Final Project Report (Taylor'd UI)

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Abstract. A complete User Interface framework designed for entry level users with a focus on vocabulary that is easy to understand. Taylor'd UI will also introduce partials using web components, boilerplate code offering different themes and integrated command line interface.

Keywords: CSS, User Interface, framework, beginners, templates, partials, themes

* Supervisor

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Glossary

CSS Cascading stylesheets. 7, 8, 15, 16, 25

DRY Don't Repeat Yourself. 27

em element. 16

HSL Hue, Saturate, Lighten. 15

mixins a mixin is a class that contains methods for use by other classes without having to be the parent class of those other classes.. 24, 27, 28

px pixel. 16, 17

rem Root element. 16, 17

SASS Syntactically Awesome Stylesheets. 24, 25, 27, 30, 31

SCSS Sassy Cascading Stylesheets. 25–27, 31

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Acknowledgements

I would like to thank ....

Introduction

UI, and *CSS* frameworks are abundant and readily available and generally covered by permissible licence agreements [Arsenault, 2016]. This not only allows commercial use of the frameworks but ultimately encourages tie in to a particular framework. End users expect all websites to work across their devices, laptops, tablets and phones. This requirement of responsive web applications ensures that hand coding a solution is a daunting task for entry level developers.

Using a framework allows the user to speed up the initial mock-up process, they offer clarification on common *CSS* issues, have wide browser support. Frameworks are good for responsive design, offer clean, and tidy code. There are disadvantages to using frameworks such as an abundance of unused code left over, this is seen more so in large front end frameworks such as Twitter Bootstrap. There is a slower learning curve with using frameworks, and the user does not learn to do it themselves through problem solving.

Frameworks such as Twitter Bootstrap [et al, 2016b], and Zurb Foundation [et al, 2016a] offer complete solutions, with ready built code for forms, buttons, fluid layouts to popovers. Skeleton [Gamache, 2016] is an example of the other end of the spectrum. Skeleton is a boilerplate for responsive, and mobile first development. It is designed to be light, and is built with less than 400 lines of code. Unlike Bootstrap or Foundation, skeleton is designed to be the users starting point, not their full solution.

This project has being built to offer the end user a complete solution designed with an entry level user in mind. The framework is non opinionated unlike frameworks such as Bootstrap which is very opinionated about their design Guadia [2016]. This framework

is be designed to be the starting point for a user, for them to add in their custom styling.

Instead of the user building large complex websites with repeating code, one of the project goals is to get the user familiar with concepts such templates, and partials. Partials break up the html code into smaller more manageable fragments that can be used across multiple html files. The framework has been built with this in mind, creating classes, and id's that can be reused instead of having a bloated package with a lot of unused code [K, 2016].

A major benefit of this project, is the ability to customise or use prebuilt themes also known an boilerplate code. Utilising boilerplate can allow the user to concentrate on the aesthetics more so than the structure of the project. Using boilerplate's does have its negatives, the boilerplate itself can be expensive costing hundreds if not thousands. Many shortcuts could be used in the development of boilerplate, not adhering to W3S standards. These boilerplate's can also offer little customisation [Weller, 2016].

Further attempts to incorporate Bootstrap into projects demonstrated the syntax as very unfriendly, and noticeably more difficult than hand coded *CSS*. Bootstrap syntax such as:

```
1 |   <div class="col-sm-4">
```

does not describe in any form that it would be displayed as a three column layout in the browser. Changing this to a one column layout by the syntax was found to be problematic and the frameworks were also found to be opinionated.

Additionally while working as a web developer mentor at Coderdojo, students were observed to have similar experiences. Many were reluctant to learn frameworks such as Bootstrap as they were too confusing.

User Manual

Introduction

The project is to build a full *UI* framework that is aimed towards an entry level user. The framework is be non-opinionated, light weight, easy to understand, theme-able, and most importantly easy to learn.

The framework has minimal styling, the author has only added styling where it is needed, and that styling is kept to basic colours. This was to ensure the framework does not carry the author's design opinions. With been non-opinionated the framework is bare so that the end user is encouraged to not rely upon the built in styling, but instead to use it as a starting point to build upon it. The framework is based on a responsive grid system of 12 grids, allowing the end user to build a seamless experience from desktops to mobile devices.

The hope is that the framework will be as small of possible as of the source code deadline, the framework weighs —— this allows projects using it load faster on mobile devices, and in countries where fast internet is either not available or expensive.

To stop code from been repeated unnecessary, code sections have been broken into partials allow for the ability for the content to be broken up into manageable pieces, removing receptive code such as headers, and footers. PHP is then used to combine the files into one when loaded in the browser.

The framework will contain similar features from both Bootstrap, and Foundation as seen in table 1 such as tables, lists, breadcrumbs, and pagination. Features such a tooltips, and right to left are outside the scope of the project. The hope for the project is to be complete framework but having a smaller file size than both foundation, and Bootstrap borrowing concepts from Skeleton in keeping the framework light, and nimble.

The proposed framework will be built using the three key points mentioned below:

- For Entry Level Users
- Themeable
- Introduce the concepts of Templates, and Partials

Partials

talk about partials here web components

Themes

Talk about themes here

Boilerplate

talk about portfolio, blog and commerce website here

Command Line Interface

A Command Line Interface (CLI), also know as a Console User Interface is a text based interface that is a means of interacting with a computer program where the end user issues commands through an application such as the terminal in the form of successive lines of text.

Development

Framework

The following section will detail the components that make up the Taylor'd UI framework. Each of the following components are what makes up the framework, and aid in the development of a website. All the components of the framework have been built in separate partial files, denoted by an underscore. The underscore also tells codekit, the compiler been used to not compile the files into their own *CSS* file. A separate file called taylord.scss was created, in this file the @include statement was used to pull all the separate partial files into one file and that file is then compiled to *CSS*.

Variables

At the start of framework development, a file called _foundation.scss was created, in this file all the variables for the framework are defined. In this file, the foundation colour variable is set and using the *HSL* function called lighten, a range of colours are created to be used in the framework. Other colour variables were added and then used to set the background colour, alert colours, and link colours.

```
1  $foundation-color: #000;
2  $foundation-color-2121: lighten($foundation-color,
3  13%);
4
5  h1, h2, h3, h4, h5, h6 {
6    color: $foundation-color-2121;
```

Font and Typography

In keeping with the framework being non opinionated, it was crucial to pick a font, and to have the typography nondescript so that the end user can change it to suit their needs. A range of fonts were looked at, the readability of the font in regards to large sections to single lines of text was looked at.

Viewing the font on a range of devices ranging from mobile to desktop was looked at ensuring it was legible across these devices. The last aspect that was looked at was the range of the font, did it allow for non latin characters, accents and symbolsWordpress [2012].

The font that passed these tests, and was visually appealing was Open Sans. The next step was to determine the font sizing and how to calculate it. When decided on the best way to execute the font sizing, two methods were looked at, *em* and *rem.px* was not looked at as early versions of Internet Explorer are not able to change the font size using browser functionality, a major usability issue. The *em* technique alters the base font size on the body element by using a percentage Laug [2007].

This adapts the font so that 1em is equal to 10px, instead of the default 16px. To change the font size to the equivalent of 14px, the *em* needs to be 1.4em. The downside of using em to calculate the font sizing is that the font size compounds. This means that a list within a list isn't 14px but rather 20px. There is a work around where any child elements are declared to use 1em, but an entry level user would not know this.

With the advent of *CSS* 3, *rem* was added, as previously mentioned, *em* sizing was relative to the font size of the parent whereas *rem* is relative to the root or html element. This means that a single font size can be defined for the html element, and all *rem* units will be a percentage of that base unit. Safari 5, Chrome, Firefox 3.6+,

and even Internet Explorer 9 have support for *rem* units. Opera up to version 11.10, and early versions of Internet Explorer have yet to implement *rem* units. In order to display font on these browsers, a fallback *px* size is calculated using a mixin.

Colour Scheme

When creating the colour scheme, it was important to keep design opinions to a minimum, to use colours that would get the frameworks point across. It was also key to use colours that the end user would recognise that they were for instructional purposes, and for them to change in their web development projects. The colour needed to look good when modified as well, this means if the hue, tone and vibrancy of the colour is modified, the resulting colour needed to look well.

Instead of researching colour theory and choosing the best colours, it was decided to use Google's Material Design Google [2017a] colour palette, and choose from their wide range of colours. The palette gave a variety of colours along with modifications of the colour such as different hues and saturations. The colours selected to use in the framework were kept to primary colours to keep it as non opinionated as possible.

Tables

Tables in HTML should only be used for rendering data that naturally belongs in a grid based system. This is data where the data characterised is similar across a number of objects. Tables should not be used for the layout of content in a website, divs should be used for this. The key to designing the tables was to demonstrate to the end user that the tables were for data, and not for layout.

Five table variations were created for the framework, ranging from default table to striped tables, and included is table modifiers. Table modifiers take the colours that are used to dictate success or warning, and add them to a row in the table. The tables were also designed to be responsive, to achieve this the padding of table is calculated by dividing the $baseline height by a set value.

```
1    .table.table-condensed > thead > tr > th,
2    .table.table-condensed > tbody > tr > td {
3      padding-top: $baseline-size / 2.4; // 5px
4      padding-bottom: $baseline-size / 2.4;  // 5px
5      padding-left: $baseline-size / 1.5;  // 8px
6      padding-right: $baseline-size / 1.5; // 8px
7    }
```

Buttons

Buttons are an integral part of a framework. The styling, and the functionality of the buttons are key in the end users goal of using a website. If a button does not look like a button or if the styling of a button is overdone, the user can get confused, and not know how to proceed. With this in mind, the development of the buttons continued throughout the development of the framework. Originally, the buttons had round corners but this was removed in trying to keep the design non opinionated.

Five button types were designed at the start of the project. The default button, then large, and small buttons based off the default button, and lastly a pill shaped button.

Based off the default button type, six styles were created. Each of these button styles has a visual waiting to it such as the warning button. This button can tell the user to proceed with caution, it can also be used as a delete button. To create these buttons a mixin was used that takes the colour stored in the variable for each of these classes. The mixin also adds in the active and hover states, and calculates the colours to be used.

```
.button-default {
  @include button-version($button-default-color,
   $button-default-background);
  color: $foundation-color-a6a6;
  text-decoration: none;
  border: $foundation-color-e8e8;
  border-style: solid;
  border-width: thin;
  }
}
```

Panels

A panel is a component that allows you to outline a section of a web page. This enables you to view sections on your page as you add content to them, allowing you to place emphasis where you need it or removing all content from a section.

```
.panel-default {
  border-color: $default-border-bottom-color;

  .panel-title {
    @include panel-title($default-color-background,
    $default-panel-text, $default-border-bottom-color);
  }
}
```

Button Groups and Pagination

A button group is a series of buttons grouped together on a single line, this can be achieved by removing the margin attribute in CSS. Pagination is a series of numbers grouped together on a single line, this can be useful for when you have multiple pages in your website. As these two components can be used interchangeably, it was decided to include them together in the same partial.

To get these components working correctly, the > symbol was used, this allowed for only the direct children of an element to be selected, and modified. It won't effect any other element that is not a direct child of that element. In the code snippet below only the a element of unordered list item belonging to the class pagination gets a solid 1px border.

```
1 .pagination > ul > li > a {
2   border: 1px solid $foundation-color-e8e8;
3 }
```

Labels

Button labels should be kept as simple as possible. Long labels take longer to read, and can also take up large sections of valuable real estate on mobile web pages.

The button element illustrates a clickable button. The button element can be quite adaptable, elements such as images, text, headers, and even paragraphs can be in the button. The button element can also contain pseudo-elements such as ::before, and ::after.

There is a clear difference between the label element, and a button created with an input element. An input element serves a data field, this is user data that you intend to dispatch to a server. There are several types of input related to a button.

```
1 <input type="submit">, <input type="image">, <input type="file">,
2 <$input type="reset">, <input type="button">.
```

Navigation

The navigation component of the framework is a simple responsive navigation menu comprised of a non list style that becomes a drop down menu when the screen size is less than 640px.

On a larger browser window size, the navigation is designed to stay at the top of the browser window when the user is scrolling down on a web page, this is achieved by making the navigation fixed to the web page. As screen real estate is a commodity on smaller browser window sizes such as mobile, the navigation bar changes to absolute. The navigation bar now stays at the top of web page, giving more screen real estate to the user.

```
///over 640px
header {
  background: $foundation-white;
  width: 100%;
  height: 80px;
  position: fixed;

///under 640px
  nav {
    ul {
      display: none;
      position: absolute;
      padding: 10px;
```

States

A state is an object that augments, and alters all other styles. For example, A message can be in a success or error state. States are commonly applied to the same element as a layout rule or applied to the same element as a base module class. In the frameworks, the states are used to indicate success in both alerts, and in a form.

```
.alert-success {
  color: darken($success-color, 15%);
  border-color: $success-color;
  background-color: lighten($success-color, 40%);
```

Grid

The grid is based on a 960 pixel grid or 60 rem in this case. The size is 60 rem as it is based on the default font size of 1 rem or 16 pixels. Using that as the base of the calculation, a font size of 960 pixels would be a rem value of 60. The reasons of why the grid is 960 pixels is that modern laptops, and or desktops no longer have a resolution below this. The 960 grid is evenly divisible in numerous ways as in in 2.

This allows for a grid system that is adaptable to the a screen layout of any screen size. In using this type of grid system, a 12 column layout will also be used. The 12 column layout lends itself to the 960 grid as its also equally divisible, allowing for an odd number of columns all with even numbers as seen in figure 1 whereas using a 16 grid column layout, the same result is not easily achieved.

The framework has three breakpoints; desktop, tablet, and mobile. Based on the viewpoint, the columns expand or collapse in size.

```
1 $breakpoint-desktop: "screen and (min-width: 48rem)
2 and (max-width: 60rem)";
3 $breakpoint-tablet: "screen and (min-width: 30rem)
4 and (max-width: 47.9375rem)";
5 $breakpoint-mobile: "screen and (max-width: 29.9375rem)";
```

The media queries were developed using the rem mixin that was also used for font sizing, this allowed for the rem value and pixel value to be stored. For the columns, a media query for each target was included. Desktop, and tablet views have a rem, and pixel value. For mobile, percentages are used to better scale the content.

```
.col12 {
  @include rem(width, 960);

  @media #{$breakpoint-desktop} {
    @include rem(width, 960);
  }
  @media #{$breakpoint-tablet} {
    @include rem(width, 767);
  }
  @media #{$breakpoint-mobile} {
     width: 100%;
  }
}
```

Even though the framework is designed for 12 grids, when the media queries were designed, a query was not made for each column of the grid. Not every column has a media query attached for it, instead the column around the missing column do the guess work for that column.

The framework has been designed to be a starting point, for better control the user needs to add media queries for each column. The framework is intended as a teaching tool for the user, adding in the queries for them, would not be beneficial.

Alerts

Alert notifications can be used to alert the user that something is about to happen or has happened, this can be that their username or password is incorrect, their login was successful, something went wrong while trying to load content, et al.

Five different alert types were created, each with their own significance. All the alerts are built using the same alert class, and through the use of the modifiers are changed into each alert type.

```
.alert {
  color: inherit;
  border: 0.5px solid transparent;
  display: block;
  padding: 1.5rem;
  background-color: $success-color;
  @include border-radius($border-radius);
```

Mixins

mixins are one of the most powerful features of *SASS*. *mixins* allow for efficient and clean code repetitions as well as an easy way to adjust your code with ease. *mixins* are the *SASS* equivalent of macros in other programming languages.

mixins are used throughout the development of this framework in an effort to keep the code DRY. As seen in the example below, instead of having to write the border radius property for each browser, a mixin was written to do this for us. In the code, the mixin is called using the include statement @include border-radius. In the compiled CSS, the border radius property for each browser is added in automatically,

```
@mixin border-radius($radius) {
  border-radius: $radius;
  -webkit-border-radius: $radius;
  -moz-border-radius: $radius;
  -ms-border-radius: $radius;
}
```

Technologies

To compile the *SCSS*, Codekit [Jones, 2017] was used. Although *SCSS* can be compiled from the command line or using a tool such as Grunt, using an application such as Codekit had extra features that would all have to be separate commands or even applications that made development easier.

Codekit is an application that helps a developer build websites faster by automating tasks that a developer needs. CodeKit compiles languages such as SASS, Less, Stylus, and CoffeeScript. Codekit auto refreshes the browsers you are testing the website in, they offer built in hosting, that can be accessed by phones, tablets and other PC's. Codekit automatically minifies, and automatically checks the syntax ensuring it is correct, as well as optimising images. By automating these features, it can speed up the developers workflow.

Originally, the development of the framework started with the *SASS* language. *SASS* is a *CSS* preprocessor that has syntax advancements, the syntax uses indentation to format the code, and does not use semi-colons to indicate a new line. Stylesheets created in *SASS* have to be compiled into regular *CSS* stylesheets to be used. However, they do not extend the *CSS* standard itself.

However as development continued, mixins were found to be an issue when written in *SASS*, *SCSS* mixins could not be used with *SASS* code. It was decided that the use of mixins were more important in the development of the *CSS* than not. All the partials that were written in *SASS* at this stage was converted into *SCSS*. As this happened in the first few weeks of the development process, the process didn't take long.

SCSS is an extension of the *CSS* syntax. This means that a correctly written *CSS* file is also valid *SCSS*. *SCSS* uses semi-colons

and braces to break up the code of an element. Variables in *SCSS* are declared with $, and the assignment sign is :.

Rails is a development tool that gives developers a structure for all the code they write, a framework. The Rails framework helps developers to build websites and applications, because it abstracts, and simplifies common repetitive tasks. Rails was chosen as the language to develop the partials as the rails conventions allows for developers to move to different projects seamlessly as each project will follow the same structure, and coding practices. This will be of benefit to the entry level users.

Ruby code is very readable, this will benefit the entry level user when they are reading the boilerplate files, gaining an understanding of how the boilerplate, and framework work.

HTML is a markup language used in structuring, and presenting content on the Word Wide Web. HTML along with Ruby on Rails is been used to develop the boilerplates to that the end user can edit to suit their needs.

LaTeX is a document preparation system for high-quality typesetting. The user uses markup tagging conventions to define the general structure of a document. LaTeX is been used in this project to develop the documentation that defines, and describes the project.

As the project will be large, with complicated parts, and to help in the development of the project, Git will be used for version control. Git works by creating snapshots of files. If there hasn't been any changes to specific file, Git will link it to a previous version, keeping the project fast, and lean.

Having versions of the project will show what changes have been made over time, and if needed allow the project to be rollbacked to a previous version if say one of the features in the framework is causing interfering with the other classes.

Development Issues

Originally the framework was to be developed using *SASS*, but as the development went on, and wanting to keep the code as *DRY* as possible, *mixins* were needed. Here within lies the issue, not enough *SASS* was known at the start of the project to write *SASS mixins* or knowing how to convert *SCSS* to *SASS*. The development then continued until several partials were created but the use of *mixins* were needed to continue the development using the correct methods.

It was at this stage when development was stopped, enough *SASS* was known to be able to convert the *SASS* into *SCSS*. After a day of conversion, ensuring that the *SCSS* worked exactly like the *SASS*, was development able to continue.

Another development issue was the buttons, the normal button was not clickable but the large, small, and pill button were. This was an issue that plagued the developer throughout the development. The code for buttons were rewritten a few times to see where the issue was, and no matter what was written, the button was not clickable, this issue then effected the default button, along with the classes that used the default button as a base such as the primary button.

To figure out the cause of the issue, tools such as the Chrome Development tools were used. Using the inspect element feature, the button toggle state was used to force the element state as seen in 2. This allowed for each of the buttons states to be forced to run, while viewing the corresponding code to see where the error was.

It seemed that the button issue was caused by the style to be overwritten by a different partial. To get the buttons to have their different states, the active, hover, and focus elements had to be hard coded into the button. In doing this, it didn't matter what other styles might override the values as the elements were hard coded.

A minor issue was trying to keep the code DRY both the SASS. and the compiled CSS was viewed to see if there was repeating code. When there was repeating code, *mixins* were used where possible. Although there was sections of repeating code that converting to *mixins* was not possible.

Originally, the partials were going to be developed using web components Components [2017], and Polymer Google [2017b]. The research had been done on these technologies, and how to use them. The development had started on the partials using these technologies but as the first partials were created, another student had viewing the work and asked "Is this not too complicated for your user?", and they were correct. The framework has been designed for the entry level user to understand, and use. Using the latest in web standards is likely to confuse them more.

The below code snippet shows how a partial would work in using polymer. A template is made in a separate file and then called into the index file. The template is broken into different sections, the template section, and then the polymer section. Polymer is used to ensure that the template file is displayed in all browsers as the template tag is bot support by all browsers currently.

```
1  \\example-app.html
2  dom-module id="example-app">
3    <template>
4      <style>
5        :host {
6          display: block;
7        }
8      </style>
9      <h2>Hello there[[prop1]]</h2>
10   </template>
11
12   <script>
13     Polymer({
14
15       is: 'example-app',
16
```

```
      properties: {
        prop1: {
          type: String,
          value: 'example-app',
        },
      },

    });
  </script>
</dom-module>

//index.html
<link rel="import" href="../iron-component-page/
iron-component-page.html">
<body>
   <iron-component-page src="example-app.html">
   </iron-component-page>
</body>
```

Instead the Ruby language is been used to develop the partials. Although the end user is likely to not know Ruby, the syntax is more user friendly. With using Ruby, the code is not overtaking the HTML as was the case with Polymer. The code snippets will always in the same places, this allows the end user to copy and paste the snippets in their websites without them having to know Ruby. Below is a code snippet of how a partial is rendering in a different file.

```
render template: "example/partial.html.erb"
```

themes were difficult to think off.

One the the biggest obstacles in the development of this framework was deciding on what components were critical to the framework. Then what elements would the end user want. And finally, what elements does the developer think will be useful for the end user, elements that they need to understand without overcomplicating the framework, and or doing the work of the end user for them.

On of the biggest issues in the development of the framework was creating the grid layout, and media queries. The first major issue was the syntax. The breakpoints had been declared in a different partial,

this lead to errors in the compiler. The compiler was looking for specific keywords after @media, which it wasn't able to interpret.

To solve this issue, the query had to be writing using different syntax. The variables for the breakpoints had to be treated as an ID. The compiler also would not accept brackets to frame the argument, curly braces had to be used instead. To reach this conclusion, a lot of trial and error was done. This involved making small changes to the @media argument, viewing the error, viewing *SASS* blogs to read what the error was in full, repeating this pattern until the code compiled with no errors.

```
1 //original
2 @media ($breakpoint-mobile)
3
4 //new method
5 @media #{$breakpoint-mobile}
```

Project Plan

Engineering Release One (January, and February):

- Iteration One: (9th of January - 23rd of January)
  - Met with Eamonn to discuss the best approach for the development in this semester
  - Changed how partials would be created, and displayed from a static site generator to using web components, and polymer to display the websites across browsers that don't support the web components import element
- Iteration Two: (23rd of January - 6th of February)
  - Started development of the framework. Created the file structure, and a partial called base that will contain all the variables of the framework
  - Decided on the colours and fonts that will be used in the framework
  - Created the body partial that contains a generic layout for a html file
- Iteration Three: (6th of February to 20th of February)
  - Created the button partial
  - Created the label partial to be used with the button partial
  - Created general layout of semester two document, broke the document into two sections; user manual, and development

Engineering Release Two (March):

- Iteration Four: (20th of February - 6th of March)
  - Rewrote all the *SASS* files to *SCSS*
  - Developed button mixins that would calculate all the button sizes
  - Created Alerts partial

  - Created States partial
  - Created Panel partial
- Iteration Five: (6th of March - 20th of March)
  - Created Table partial
  - Created Form partial

Engineering Release Three (April):

- Iteration Six: (20th of March - 3rd of April)
  - Started work on the development section of the document, broke the development section into smaller sections for each partial.
  - Created Button Groups and Pagination partial
  - Created Navigation partial
- Iteration Seven: (3rd of April - 17th of April)
  - Met with Eamonn, decided on final structure of report
  - Added in Engineering Releases section
  - Finalised all the sections of the report, reworded sections, ready for submission.

Future Work

The original plan of the framework was to create a documentation website showcasing the framework, and detailing everything about the framework with code snippets, and examples of usage. When the framework was been developed, a kitchen sink website was created first to ensure that the development was working as it should. Due to time constraints, the finished website hasn't been developed. For the continuation of the project, this website will be built using the framework, and have documentation on each of the core functionality of the framework.

In continuing on developing the framework, the following features would be added to the framework to make it more robust, and eliminate the need to write extra CSS:

- Badges to show unread content or to be used to display notifications
- Breadcrumbs to show the user where they are are on a website
- Tabs for tabbed navigation
- Off canvas sidebar that slides in and out of a page, ideal for mobile design
- Modal to create modal dialog boxes
- Inverse to reverse the style of any component for light or dark backgrounds

In addition to CSS, jQuery features to be added that would help the framework work more seamlessly such as making links active in the navigation bar, ensuring that the footer section always stays at the bottom of the page, regardless of page height, adding close options to the alerts, et al.

Conclusions

time management issues project management issues wanting to do more

Appendix

Fig. 1: 12 grid layout with the 960 grid

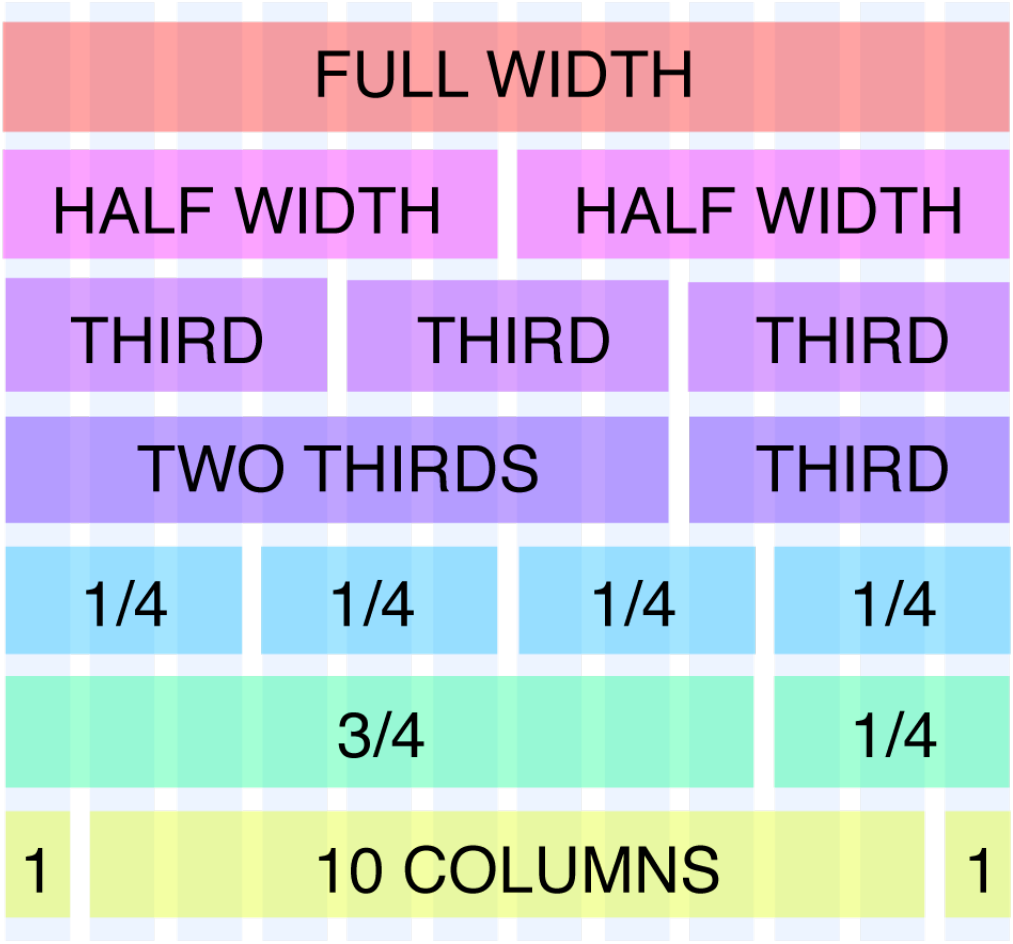

Fig. 2: Chrome Developer Tools

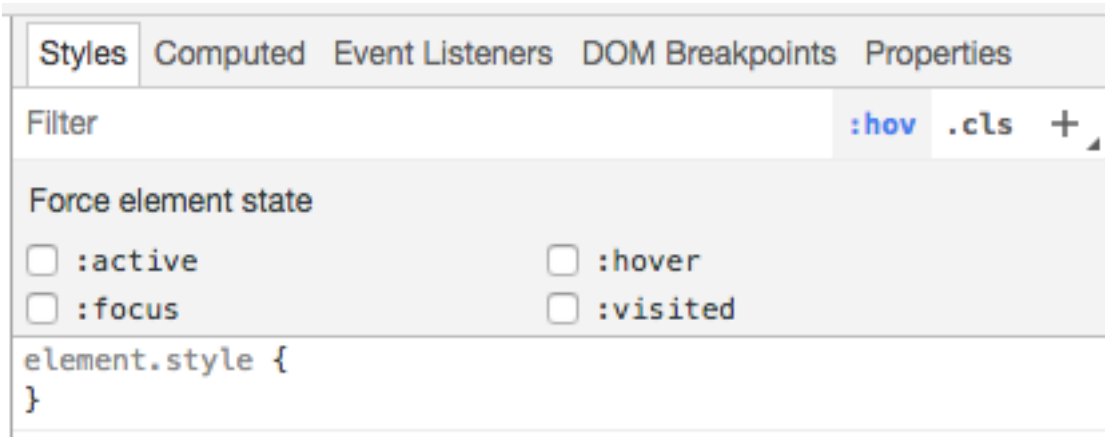

Table 1: Framework features

	Bootstrap	Foundation	Skeleton
Alerts	Yes	Yes	No
Accordion	Yes	Yes	No
Badges	No	Yes	No
Breadcrumbs	Yes	Yes	No
Buttons	Yes	Yes	Yes
Carousel	Yes	Yes	No
Dropdown	Yes	Yes	No
Forms	Yes	Yes	Yes
Form Validation	Yes	Yes	No
Grid	Yes	Yes	Yes
Icons	No	Yes	No
Labels	Yes	Yes	No
Lists	Yes	Yes	Yes
Media Object	Yes	Yes	Yes
Modals	Yes	Yes	No
Navigation	Yes	Yes	No
Pagination	Yes	Yes	No
Panels	Yes	Yes	No
Popovers	Yes	Yes	No
Print Styles	Yes	Yes	Yes
Progress Bar	Yes	Yes	No
Responsive Media	No	Yes	No
Right to Left	No	Yes	No
Scrollspy	Yes	Yes	No
Tables	Yes	Yes	Yes
Tabs	Yes	Yes	No
Thumbnails	Yes	Yes	No
Tooltips	Yes	Yes	No
Typeahead	No	No	No
Typography	Yes	Yes	Yes
Video Scaling	Yes	Yes	No

Table 2: Column Layout

Layout	Number of Columns
2 x 480	2 columns
3 x 320	3 columns
4 x 240	4 columns
5 x 192	5 columns
6 x 160	6 columns
8 x 120	8 columns
10 x 96	10 columns
12 x 80	12 columns
16 x 60	16 columns
20 x 48	20 columns
24 x 50	24 columns
30 x 32	30 columns

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