http://bit.ly/sass-fundamentals

Sass

Fundamentals

April 12, 2017

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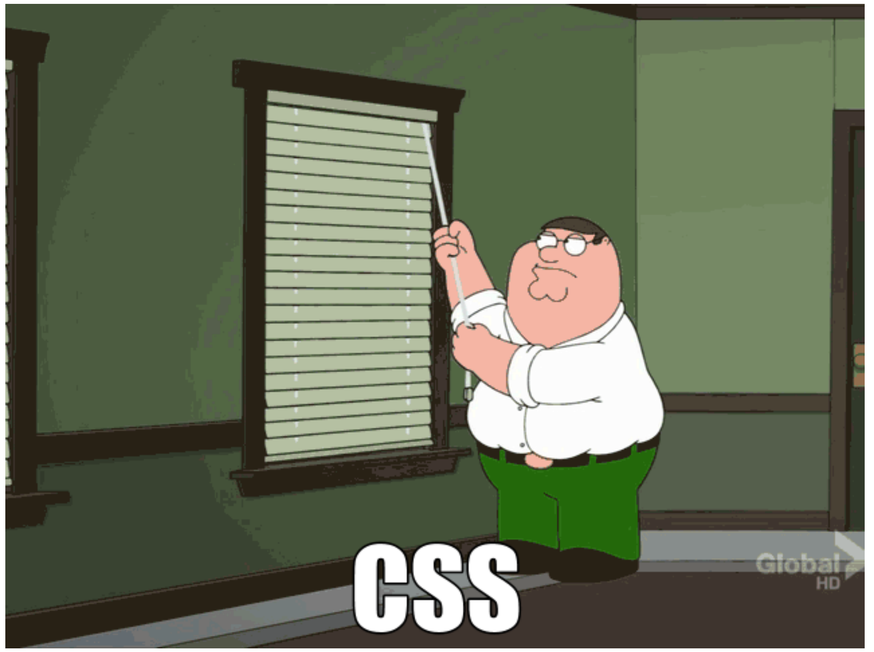
Frontend Masters

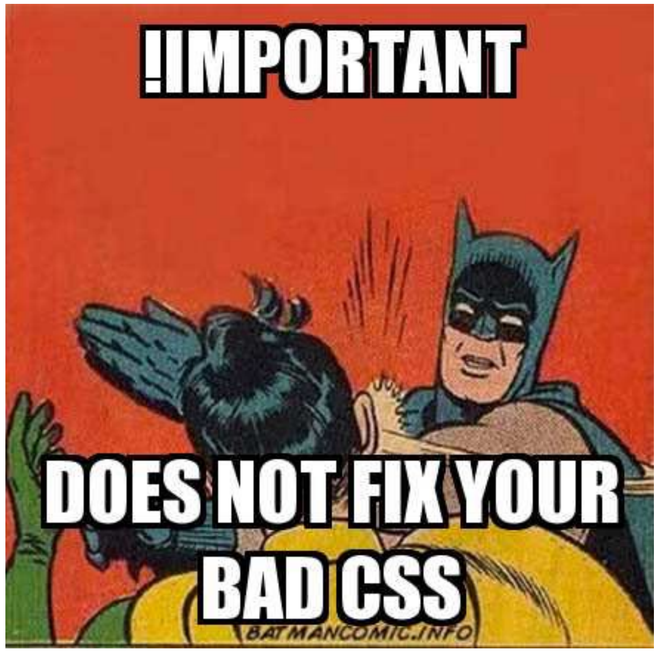
MIKE WORKS

CSS Pitfalls

- No encapsulation
- No variables
- Not composable
- Bad modularity primitives
- Globals
- Beating-into-submission-driven-development

CSS
IS
AWESOME





24.9k

Trying to learn CSS (i.imgur.com)
submitted 2 years ago by mcc5159
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CSS
IS
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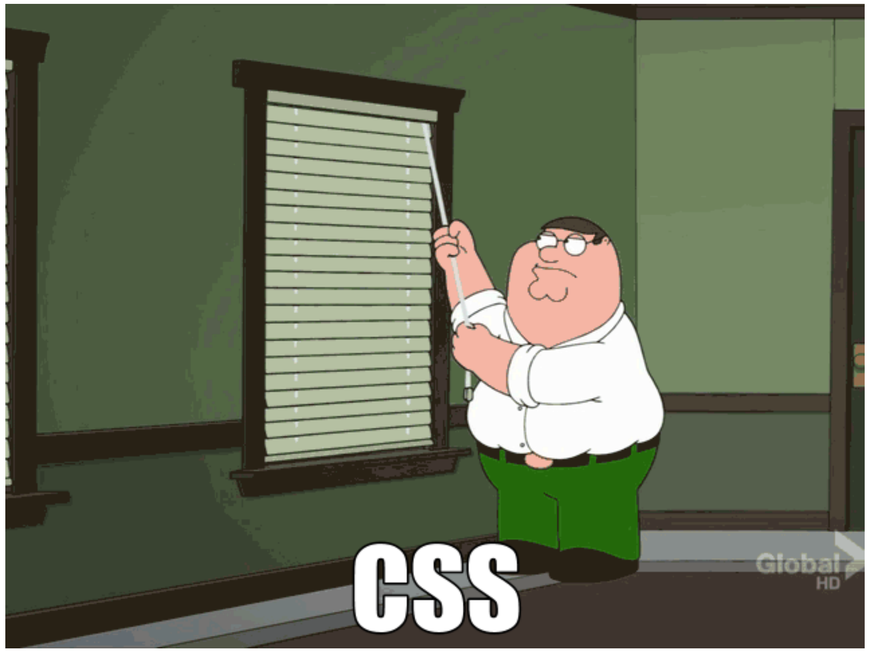

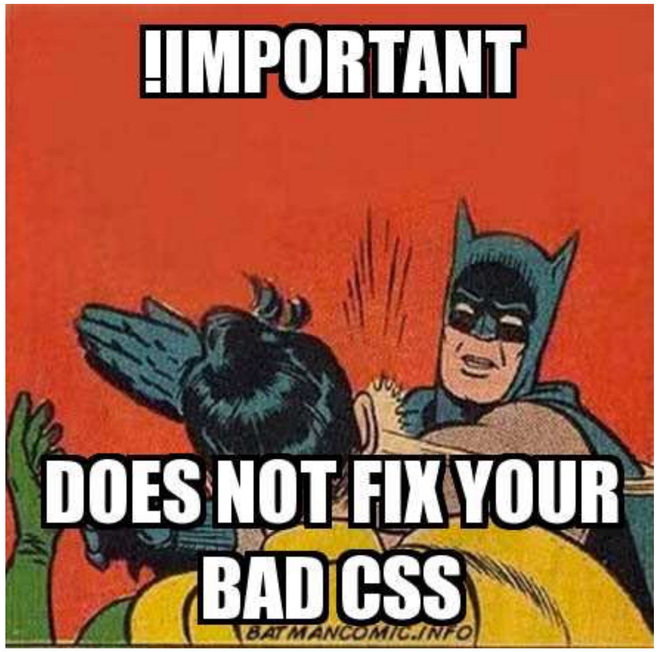

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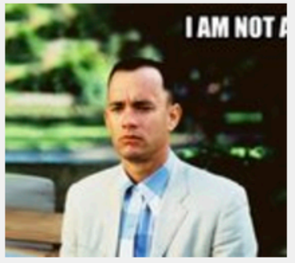

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Rise of the preprocessors

- Compile to CSS
- Parameterized (variables)
- Composable
- Modular
- Plug in to your existing tools

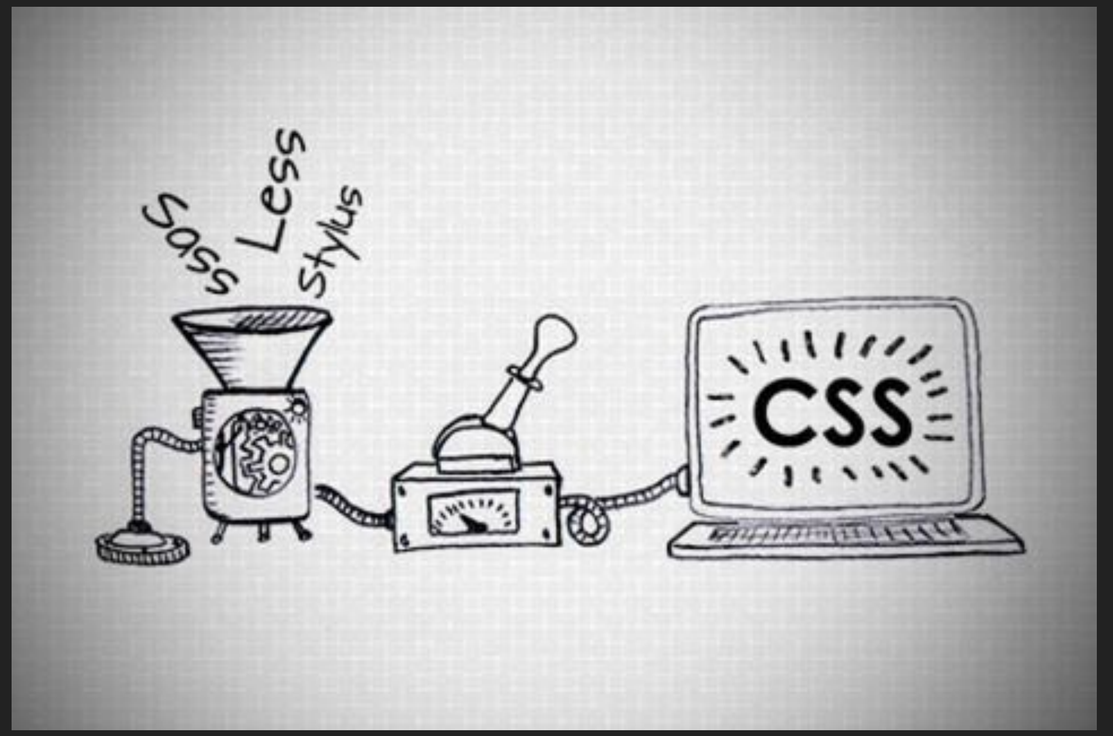


Image Credit: Smashing Magazine

Preprocessors: Why use one?

- Adds stuff that should have been there
- Style is faster to build & easier to maintain
- D.R.Y.
- It's easier to keep your styles organized
- Easy to set up
- Toolkits on top of preprocessors

Fundamentals

Fundamentals

- Sass Origins & Basics
- Variables & Mixins
- Control flow
- CSS Architecture
- Defining your own Sass functions

HAMPTON
CATLIN

Invented it

HAMPTON
CATLIN

CHRIS
EPPSTEIN

NATALIE
WEIZENBAUM

Invented it

maintain it today

Syntax

styles.scss

```scss
.foo {
  color: green;
  font-size: 1.3rem;
}
```

styles.sass

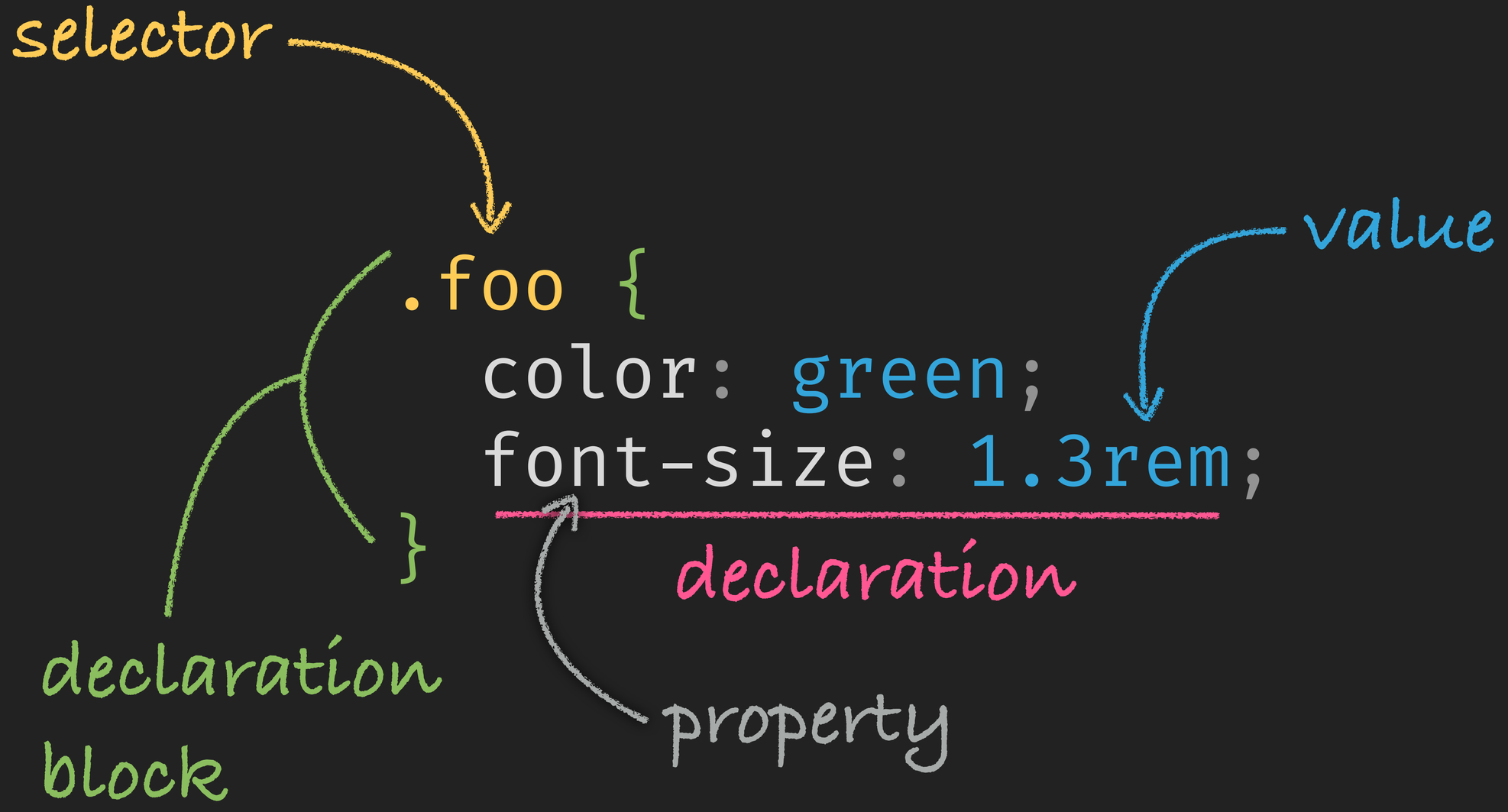
```sass
.foo
  color: green
  font-size: 1.3rem
```

Syntax

styles.scss

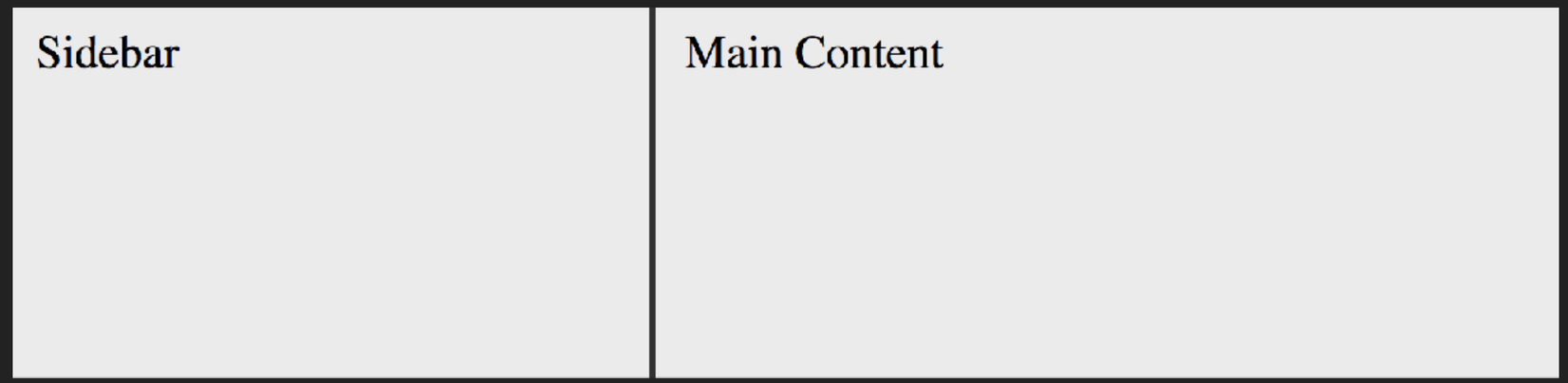
```scss
.foo {
  color: green;
  font-size: 1.3rem;
}
```

Terminology



Nesting & Scoping

```
<div class="container">
  <div class="sidebar">
    Sidebar
  </div>
  <div class="main">
    Main Content
  </div>
</div>
```



Nesting & Scoping

```
.container {
  max-width: 600px;
  width: 100%;
  margin: auto;
  background: #eee;
}

.container .sidebar,
.cortainer .main {
  padding: 10px;
}
```

```
.container .main {
  margin-left: 220px;
  min-height: 100vh;
  border-left: 2px solid #333;
}

.container .sidebar {
  width: 200px;
  float: left;
}
```

```
.container {
  max-width: 600px;
  width: 100%;
  margin: auto;
  background: #eee;

  .sidebar,
  .main { padding: 10px; }

  .main {
    margin-left: 220px;
    min-height: 100vh;
    border-left: 2px solid #333;
  }

  .sidebar {
    width: 200px;
    float: left;
  }
}
```

Nesting & Scoping

- Styles can be placed in the declaration block of a parent element
- Everything is expanded as you would expect during the Sass compilation process
- This is already D.R.Y.'ed up quite a bit!

Nesting & Scoping

```
.container {
  max-width: 600px;
  width: 100%;
  margin: auto;
  background: #eee;
}

.container .sidebar,
.container .main {
  padding: 10px;
}
```

```
.container .main {
  margin-left: 220px;
  min-height: 100vh;
  border-left: 2px solid #333;
}

.container .sidebar {
  width: 200px;
  float: left;
}
```

Descendant

```
<div class="container">
  <div class="left-area"> ... </div>
  <div class="other-thing">
    <div class="left-area"></div>
  </div>
</div>
```

SASS

```
.container {
  .left-area {
    ...
  }
}
```

CSS

```
.container .left-area {
  ...
}
```

Direct Descendant (>)

```
<div class="container">
  <div class="left-area"> ... </div>
  <div class="other-thing">
    <div class="left-area"></div>
  </div>
</div>
```

SASS

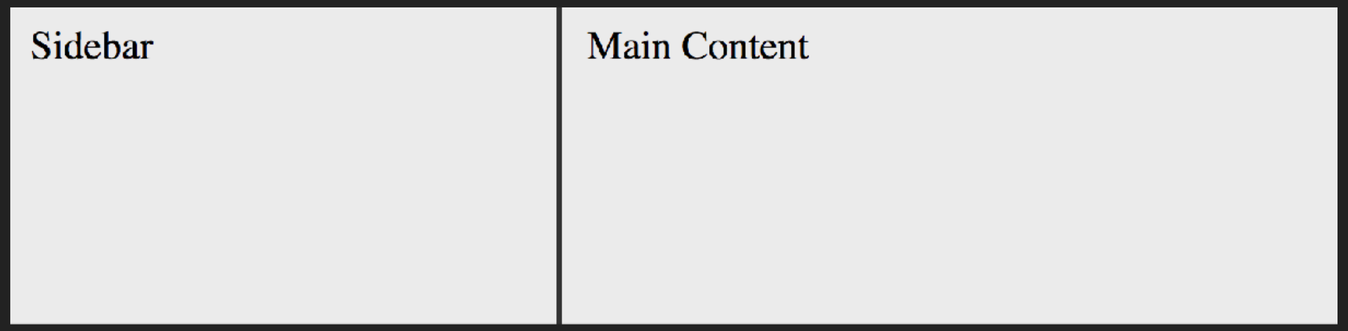
```
.container {
  > .left-area {
    ...
  }
}
```

CSS

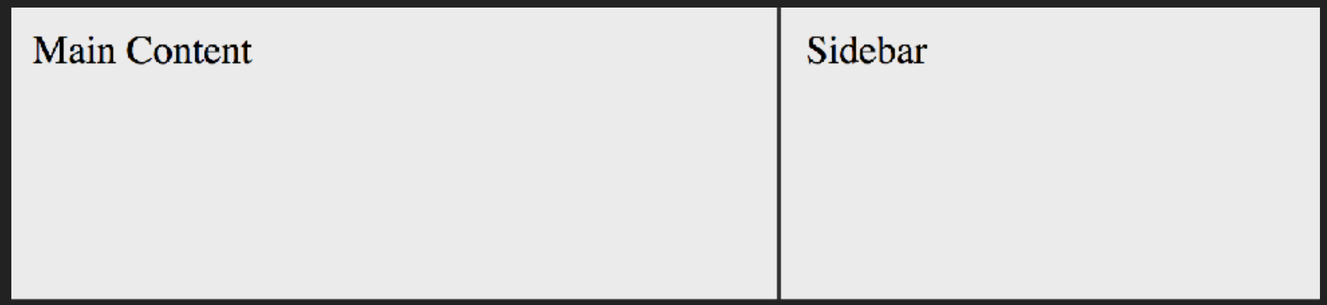
```
.container > .left-area {
  ...
}
```

Parent Selector (&)

```
<div class="container">
   ...
</div>
```




```
<div class="container right-nav">
   ...
</div>
```



Parent Selector (&)

SASS

```
.container {
  &.right-nav {
    color: #333;
  }
}
```

CSS

```
.container.right-nav {
  color: '#333';
}
```

- The parent selector is often useful in situations where adding a secondary class changes styles

Parent Selector (&)

SASS

```
.button {
  color: #333;
  .theme-dark & {
    color: #fff;
  }
}
```

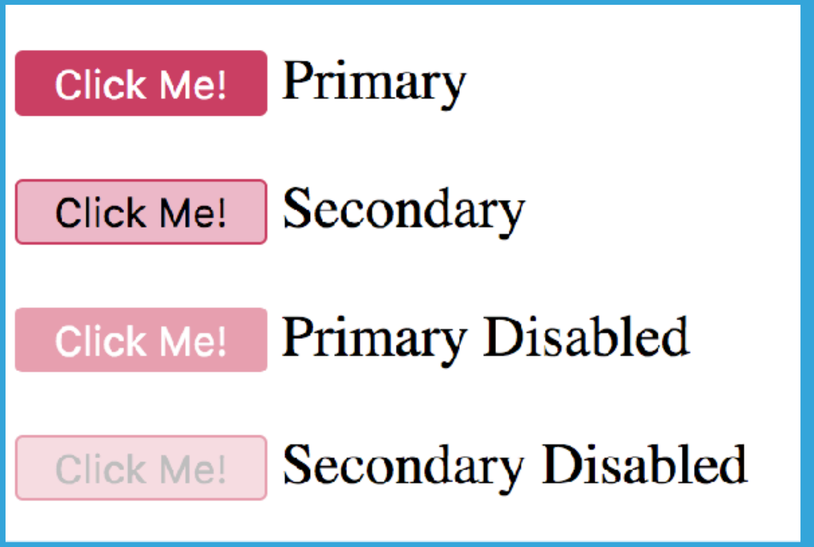
CSS

```
.button {
  color: #333;
}
.theme-dark .button {
  color: #fff;
}
```

Exercise: Parent Selectors I

1

- All buttons must have 10px padding on left and right, 2px on top and bottom
- All buttons should have a 1px #c46 solid border, with a 2px radius
- Adding the .btn-primary class to a button should turn its text white and background #c46
- Adding the .btn-secondary to a button should turn its background #edbcc8 and text black
- Disabling a button should cause its opacity to be set to 0.5



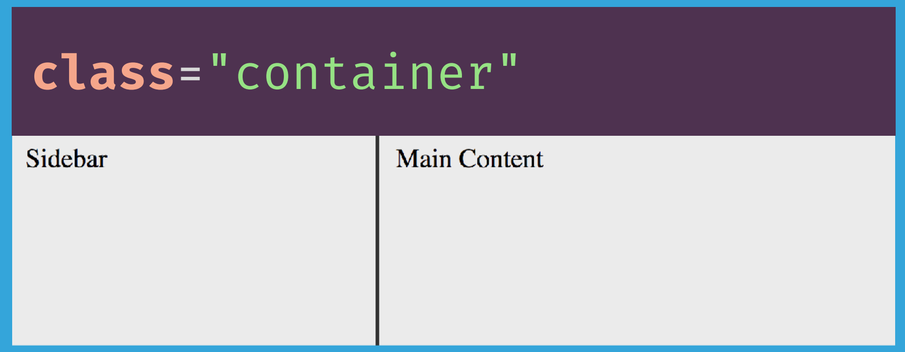
Time: 10 min

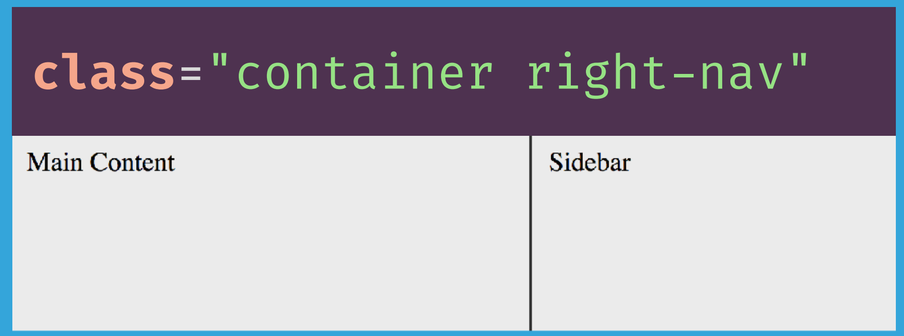
Command to run: `./run -e nesting`

Exercise: Parent Selectors II

2

- Expand upon our sidebar example, so that adding the .right-nav class to the .container div can be used to toggle between left and right sidenav alignment
- Ensure that your code passes the tests that are in place





Time: 10 min

Command to run: `./run -e parent`

Importing

```
@import '_variables';
```

- Using an **@import** in CSS results in a new round-trip HTTP request, this is a perf concern
- The files our users download vs. files we use to manage source code are different concerns
- JS Modules have taught us that modularity is a wonderful tool
- **@import** in Sass does something else (something more useful)

Importing

src/sass

_layout.scss

_variables.scss

app.scss

other.scss

"partials"

will turn into css files

SASS

```
/* From a library */
@import 'bootstrap';
/* A "partial" in my project */
@import '_layout';
```

Variables

global variable declaration

value

"unless set elsewhere"

```scss
$error_color: #f00 !default;

.alert-error {
  $text_color: #ddd;
  background-color: $error-color;
  color: $text_color;
  text-shadow: 0 0 2px darken($text_color, 40%);
}
```

local variable declaration

Variables

- Simple arithmetic for values is ok
- Sass can convert units, as long as dimension is the same
- Any CSS value should be ok

Types

NUMBERS	COLORS	STRINGS	BOOLEANS	LISTS

10
200px
50%
14pt
	#FFF
	rgb(255, 0, 0)
	red
		“a.png”
		url(“a.png”)
			true
			false
				MAPS

Comments

SASS

```
/**
 * Will remain
 */
.foo {
  color: red; // Will be removed
}
```

CSS

```
/**
 * Will remain
 */
.foo {
  color: red;
}
```

String Interpolation

SASS

```
/**
 * Hue is #{hue(green)}
 */
```

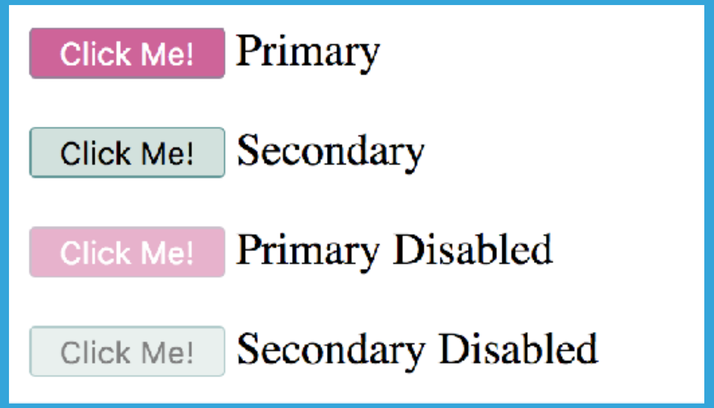
CSS

```
/**
 * Hue is 120deg
 */
```

Exercise: Imports and Variables

3

- This looks like our first exercise
- Except, there's a _variables.scss
- Primary button should have a $hopbush background and $venus border
- Secondary button should have a $nebula background and $patina border




```
$hopbush: #c69 !default;
$patina: #699 !default;
$venus: #998099 !default;
$nebula: #d2e1dd !default;

$black: #000 !default;
$white: #fff !default;

$btn-disabled-opacity: 0.5 !default;
```

Time: 10 min

Command to run: `./run -e variables`

Mixins

- Allow for re-use of style
- Mental model: declaration block is merged, by way of @include
- Best practice: separate from styles, like variables

```
@mixin alert-text {
  background-color: #f00;
  color: white;
  font-variant: small-caps;
}

.error-text {
  @include alert-text;
}

.has-error:after {
  @include alert-text;
  display: inline-block;
  content: attr(data-error);
}
```

Mixins

- Allow for re-use of style
- Mental model: declaration block is merged, by way of @include
- Best practice: separate from styles, like variables

```scss
@mixin alert-text($color) {
  background-color: $color;
  color: white;
  font-variant: small-caps;
}

.error-text {
  @include alert-text(blue);
}

.has-error:after {
  @include alert-text(red);
  display: inline-block;
  content: attr(data-error);
}
```

Mixins: Arguments

- Variables allow for parameterization!

Exercise: Mixins I

- In your app.scss file, we're making use of a new (currently empty) mixin
- The goal is to define a means of defining the style of a button, given a color
- Implement the mixin, such that all failing tests pass

Time: 10 min

Command to run: `./run -e mixins`

Mixins - Default Argument Values

```
@mixin alert-text($color: #f33) {
  background-color: $color;
  color: white;
  font-variant: small-caps;
}

h1 {
  @include alert-text(blue);
}
h2 {
  @include alert-text($color: green)
}
```

- We can define default values for arguments
- Arguments can be provided in order, or by name
- When “keyword args” used, order is ignored

Mixins - Null Values

SASS

```sass
@mixin foo($opacity: null) {
  color: #333;
  opacity: $opacity;
}
.btn {
  @include foo();
}
.other-btn {
  @include foo(0.5);
}
```

CSS

```css
.btn {
  color: #333;
}

.other-btn {
  color: #333;
  opacity: 0.5;
}
```

Mixins - Passing a Declaration Block

SASS

```sass
@mixin foo($color) {
  color: $color;
  .inner {
    @content
  }
}

.btn {
  @include foo(#c69) {
    color: red;
  }
}
```

use the @content directive to place the block passed in

pass in a block

CSS

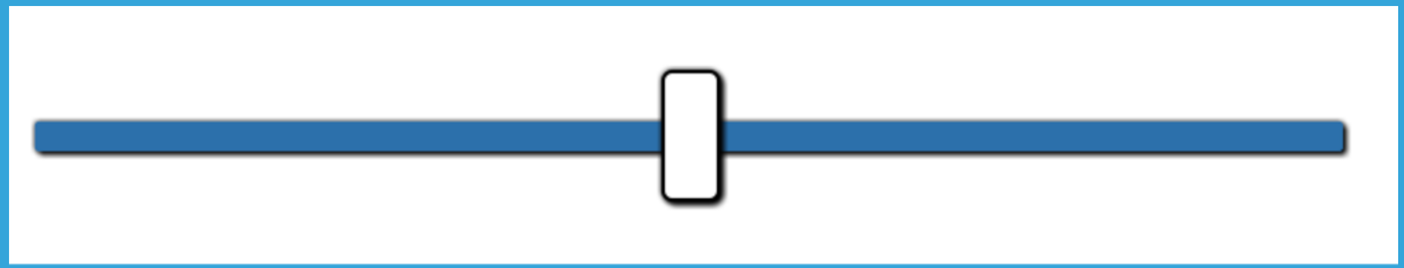
```css
.btn {
  color: #c69;
}
.btn .inner {
  color: red;
}
```

Exercise: Mixins II

5

- The range input can be styled, but it involves lots of ugly vendor-prefixing
- This excellent tutorial from CSS tricks describes what needs to be done in CSS. Do it the Sass way!

https://css-tricks.com/styling-cross-browser-compatible-range-inputs-css/



Time: 20 min

Command to run: `./run -e range`

Functions

http://sass-lang.com/documentation/Sass/Script/Functions.html

`rgb($red, $green, $blue)`
Creates a `Color` from red, green, and blue values.
`rgba($red, $green, $blue, $alpha)`
Creates a `Color` from red, green, blue, and alpha values.
`red($color)`
Gets the red component of a color.
`green($color)`
Gets the green component of a color.
`blue($color)`
Gets the blue component of a color.
`mix($color1, $color2, [$weight])`
Mixes two colors together.

Color Functions

http://sass-lang.com/documentation/Sass/Script/Functions.html

```
adjust-hue($color, $degrees);
```

Rotates the hue of a color by a certain number of degrees

#F3C 315°

#63F 225°

```
.foo {
  color: adjust-hue(#63f, 60deg); // #f3c
}
```

Color Functions

http://sass-lang.com/documentation/Sass/Script/Functions.html

```
darken($color, $percent);
lighten($color, $percent);
```

Change the brightness of a color by a certain amount

```
.foo {
  color: darken(#63f, 20%); // #30C
}
```

#63F 100% #30C 80%

Color Functions

http://sass-lang.com/documentation/Sass/Script/Functions.html

```
desaturate($color, $percent);
  saturate($color, $percent);
```

Change the saturation of a color by a specified amount

```
.foo {
  color: desaturate(#f00, 75%); // #9F6060
}
```

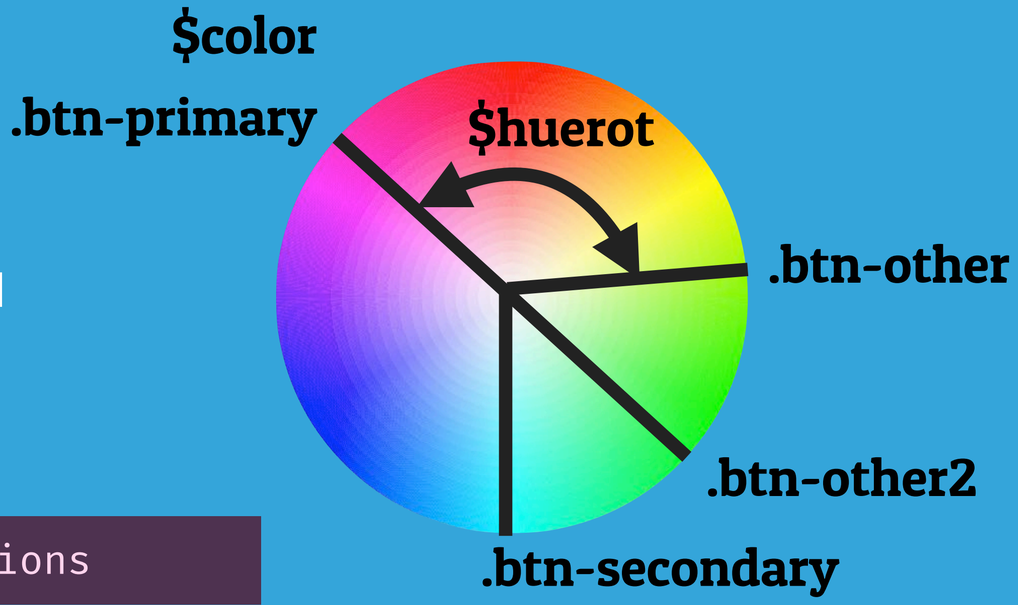
#F00 100% #9F6060 25%

Exercise: Color Functions

- We wish to apply some basic “theming” to a set of buttons

```
<div class="theme-1"><!—— Will be themed ——></div>
```

- Theme mixin should take a **$color** as first argument, **$huerot** as second, and a **$darkenpct** as third



`all buttons`

- border 20% darker color than background
- hover background: 20% more saturated then 10% lightened

`non-primary buttons`

- darkened by **`$darkenpct`**

Time: 30 min

Command to run: `./run -e functions`

Control Flow - @if

SASS

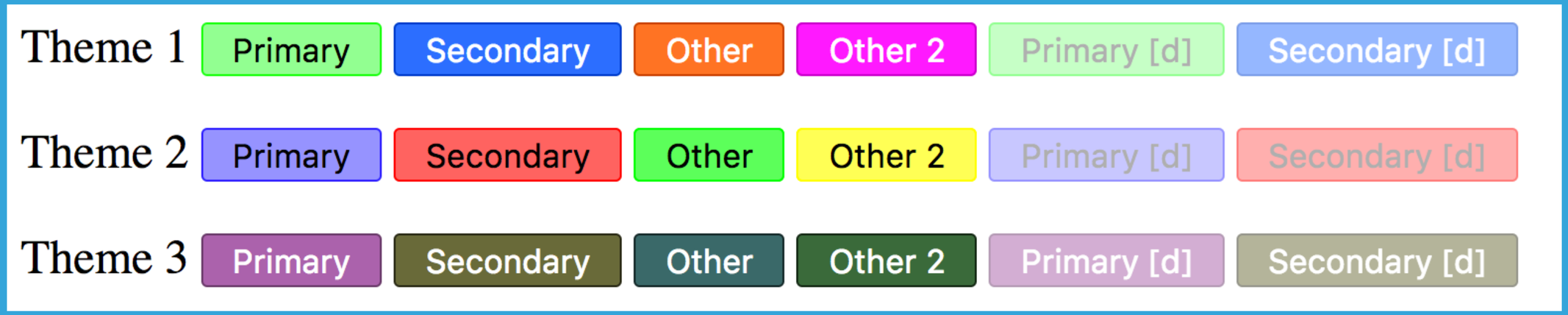
```sass
@mixin foo($size) {
  font-size: $size;
  @if $size > 20 {
    line-height: $size;
  }
}

.small {
  @include foo(14px);
}
.large {
  @include foo(24px);
}
```

CSS

```css
.small {
  font-size: 14px;
}
.large {
  font-size: 24px;
  line-height: 24px;
}
```

Exercise: Control Flow w/ @if

- Only use white button text if the brightness value of a button background color is less than 70% (0.7)



Time: 5 min **Command to run:** `./run -e if`

Control Flow - @for

SASS

```scss
@for $i from 1 through 5 {
  h#{$i} {
    font-size: 5rem - $i*0.75rem;
  }
}
```

CSS

```css
h1 {font-size: 4.25rem;}
h2 {font-size: 3.5rem;}
h3 {font-size: 2.75rem;}
h4 {font-size: 2rem;}
h5 {font-size: 1.25rem;}
```

Data Structures - Lists

SASS

```sass
$mylist: 0 0 2px #000;

.foo {
  /**
   * Shaodw blur radius:
   * #{nth($mylist, 3)}
   */
  box-shadow: $mylist;
}
```

CSS

```css
.foo {
  /**
   * Shaodw blur radius:
   * 2px
   */
  box-shadow: 0 0 2px #000;
}
```

Data Structures - Lists and @each

SASS

```sass
$mylist: 0 0 2px #000;

.foo {
  @each $i in $mylist {
    /* #{$i} */
  }
}
```

CSS

```css
.foo {
  /* 0 */
  /* 0 */
  /* 2px */
  /* #000 */
}
```

Data Structures - nth

SASS

```sass
$gradients:
  (to left top, blue, red),
  (to left top, blue, yellow);

.foo {
 background: linear-gradient(nth($gradients, 2));
}
```

Data Structures - Maps

SASS

```scss
$mymap: (
  dark: #009,
  light: #66f
);

@mixin theme-button($t) {
  /* Theme: #{$t} */
  color: map-get($mymap, $t);
}

.btn-dark {
  @include theme-button('dark')
}

.btn-light {
  @include theme-button('light')
}
```

CSS

```css
.btn-dark {
  /* Theme: dark */
  color: #009;
}

.btn-light {
  /* Theme: light */
  color: #66f;
}
```

Exercise: Nudging Classes

8

- We're going to build a bunch of tiny css rules, each with exactly one style declaration
- using @for, @each and Sass data structures, build a set of styles **in 5px increments**, for both **margin and padding**, in **each of the four directions** (top, bottom, left right).
- BONUS: Try to use 15 lines of Sass or less!

```
.m-t-5 {
  margin-top: 5;
}
```

Time: 25 min

Command to run: `./run -e tiny`

CSS Architecture - BEM

- **Block** - standalone entity, meaningful on its own

  header, container, menu, checkbox, input, button

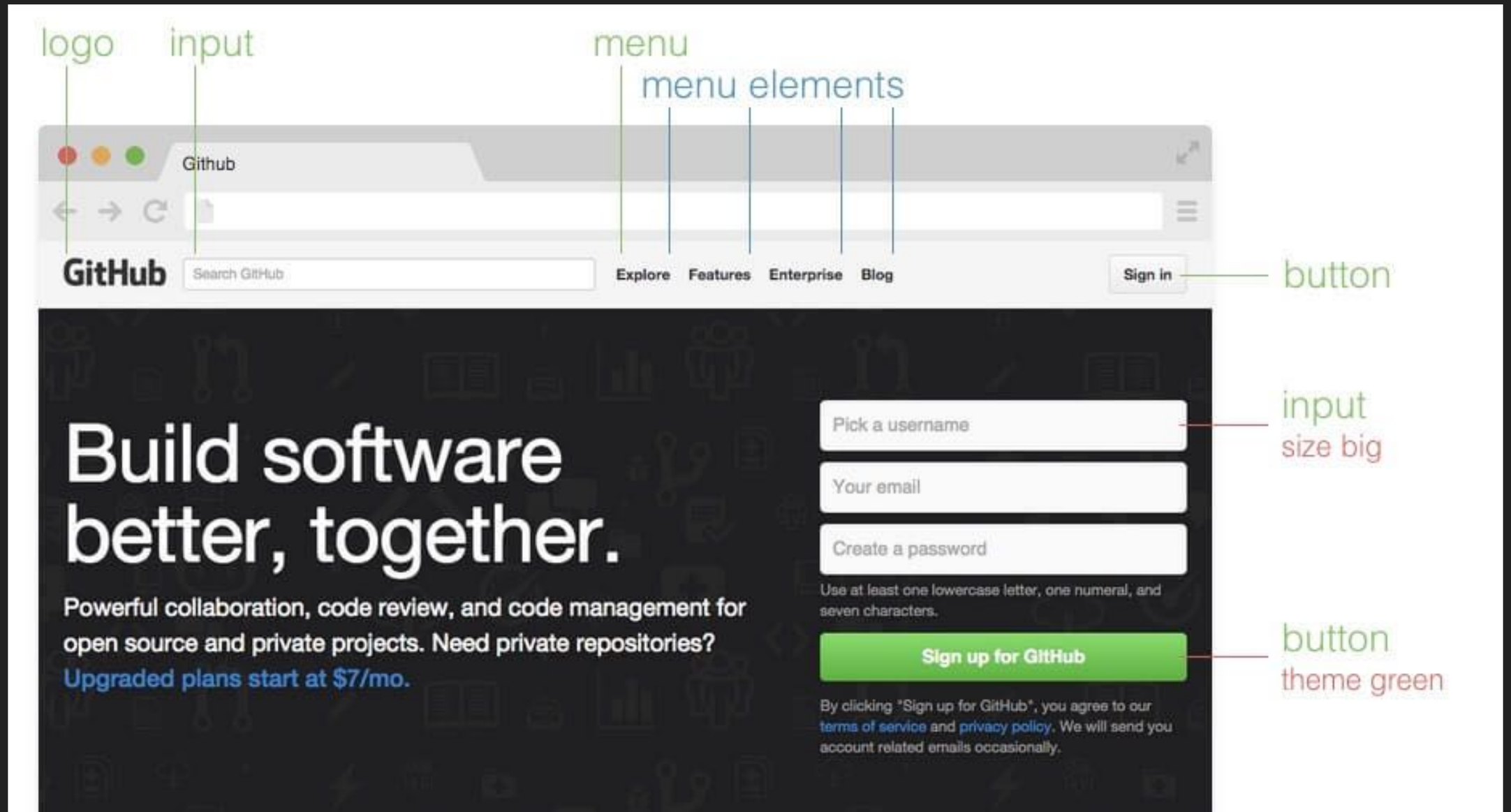
- **Element** - A part of a block that has no standalone meaning, and is semantically tied to its block

  menu-item, list-item, checkbox-caption, header-title

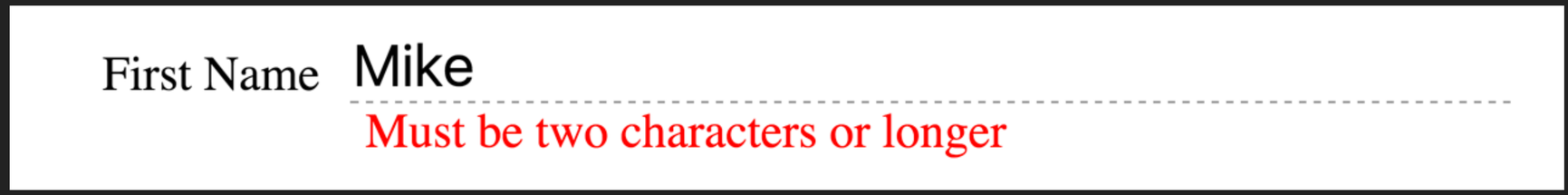
- **Modifier** - A flag on a block or element, used to change appearance and/or behavior

  disabled, highlighted, checked, size-big, color-yellow

CSS Architecture - BEM



CSS Architecture - BEM




```
<div class="textfield">
  <label for="first-name" class="textfield__label">
    First Name
  </label>
  <input name="first-name" type="email" class="textfield__input" />
  <span class="textfield__validation-error">
    Must be two characters or longer
  </span>
</div>
```

CSS Architecture - BEM Elements

```
<div class="textfield">
  <label for="first-name" class="textfield__label">
    First Name
  </label>
  <input name="first-name" type="email" class="textfield__input" />
  <span class="textfield__validation-error">
    Must be two characters or longer
  </span>
</div>
```

```
.textfield {
  &__input { }
  &__label { }
  &__validation-error { }
}
```

CSS Architecture - BEM Modifiers

```
<div class=“textfield textfield--state-validated“>
  <label for="first-name" class="textfield__label">
    First Name
  </label>
  <input name="first-name" type="email" class="textfield__input" />
  <span class="textfield__validation-error">
    Must be two characters or longer
  </span>
</div>
```

```
.textfield {
  &--state-error {}
  &--state-validated {}
}
```

Exercise: BEM Buttons

- Build a “one-click checkout” button using BEM
- Basic color requirements for buttons, same as exercise 1
- Price should have bg of #080, but #aaa when button is disabled

Time: 30 min

Command to run: `./run -e bem`

Style reuse via Mixins

SASS

```sass
@mixin danger {
  background: red;
  color: white;
}

.btn-danger {
  @include danger();
  padding: 2px;
}

.alert-danger {
  @include danger();
  width: 100%;
}
```

CSS

```css
.btn-danger {
  background: red;
  color: white;
  padding: 2px;
}

.alert-danger {
  background: red;
  color: white;
  width: 100%;
}
```

@extend

SASS

```sass
.danger {
  background: red;
  color: white;
}

.btn-danger {
  @extend .danger;
  padding: 2px;
}

.alert-danger {
  @extend .danger;
  width: 100%;
}
```

CSS

```css
.danger,
.btn-danger,
.alert-danger {
  background: red;
  color: white;
}

.btn-danger {
  padding: 2px;
}

.alert-danger {
  width: 100%;
}
```

@extend - Placeholders

SASS

```sass
%danger {
  background: red;
  color: white;
}

.btn-danger {
  @extend %danger;
  padding: 2px;
}

.alert-danger {
  @extend %danger;
  width: 100%;
}
```

CSS

```css
.btn-danger,
.alert-danger {
  background: red;
  color: white;
}

.btn-danger {
  padding: 2px;
}

.alert-danger {
  width: 100%;
}
```

⚠️ @extend ⚠️

SASS

```sass
%danger {
  background: red;
  color: white;
}

.top, .middle, .footer {
  .login-panel, .registration-panel {
    .success-button, .cancel-button {
      @extend %danger;
    }
  }
}
```

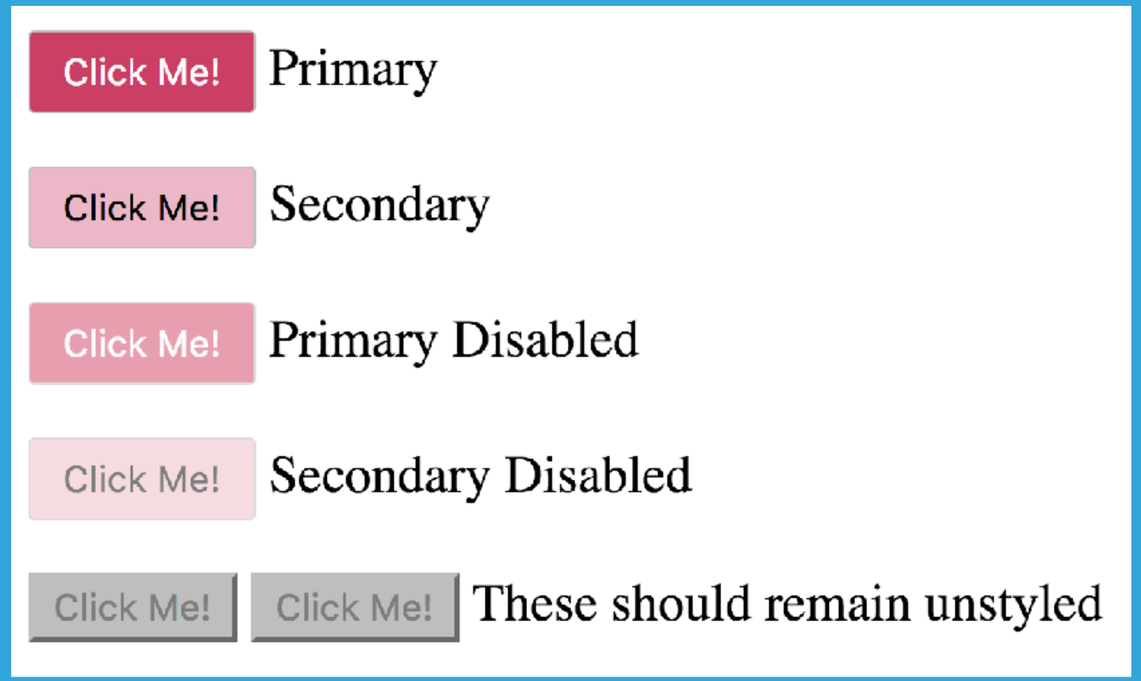
⚠️ @extend ⚠️

CSS

```
.top .login-panel .success-button,
.top .login-panel .cancel-button,
.top .registration-panel .success-button,
.top .registration-panel .cancel-button,
.middle .login-panel .success-button,
.middle .login-panel .cancel-button,
.middle .registration-panel .success-button,
.middle .registration-panel .cancel-button,
.footer .login-panel .success-button,
.footer .login-panel .cancel-button,
.footer .registration-panel .success-button,
.footer .registration-panel .cancel-button {
  background: red;
  color: white;
```

Exercise: @extend

- Achieve the same outcome as exercise 1, except...
- Do not change the appearance of the buttons at the bottom
- Use @extend and a %placeholder



Time: 30 min

Command to run: `./run -e extend`

Defining your own functions

SASS

```sass
$w: 2px;
@function double($x) {
  @return 2 * $x;
}

.thin-border {
  border-width: $w;
}
.thick-border {
  border-width: double($w);
}
```

CSS

```css
.thin-border {
  border-width: 2px;
}

.thick-border {
  border-width: 4px;
}
```

Defining your own functions

SASS

```sass
@function biggest_channel_only($color) {
  $r: red($color);
  $g: green($color);
  $b: blue($color);
  @if $r > $g and $r > $b {
    @return rgb($r, 0, 0);
  }
  @else if $g > $b and $g > $r {
    @return rgb(0, $g, 0);
  }
  @else {
    @return rgb(0, 0, $b);
  }
}
```

Defining your own functions

SASS

```
.cadetblue { color: biggest_channel_only(cadetblue); }
.peru      { color: biggest_channel_only(peru); }
.lawngreen { color: biggest_channel_only(lawngreen); }
```

CSS

```
.cadetblue { color: #0000a0; }
.peru      { color: #cd0000; }
.lawngreen { color: #00fc00; }
```

Exercise: Relative Luminance

- Exercise 6 involved using @if to ensure that the text/background color combination on a button was readable
- This quite the right concept. What we really want is to base the label text color on a difference in “relative luminance” between the label and background colors
- First, we’ll need to convert our RGB values from their current form (a gamma-compressed color space) to a linear color space.
- A pow($base, $exp) function has been provided

@if

$$C_{\text{linear}} = \begin{cases} \frac{C_{\text{srgb}}}{12.92}, & \text{pow } C_{\text{srgb}} \leq 0.04045 \\ \left(\frac{C_{\text{srgb}}+a}{1+a}\right)^{2.4}, & C_{\text{srgb}} > 0.04045 \end{cases}$$

- where $a = 0.055$ and where C is R, G, or B.

Time: 35 min

Command to run: `./run -e luminance`

Exercise: Relative Luminance

- Next, we'll want to weigh these linear RGB values as follows

$$Y = 0.2126R + 0.7152G + 0.0722B.$$

- Finally, we'll want to change the @if involved with determining button text color, so that instead of the existing comparison, **it sets a white text color when the background color and the color white differ in luminance by more than 0.7**

Time: 35 min **Command to run:** `./run -e luminance`