IN4MATX 133: User Interface Software

Lecture 21:
SASS and Styling in Ionic

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Class notes

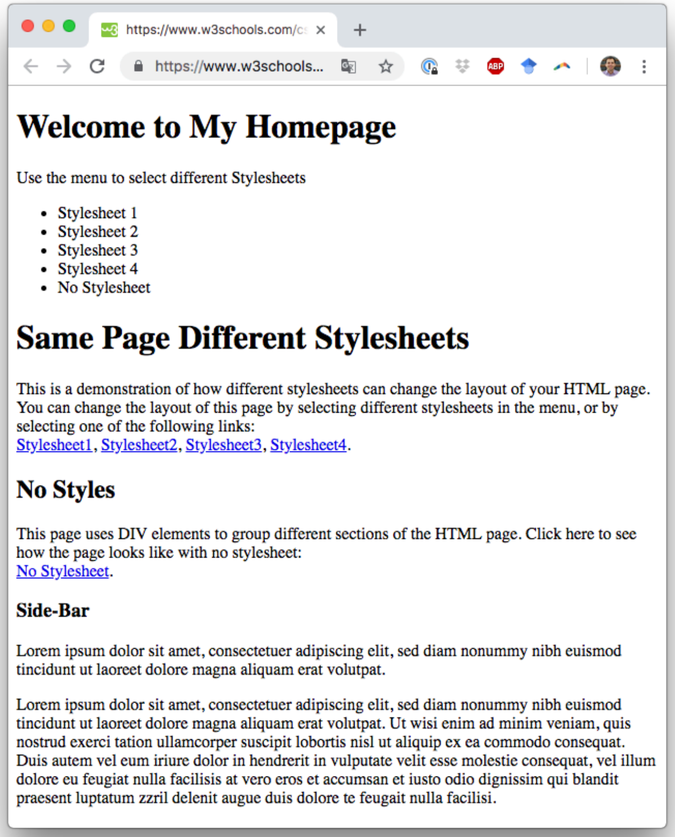
- Quiz 4 (Tuesday) will cover November 5th's lecture (Guest lecture by Josh Tanenbaum) through today
- A2 grades will be posted after class
  - Sorry for the delay
- Quiz 3 grades will hopefully be posted early next week
- Next week's office hours schedule is rearranged to account for Thanksgiving
  - Check the calendar

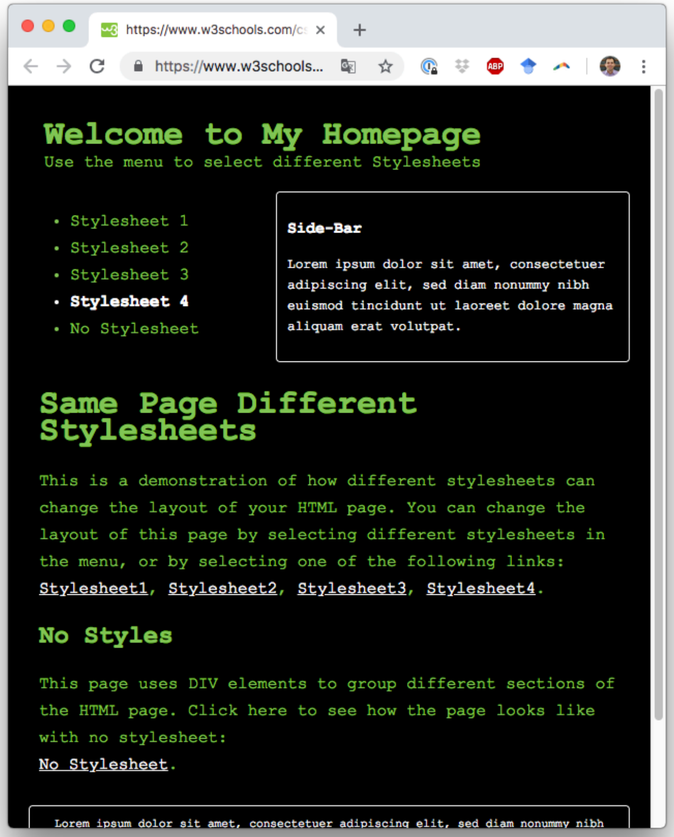
Today’s goals

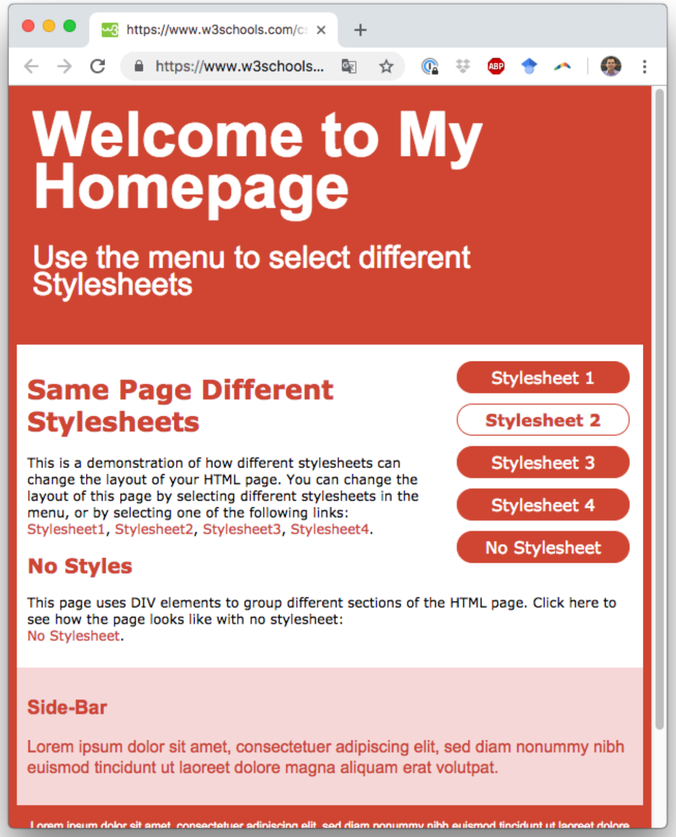
By the end of today, you should be able to…

- Explain why we might use a preprocessor like SASS for CSS
- Use SASS variables, mixins, nesting, and operators to simplify CSS
- Style Ionic components and override platform-specific styles

Same page, different stylesheets







https://www.w3schools.com/css/demo_default.htm

CSS syntax

- **Selectors** specify which elements a **rule** applies to

- **Rules** specify what *values* to assign to different formatting **properties**

```
/* CSS Pseudocode */
selector {
  property: value;
  property: value;
  ...
}
```

One rule, many properties

Writing plain CSS

- Violates the “Don’t Repeat Yourself” principle of coding
- Many times we’re writing the same snippets of code for frequently used declarations

Example: fonts

- What if I want to switch from Lato to some other font?
- What if I want to make everything larger?
- I could have structured my CSS more efficiently, but at the core, it's inflexible
  - For example, I could have set Lato to be the default font for `cite`

```
cite > .series {
  font-family: 'Lato', sans-serif;
}

cite > a {
  font-family: 'Lato', sans-serif;
  font-size: 0.8em;
}

cite > .authors {
  font-family: 'ChaparralPro', serif;
  font-size: 1.1em;
}

cite > .title {
  font-family: 'Lato', sans-serif;
  font-weight: 700;
}
```

CSS preprocessors

- “Let you abstract key design elements, use logic, and write less code”
- Three widely used ones: SASS, Less, Stylus
- They all do pretty much the same thing
  - Ionic uses SASS by default

CSS preprocessors

Major features

- Variables
- Mixins
- Nesting
- Operators

Variables

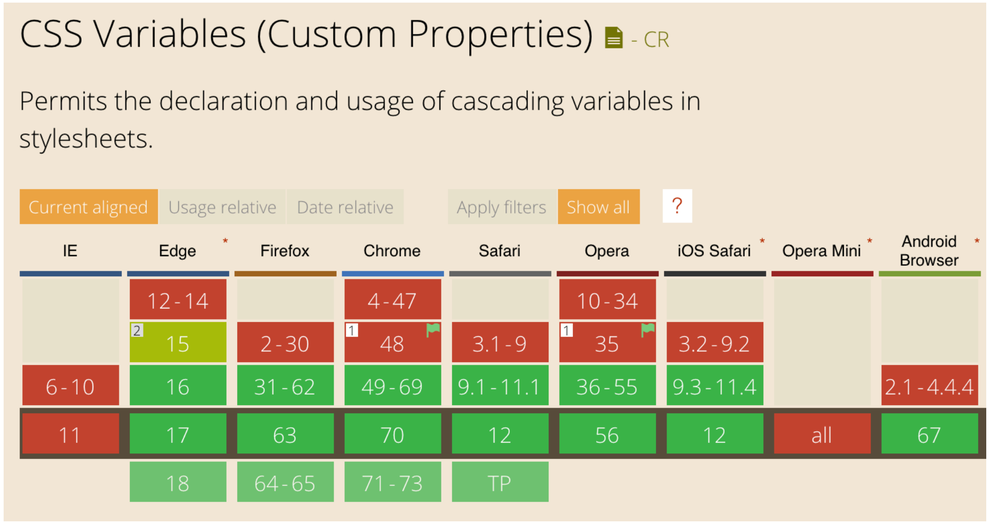
- Using variables with CSS preprocessors makes it easy to update colors, fonts, or other values throughout your entire stylesheet

```
//Sass Variables
$primary: #CC5533;
$font-base: 12px;

//Less Variables
@primary: #CC5533;
@font-base: 12px;

//Stylus Variables
primary = #CC5533
font-base = 12px
```

Variables

- As of 2016, variables are supported in plain old CSS
  - Many frameworks use these variables instead of preprocessor variables
  - Including Ionic (new in 4!)
- But preprocessors offer a lot more functionality

```
/*Declaring a variable*/
element {
  --main-bg-color: brown;
}

/*Using the variable*/
element {
  background-color: var(--main-bg-color);
}
```



https://www.caniuse.com/#search=css%20variables

Mixins

- Mixins can share a whole collection of CSS rules throughout a stylesheet

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

.box { @include border-radius(10px); }
```

Nesting

- You can nest selectors with preprocessors
- This means you can easily organize an entire hierarchy of selectors, including child elements

```
nav {
  ul {
    margin: 0;
    padding: 0;
    list-style: none;
  }

  li { display: inline-block; }

  a {
    display: block;
    padding: 6px 12px;
    text-decoration: none;


   &:hover {
    text-decoration: underline;
  }
  }
}
```

Question

Which SASS nesting is equivalent to these plain CSS rules?

```
ul > li {
  color: red;
}

ul {
  font-weight: 500;
  list-style-type: circle;
}
```

A

```
ul {
  font-weight: 700;
  list-style-type: square;
}

li {
  color: blue;
}
```

B

```
ul {
  font-weight: 500;
  list-style-type: circle;
}

li {
  color: red;
}
```

C

```
li {
  ul {
    color: red;
  }

  font-weight: 500;
  list-style-type: circle;
}
```

D

```
ul {
  font-weight: 500;
  list-style-type: circle;

  li {
    color: red;
  }
}
```

E

```
li {
  color: red;

  ul {
    font-weight: 500;
    list-style-type: circle;
  }
}
```

Operators

- Like most programming languages, CSS preprocessors can do math!
- This is especially great for setting a fixed value in a variable, like a font-size or padding, and then modifying it as you go along

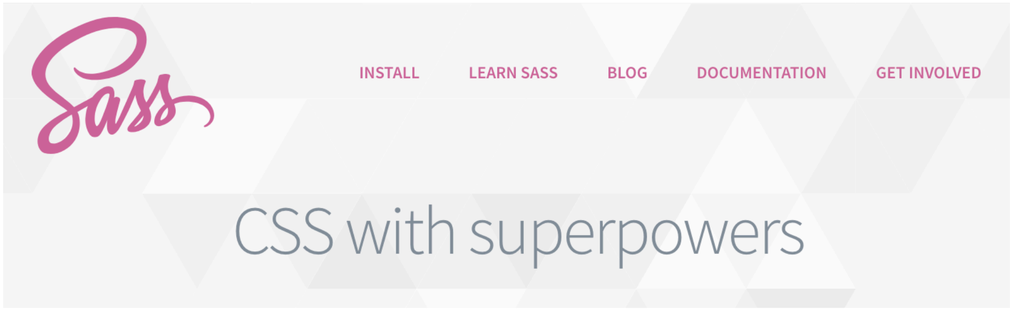
```
$container = 100%;

article[role="main"] {
  float: left;
  width: 600px / 960px * $container;
}
```

Digging into SASS

SASS

Syntatically Awesome Style Sheets

- “SASS is the most mature, stable, and powerful professional grade CSS extension language in the world.”
- “SASS boasts more features and abilities than any other CSS extension language out there”
- It’s on their website, so it must be true!



Sass is the most mature, stable, and powerful professional grade CSS extension language in the world.

http://sass-lang.com/

SASS

- File extension: `.scss`
- SASS is a superset of CSS
  - You can write any CSS in a SCSS document
- SCSS is transpiled to CSS
  - Just like TypeScript is transpiled to JavaScript

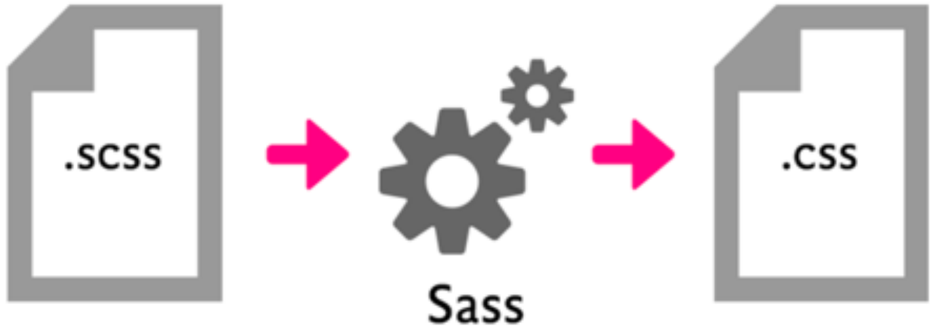


FIG 1: Sass converts its own "power syntax" to plain old CSS.

SCSS Syntax

- Looks very much like regular CSS
- Rules apply to a selector and are made in brackets
- Each rule ends with a semicolon
- SCSS adds variables, mixins, etc.

```
$font-stack:    Helvetica, sans-serif;
$primary-color: #333;

body {
  font: 100% $font-stack;
  color: $primary-color;
}
```

SCSS Syntax

- There's another style, called "sass syntax", which looks more like python
- It's older, uses the `.sass` extension
- Why is `.scss` better?
  - It's a superset of CSS, rather than another syntax

.scss

```scss
$primary-color: #3bbfce;
$margin: 16px;

.content-navigation {
  border-color: $primary-color;
  color: darken($primary-color, 10%);
}

.border {
  padding: $margin / 2;
  margin: $margin / 2;
  border-color: $primary-color;
}
```

.sass

```sass
$primary-color: #3bbfce
$margin: 16px

.content-navigation
  border-color: $primary-color
  color: darken($primary-color, 10%)

.border
  padding: $margin/2
  margin:  $margin/2
  border-color: $primary-color
```

How do I actually use a CSS preprocessor like SASS?

Installing SASS

- `npm install -g sass`
  - This version is written in JavaScript, which is slower
  - But it’s fine for the size of projects we’re working with
- `choco install sass`
- `brew install sass/sass/sass`
  - 3 times to make super duper sure
  - (just kidding, it’s how HomeBrew designates projects)

https://sass-lang.com/install

Manually transpiling

- You can use SASS with a plain-old HTML page!
- It just needs to be transpiled to CSS before getting loaded

Manually transpiling

- Transpile one file:
- `sass input.scss output.css`
- Watch one file for changes:
  - `sass —watch input.scss:output.scss`
- Watch a whole directory of SASS files:
  - `sass —watch path/sass-directory`

Automatic transpiling

- A lot of frameworks will automatically transpile `.scss` files when they build and run
- Angular and Ionic can include `.scss` files for every component and secretly transpile them to `.css`
  - A preprocessor is specified when the app is first created

Thoughts on CSS preprocessors

- Preprocessor functionality is slowly getting added to the CSS standard
  - CSS now supports variables, for example
- Does this mean that preprocessors will soon be obsolete?
  - Maybe. Or maybe they'll evolve, adding other kinds of new and better features
  - Transpiling languages are a great way to show the value of new features
  - And if they catch on enough, they get added into the standard
  - Who knows, maybe JavaScript will add typing from TypeScript

Styling in Ionic

Ionic variables

- Two types of variables:
  - Global variables
  - Component variables
- Three files:
  - `app/global.scss`
  - `app/theme/variables.scss`
  - `app/[component]/[component].scss`

Ionic global variables

- Defined in `app/theme/variables.scss`
- Used for defining platform colors, fonts, margins, etc.
- There are ~100 different global variables, but the defaults are pretty good

```scss
/** primary **/
:root {
  --ion-color-primary: #3880ff;
  --ion-color-secondary: #0cd1e8;

  --ion-font-family: 'Arial';
  --ion-margin: 16px;
}
```

https://beta.ionicframework.com/docs/theming/advanced/

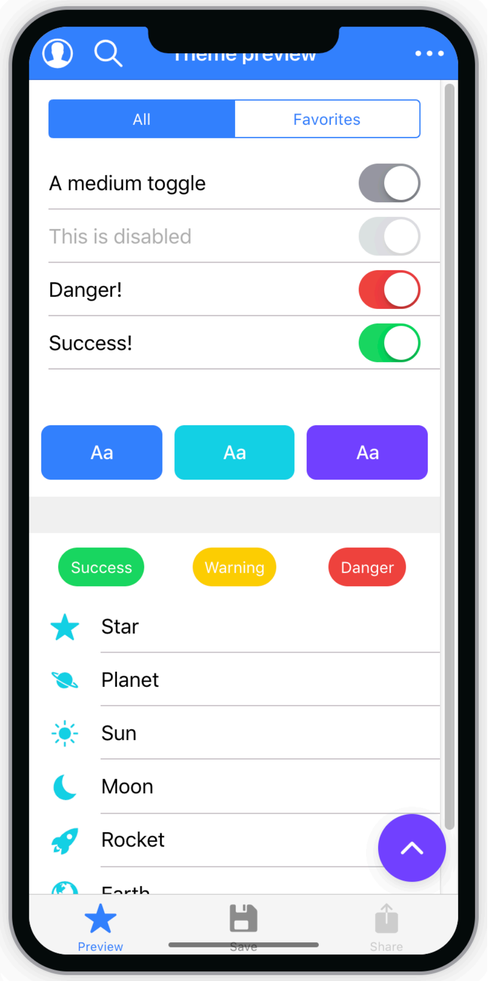
Ionic global variables

- Global variables can be accessed manually, like other CSS variables
- Ionic provides utilities for accessing global color variables
  - This somewhat violates code separation principles…
    but the syntax is cleaner

```
/*SCSS or CSS*/
ion-button {
  color: var(--ion-color-primary);
}

<!--HTML-->
<ion-button color=“primary"></ion-button>
```

Color palette

- Ionic's color generator can help you see what your scheme will look like in a built-out app
- May be useful in conjunction with a color pallette tool:
  - https://color.adobe.com/
  - http://paletton.com/
- It will generate a file which can be copy/pasted into `app/theme/variables.scss`



https://beta.ionicframework.com/docs/theming/color-generator

Component variables

- Each component has specific variables for defining its style
- These variables can be edited where the component is created

CSS Custom Properties

Name	Description
`--background`	Background of the button
`--background-activated`	Background of the button when activated
`--background-focused`	Background of the button when focused
`--border-color`	Border color of the button
`--border-radius`	Border radius of the button
`--border-style`	Border style of the button
`--border-width`	Border width of the button
`--box-shadow`	Box shadow of the button
`--color`	Text color of the button
`--color-activated`	Text color of the button when activated
`--color-focused`	Text color of the button when focused
`--height`	Height of the button
`--margin-bottom`	Margin bottom of the button

https://beta.ionicframework.com/docs/api/button

Component variables

```
<!--component.html-->
<ion-button id="testButton">Test Button
</ion-button>

/*component.scss*/
#testButton {
  --border-width: 5px;
  --border-style: solid;
  --border-color: black;
}
```

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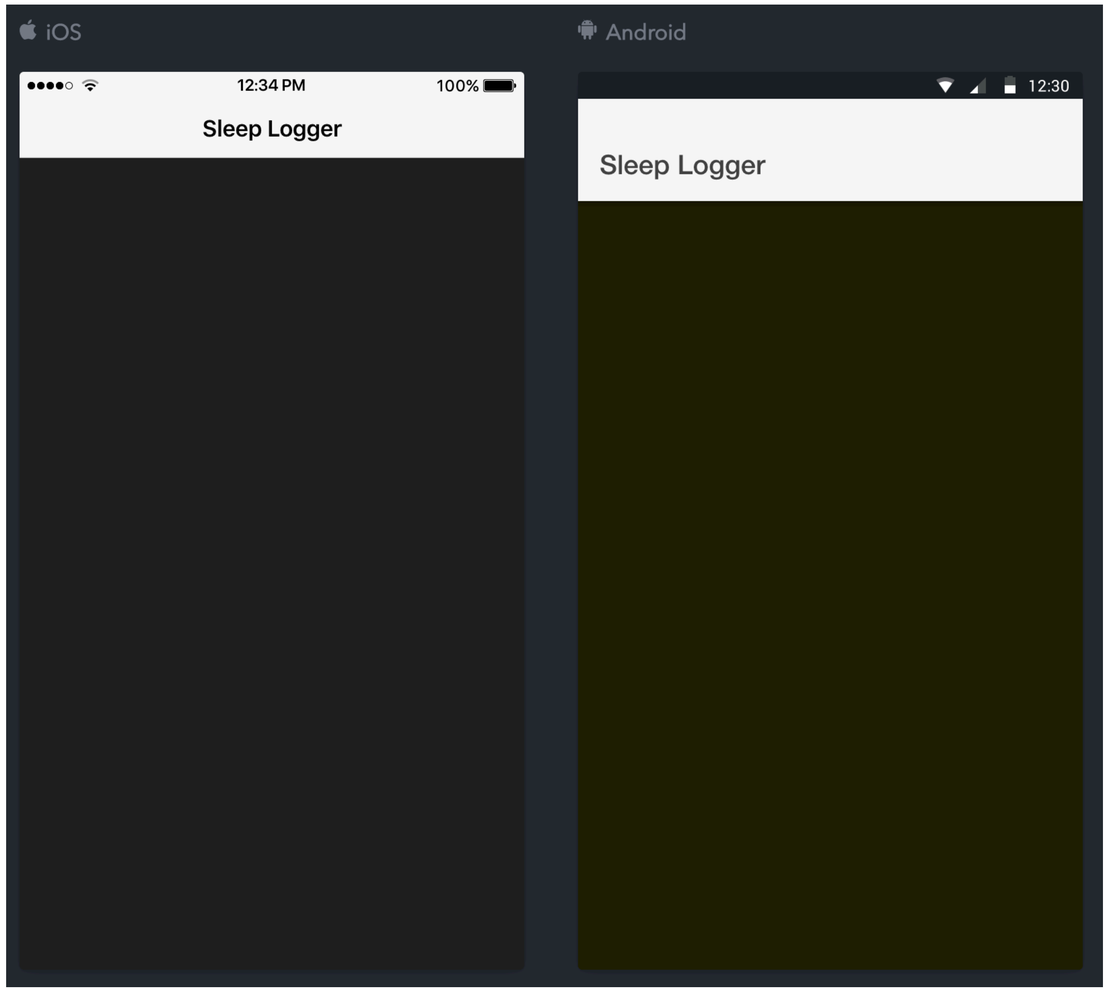
https://beta.ionicframework.com/docs/api/button

Platform styles

- Each platform has a mode, either `ios` (iOS) or `md` (Android)
- Components and global styles can be adjusted for each mode

```scss
/*in global.scss*/
.ios {
  --ion-background-color: #222;
}

.md {
  --ion-background-color: #220;
}
```



Today's goals

By the end of today, you should be able to…

- Explain why we might use a preprocessor like SASS for CSS
- Use SASS variables, mixins, nesting, and operators to simplify CSS
- Style Ionic components and override platform-specific styles

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