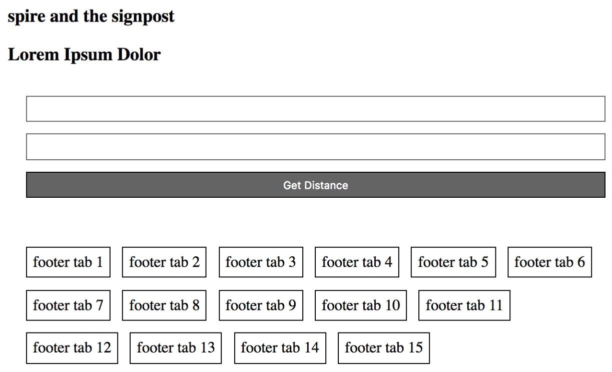


Figure 7: CSS Flexbox - flex wrap

Video - Flexbox

flexible design Examples of Modular UI Design

Source - Modular UI Design - YouTube

HTML5, CSS, & JS - example - part 5

add flex to grid layout - option 1

- we might specify CSS properties for a flex container

```
.flex-container {
    display: flex; /* defines container as flex */
    flex-direction: row; /* defines positioning of items added to container */
    flex-wrap: wrap; /* defines whether to wrap items to another line */
    justify-content: flex-start; /* defines start point and distribution of items */
}
```

- allows us to position our container starting at the left
  - items contained in a row
  - contained items wrapping to additional lines if necessary
- many additional options available for each property
- also add rulesets for specific styling of items within a flex container
- we could add properties to a flex item such as
  - specify the order of the flex items
  - whether a particular item can grow or shrink relative to content
  - default size of an item before any remaining space is distributed
  - individual alignment for a given item…

CSS - Flexbox

flex direction reverse

- also set flex direction to reverse
  - starts flex items from the right on an English language browser

```
#tabs {
  flex-direction: row-reverse;
  flex-wrap: wrap;
}
```

Image - CSS Flexbox

flex direction reverse

CSS - Flexbox

`flex-flow` shorthand

- also combine *direction* and *wrap* into a single declaration

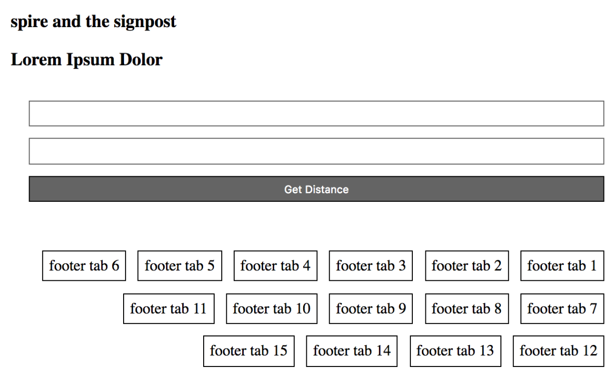


Figure 8: CSS Flexbox - flex direction reverse

- `flex-flow`
- now contain values for both `row` and `wrap`
- e.g.

```
#tabs {
  flex-flow: row wrap;
}
```

HTML5, CSS, & JS - example - part 6

add flex to grid layout - option 2

- flex container for option 2 design

```
/* note container - flex */
.note-output {
    display: flex;
    justify-content: space-between;
    flex-wrap: wrap;
    row-gap: 20px;/*applies to rows of items - not above first row... */
    padding-top: 20px;
}
```

- output notes section
  - organise single notes as flex items
  - add gap between rows of flex items
- justify content in container
  - notes start at left edge, end at right edge
  - space between evenly apportioned per note

CSS - Flexbox

sizing of flex items

- for each flex item, we may need to specify apportioned space in the layout
  - e.g. set space as an equal proportion for each flex item
  - we may add the following to a child item ruleset

```
div.fTab {
  flex: 1;
}
```

- defines each child flex item `<div class="fTab">`
    - occupy an equal amount of space within the given row
    - after considering margin and padding
- **n.b.** this value is proportional
    - doesn't matter if the value is 1 or 100 &c.
- define additional flex proportions for specific child items
    - e.g.

```
div.fTab:nth-child(odd) {
  flex: 2;
}
```

- each odd *flex-item* will now occupy twice available space
    - space in the current direction

Image - CSS Flexbox

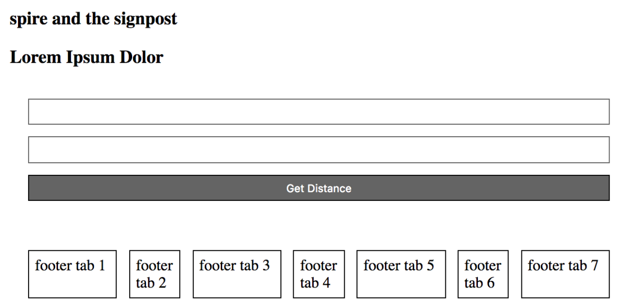


Figure 9: CSS Flexbox - flex item sizing

flex item sizing

CSS - Flexbox

minimum size

- then set a minimum size for a flex item
    - e.g.

```
div.fTab {
  flex: 1 100px;
}
```

- or a relative unit for the size

```
div.fTab {
  flex: 1 20%;
}
```

- each flex item will initially be given a minimum

  - e.g. `20%` of the available space
  - the remaining space will be defined relative to proportion units

---

Image - CSS Flexbox

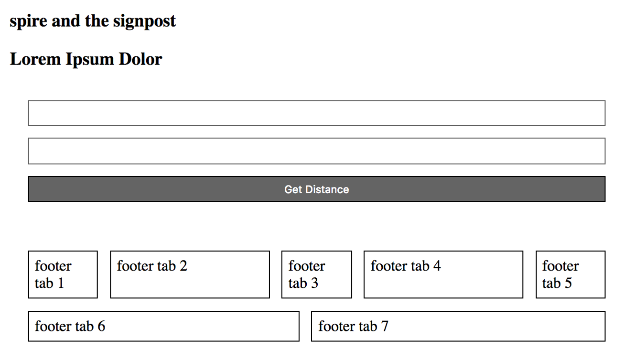


Figure 10: CSS Flexbox - flex item sizing - minimum size

flex item sizing

HTML5, CSS, & JS - example - part 7

add flex to notes

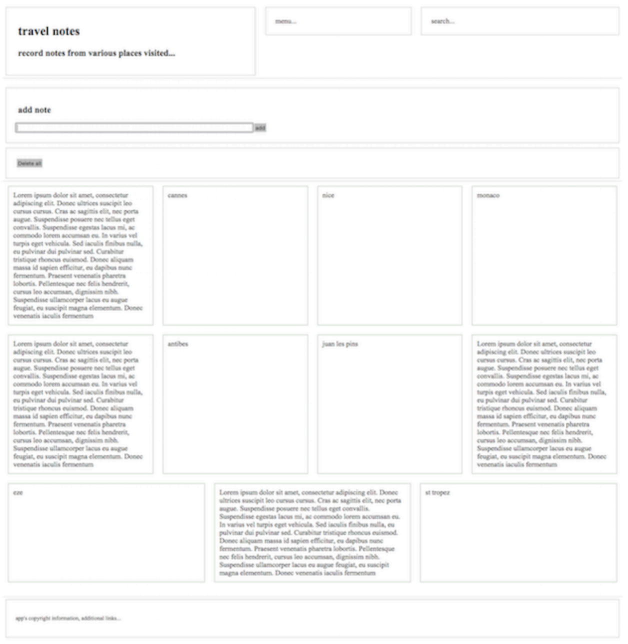
- flex container and items useful for organising and positioning our notes
- due to uncertainty about content, size, and general note requirements
  - flex positioning and styling removes the need for assumptions or fixed sizes
- we can start to modify the styling and rendering of our notes using flex

```
/* flex item */
.flex-item {
  flex-basis: 300px; /* default size before extra */
  flex-grow: 1; /* all items will be equal */
}
```

- gives us a default smallest size for each note
- then the ability for each note to grow to fill the row as required
- also work with responsive layouts
  - due to the minimum size and the option to grow for each item
  - and wrap flex items per flex container
- modify and update styles as we develop travel notes app

DEMO - Travel Notes - grid layout with flex notes

Image - HTML5, CSS, & JS - Flex Notes


travel notes

record notes from various places visited...

menu...

search...

add note

add

Delete all

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Figure 11: Grid Layout - flex notes

Image - HTML5, CSS, & JS - Flex Notes 2

Image - HTML5, CSS, & JS - Flex Notes 3

HTML5, CSS, & JS - example - part 8

add flex to notes

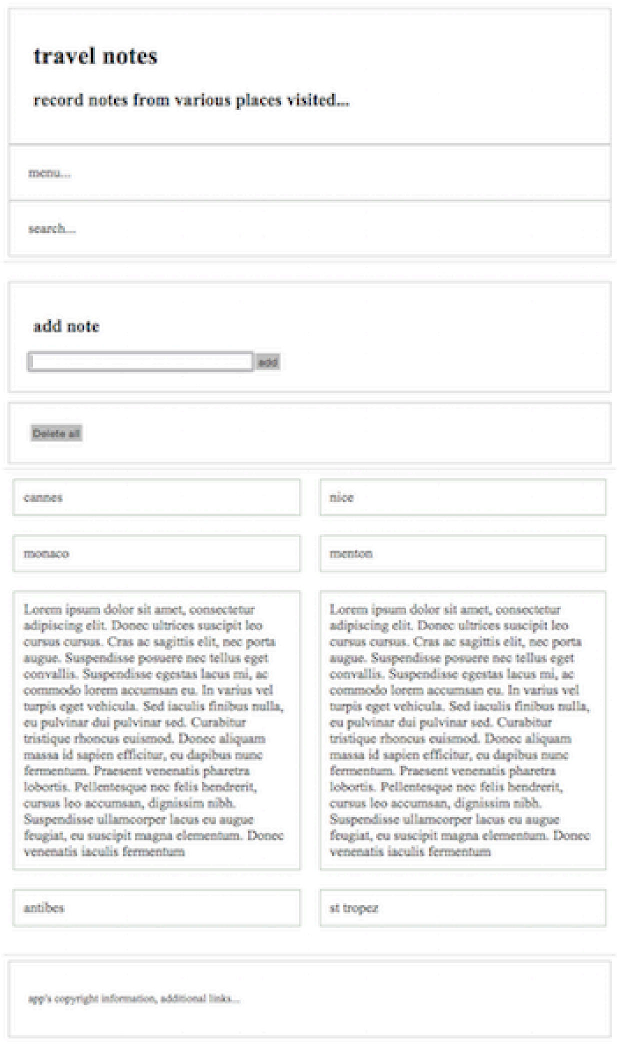
- Notes with Flex and Media Queries

HTML5, CSS, & JS - example - part 9

add flex to notes - option 2

- define styling for flex items in option 2 design
- note defined using card layout design
  - card-view, card-content

```css
/* note card - flex */
.card-view {
  display: flex;
  flex-direction: column;
    flex: 0 0 250px;
    border: 1px solid #CCCCCC;
    padding: 20px;
}
.card-content {
```


travel notes
record notes from various places visited...
menu...
search...
add note
add
Delete all
cannes
nice
monaco
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antibes
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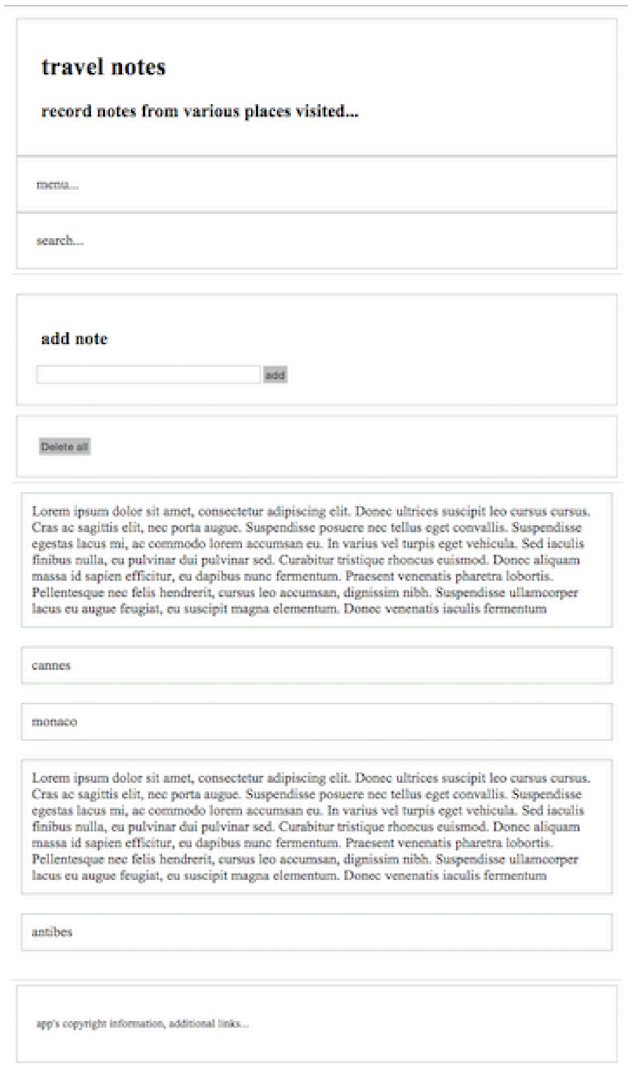
Figure 12: Grid Layout - flex notes - medium



travel notes

record notes from various places visited...

menu...

search...

add note

add

Delete all

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Figure 13: Grid Layout - flex notes - small

```
  flex: 1;
}
```

- card is flex container for child flex items
  - e.g. note content, header, footer &c.
- `flex` defines shorthand property
  - flex-grow, flex-shrink, flex-basis
  - note set to initial length of `250px`

CSS - Flexbox

flex item alignment

- Flexbox allows us to define alignment for flex items in each flex container
  - relative to the main and cross axes
- e.g. we might want to specify a centred alignment for flex items

```
#tabs {
  flex-direction: row;
  flex-wrap: wrap;
  align-items: center;
}
```

- `align-items: center`
  - causes flex item in flex container to be centred along the cross axis
  - however, they'll still maintain their basic dimensions
- also modify value for `align-items` to either `flex-start` or `flex-end`
- such values will align flex items to either start or end of cross axis

---

CSS - Flexbox

override align per flex item

- as with `flex`
  - also override alignment per flex item
  - using `align-self` property add a value for positioning
- e.g. a sample declaration might be as follows

```
div.fTab:nth-child(even) {
  flex: 2;
  align-self: flex-end;
}
```

CSS - Flexbox

justify content for flex item

- also specify `justify-content` for flex items in a flex container
  - property allows us to define position of a flex item relative to main axis
- default value is `flex-start`
- then modify it relative to one of the following
  - `flex-end`

    - `center`
    - `space-around`
        * distributes each flex item evenly along main axis with space at either end
    - `space-between`
        * same as `space-around` without space at either end...

CSS - Flexbox

alignment and order - part 1

- define alignment relative to each axis using a specific declaration
    - e.g. for the main we may use `justify-content`
    - for the cross axis we use `align-items`
- also modify layout order of flex items
    - without directly changing underlying source order
- use the following pattern to specify order

```css
div.fTab:first-child {
  order: 1;
}
```

- first flex item will now move to the end of the tab list

Image - CSS Flexbox

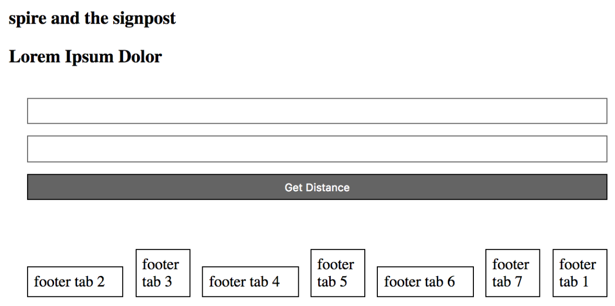

Figure 14: CSS Flexbox - flex item order 1

flex item order

CSS - Flexbox

alignment and order - part 2

- due to default order for flex items
    - by default, all flex items have an `order` value set to `0`
- higher the `order` value, later the item will appear in the list &c.
- items with the same order will revert to the order in the source code
- also possible to ensure certain items will always appear first
    - or at least before default `order` values

    - by using a negative value for the `order` declaration
    - e.g.

```
div.fTab:last-child {
  order: -1;
}
```

CSS - Flexbox

nesting flex containers and items - part 1

- Flexbox can also be used to create nested patterns and structures
    - e.g. we may set a flex item as a flex container for its child nodes
- we might add a banner to the top of a page

```
<section id="banner">
  <header id="page-header">
    <h3>spire and the signpost</h3>
    <h5>point to the stars...</h5>
  </header>
  <section id="search">
    <input type="text" id="searchBox"/>
    <button id="searchBtn">Search</button>
  </section>
</section>
```

CSS - Flexbox

nesting flex containers and items - part 2

- set `#banner` , `#page-header` , and `#search` as flex containers
    - e.g.

```
#search {
  display: flex;
}
```

- then specify various declarations for `#search`
    - e.g.

```
#search {
  display: flex;
  flex-direction: row;
  flex: 2;
  align-self: flex-start;
}
```

- includes values for itself and any child elements
    - if we then add some rulesets for the nested flex items
    - e.g.

```
#searchBox {
  flex: 4;
}
```

```
#searchBtn {
  flex: 1;
}
```

- we get a simple proportional split of `4:1` for the input field to the button

---

Image - CSS Flexbox

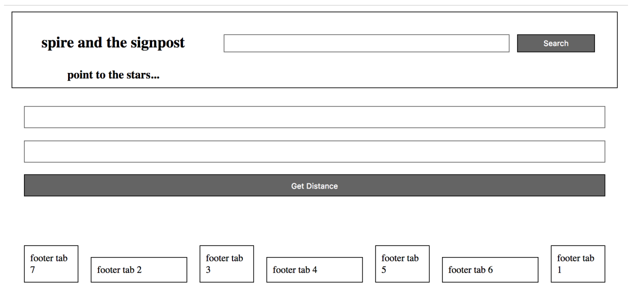

Figure 15: CSS Flexbox - nested flex containers

nested flex containers

HTML5, CSS, & JS - example - part 10

add flex to notes - option 2

- define rulesets for child items
  - card-view header
  - card-view footer

```
.card-view header {
    padding: 10px;
    background-color: #666666;
    color: #EEEEEE;
    font-size: 17px;
}
.card-view footer {
    border-top: 1px solid #666666;
    padding: 10px 0;
}
```

- DEMO - Travel Notes - Version 3 - Grid

Image - HTML5, CSS, & JS - Flex Notes

Image - HTML5, CSS, & JS - Flex Notes

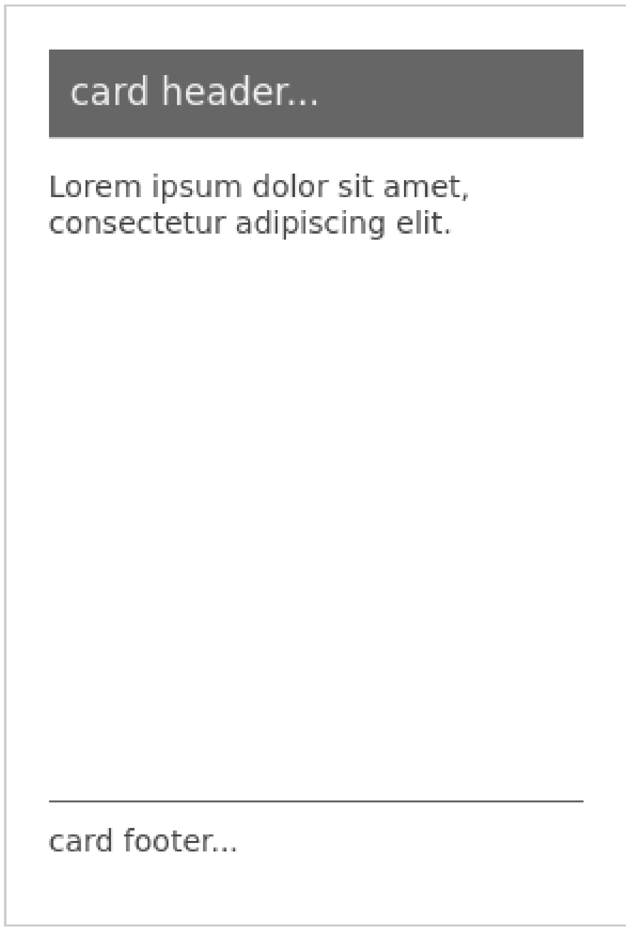

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Figure 16: Grid Layout - flex notes - card design

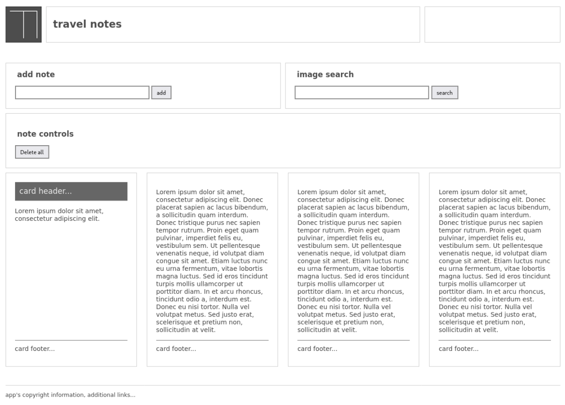

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Figure 17: Grid Layout - flex notes - card view with space between

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…

Image - Grid Layout 4

grid test 2 - gutters
app's copyright information, additional links...

Figure 18: Grid Layout - Media Queries

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…

```css
/* 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

```css
@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

Resources

- MDN - CSS3 Grid
- W3 Schools - CSS Grid View
- Example Responsive UI Designs - YouTube
- MDN - CSS3 Grid
- Modular UI Design - YouTube
- W3 Schools - CSS Grid View
- MDN - CSS Flexbox
- W3 Schools - CSS Flexbox
- Various
  - Example Responsive UI Designs - YouTube
  - MDN - CSS3 Grid
  - Modular UI Design - YouTube