CS47: Cross-Platform Mobile Development

Lecture 1B: Introduction to Javascript (ES6)

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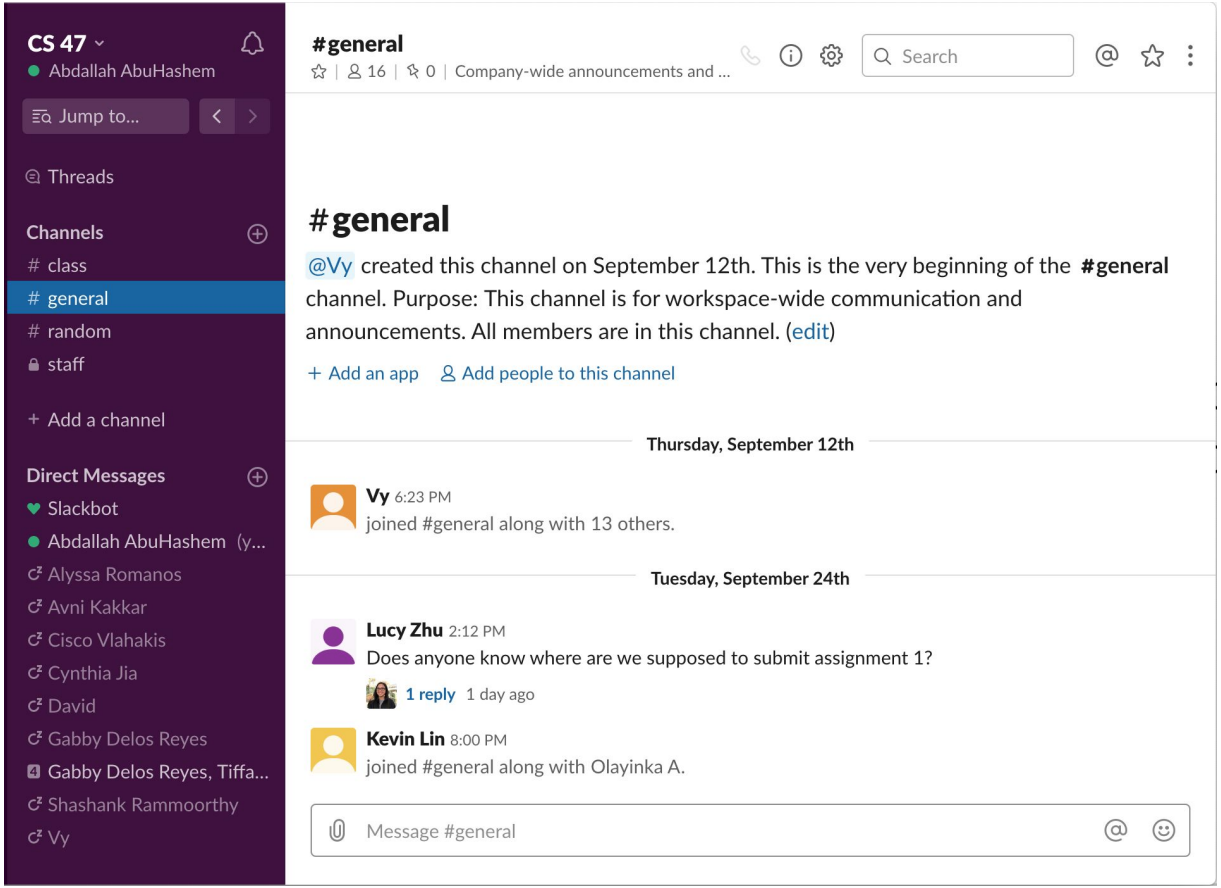
Vy Mai

https://cs-47.stanford.edu

cs47-fall19.slack.com

Fall 2019



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CS 47

Cross-Platform Mobile Development

- Overview
- Schedule
- Readings

Overview

This course teaches the fundamentals of cross-platform mobile application development with a focus on the React Native framework (RN). The goal is to help students develop best practices in creating apps for both iOS and Android by using Javascript and existing web + mobile development paradigms. Students will explore the unique aspects that made RN a primary tool for mobile development within Facebook, Instagram, Walmart, Tesla, and UberEats.

COURSE LOGISTICS

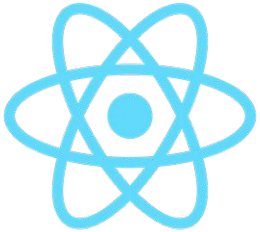
Date/Time	T/Th 10:30PM - 12:00PM
Enrollment	Please apply here and show up to the first class to enroll in the class.
Location	Wallenberg 124 (160-124)
Units	2 Pass/Fail
Instructors	Abdallah Abuhashem (aabuhash@stanford.edu) Tiffany Manuel (manuel14@stanford.edu) Vy Mai (vmai2@stanford.edu) Cisco Vlahakis (vlahakis@stanford.edu)
Faculty Sponsor	James Landay (landay@stanford.edu)
Staff email	reactnative@cs.stanford.edu
Office hours	TBD
Prerequisites	CS 106A/B
Explore courses	CS47

https://cs47.stanford.edu

Last lecture

- Introduced CS47 and React Native as a framework
- Briefly touched upon environment setup
- Assignment 1 due Tuesday, October 1st, at 11:59 PM

Why do you want to take this class?



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- Introduce JavaScript Basics
- Introduce Babel
- Introduce JSX
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https://es6console.com/

JS: Variables

In ES6, variables:

- Don’t have types
- But must be declared before using them

- Global variables

```
var x = 1;

if (x === 1) {
  var x = 2;
  console.log(x);
  // expected output: 2
}

console.log(x);
// expected output: 2
```

ES6

JS: Variables

In ES6, variables:

- Don’t have types
- But must be declared before using them

- Local variables

```
let x = 1;

if (x === 1) {
  let x = 2;
  console.log(x);
  // expected output: 2
}

console.log(x);
// expected output: 1
```

ES6

JS: Variables

In ES6, variables:

- Don't have types
- But must be declared before using them

- Const variables

```
const x = 1;

if (x === 1) {
  x = 2;
  //Error
  console.log(x);
  // expected output: 2
}

console.log(x);
// expected output: 1
```

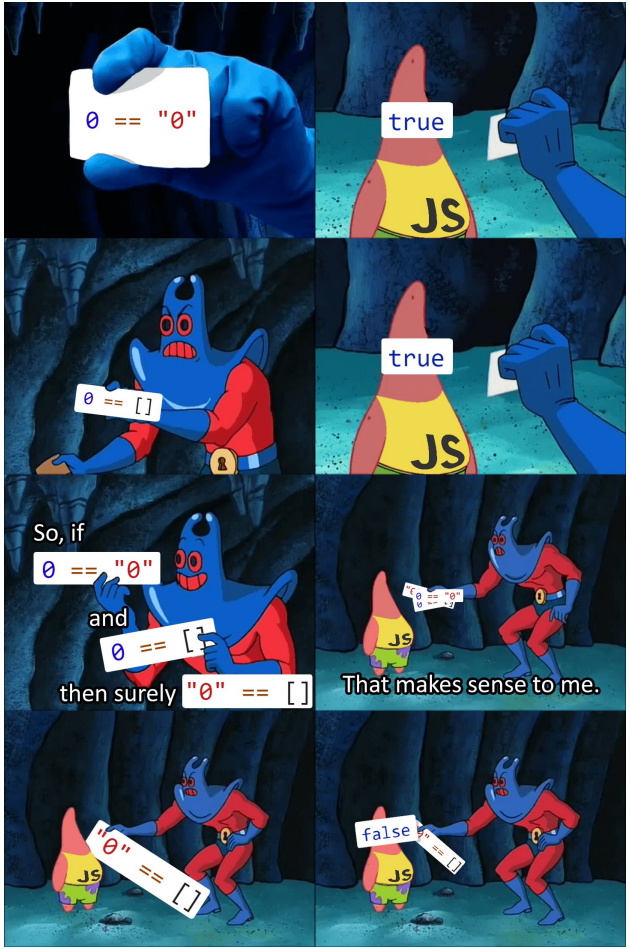
ES6

JS: Variables

	Global Variables	Local Variables	Constant Variables
Use	The scope here is the function in which it's declared	The scope here is the block in which it is declared	The scope here is the block, but it cannot be changed in value
Syntax	`var x = 10;`	`let x = 10;`	`const x = 10;`

ES6

JS: If statements



ES6

JS: If statements

JS needs special care with equality.

If in doubt use `===` and `!==` (or use them always)

- Example

```
if (a > 0) {
    return "positive";
} else if (a === 0) {
    return "It’s a zero";
} else {
    return "NOT positive";
}
```

ES6

JS: Loops

You have many options for loops in JS

- For loops

```
for (var i = 0; i < arr.length; i++) {
  console.log(arr[i]);
}
```

- For of loops

```
for (var element of arr) {
  console.log(arr);
}
```

ES6

JS: Loops

You have many options for loops in JS

- For each loops

```
arr.foreach(function(element) {
  console.log(element);
});
```

- While loops

```
While (true) {
  console.log(“You can’t stop me”);
}
```

JS: Functions

- Functions in JS are declared in the following way

```
function addition(a, b = 10) {
  return a + b;
}
```

ES6

JS: Functions

- Functions in JS are declared in the following way

```
function addition(a, b = 10) {
  return a + b;
}
```

- Another way is as follows

```
var addition = (a, b = 10) => {
  return a + b;
}
```

ES6

JS: Functions

- Functions in JS can turn passed in arguments to arrays

```
function addition(a, ...b) {
  return a + b.length;
}
console.log(addition(2,1,7,5));
// 2 + 3 = 5
```

- On the opposite side, we can do

```
function addition(a, b, c) {
  return a + b + c;
}
console.log(addition(...[1,2,3]));
// 1 + 2 + 3 = 6
```

ES6

JS: Objects

- Objects are similar to dictionaries and/or maps in other languages

```
let obj = {
     name: ‘John’,
     age: 17,
};
console.log(obj.name + ‘ ‘ + obj[‘age’]);
```

- Other ways of representing properties

```
let obj = {
     [‘full’ + ‘name’]: ‘John Doe’,
     //same as age: age
     age,
     lorem() {
          return “ipsum”;
     },
};
```

ES6

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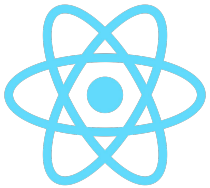
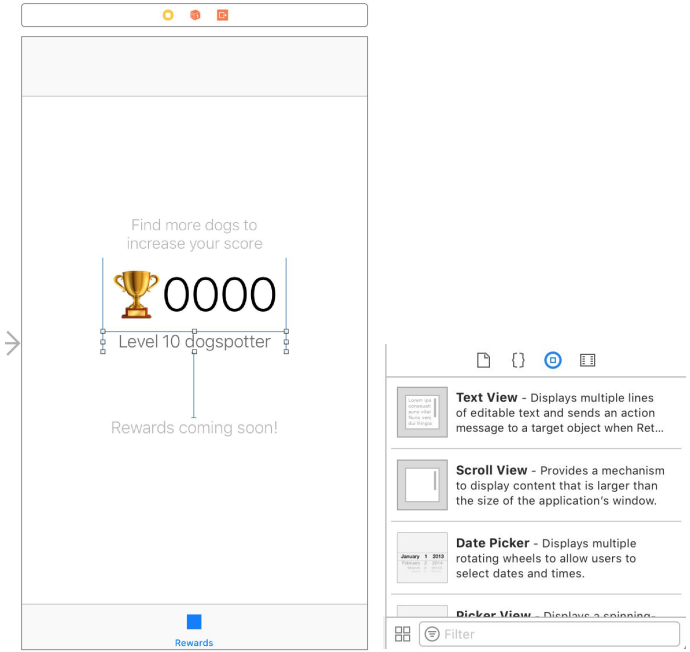
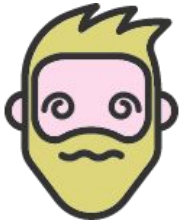
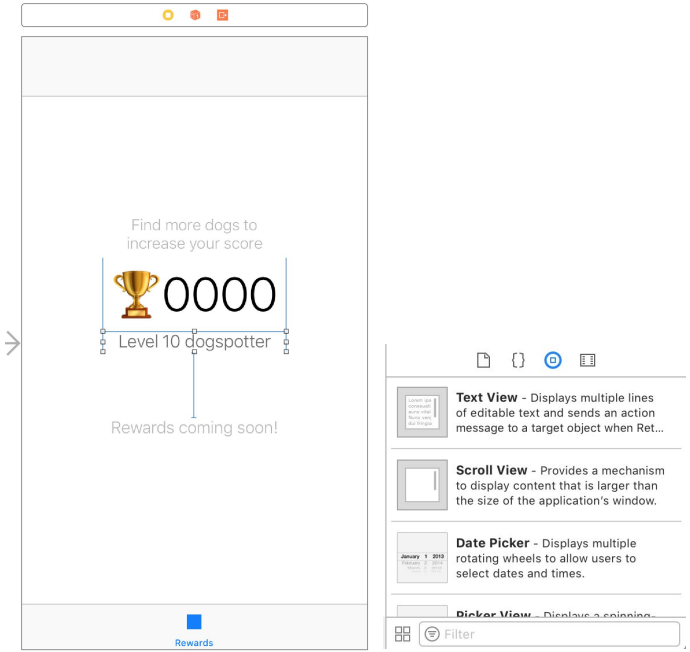



Find more dogs to
increase your score
0000
Level 10 dogspotter
Rewards coming soon!
Rewards
Text View - Displays multiple lines of editable text and sends an action message to a target object when Ret...
Scroll View - Provides a mechanism to display content that is larger than the size of the application's window.
Date Picker - Displays multiple rotating wheels to allow users to select dates and times.
Filter

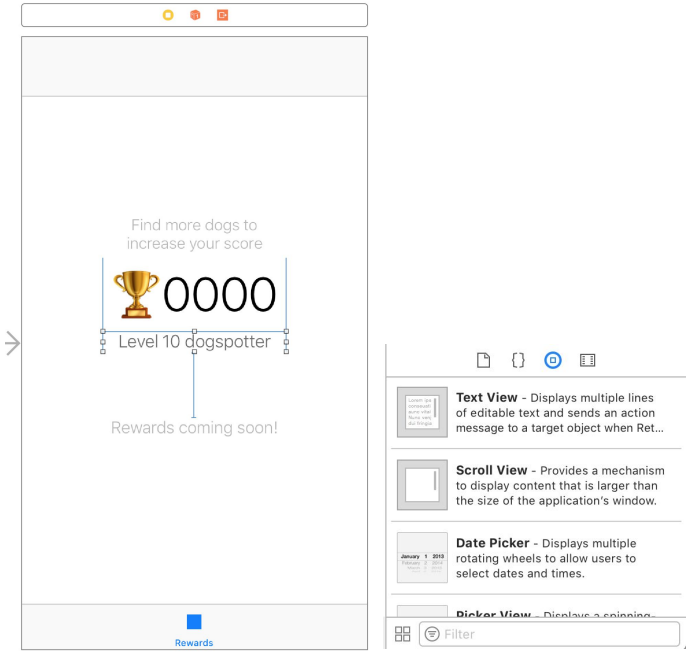
Unfortunately you will have to deal
with autolayout constraints





```
let textLayer = CATextLayer()
textLayer.backgroundColor = color.cgColor
textLayer.foregroundColor = UIColor.white.cgColor
textLayer.frame = frame
textLayer.alignmentMode = kCAAlignmentLeft
textLayer.isWrapped = true
let font = CTFontCreateWithName("System" as CFString, 18.0, nil)
textLayer.font = font
textLayer.fontSize = 18.0
textLayer.contentsScale = UIScreen.main.scale
textLayer.string = label

self.view.layer.addSublayer(textLayer)
```



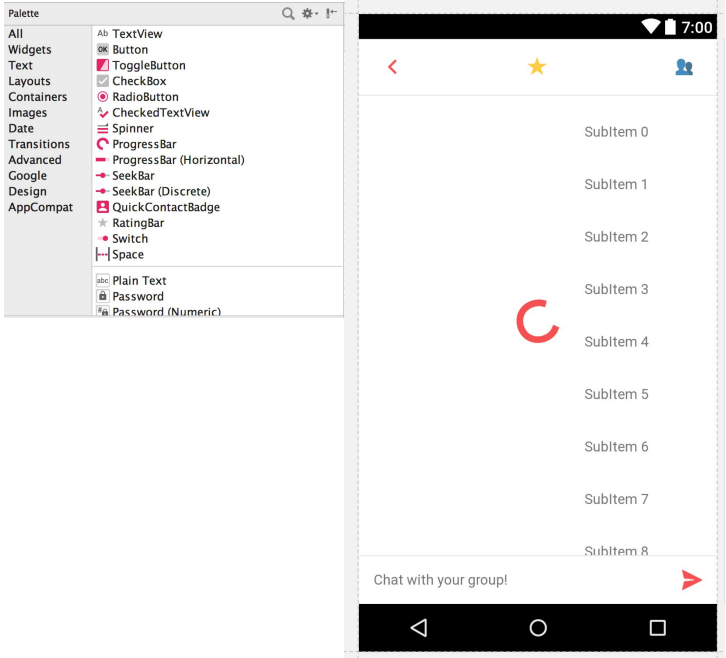

```
let textLayer = CATextLayer()
...

self.view.layer.addSublayer(textLayer)
```

```
LinearLayout myLayout = findViewById(R.id.main);

Button myButton = new Button(this);
myButton.setLayoutParams(new LinearLayout.LayoutParams(
LinearLayout.LayoutParams.MATCH_PARENT,
LinearLayout.LayoutParams.MATCH_PARENT));

myLayout.addView(myButton);
```

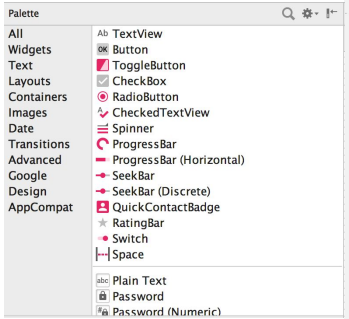


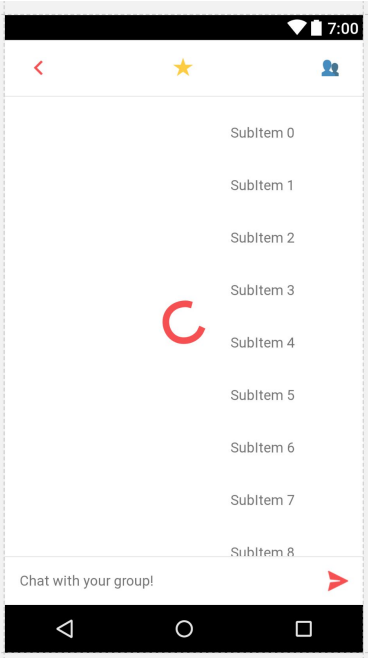
```
<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:background="@android:color/white"
    android:gravity="center"
    android:minHeight="48dp"
    android:orientation="horizontal">

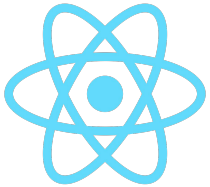
    <EditText
        android:id="@+id/chat_message_text"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:layout_weight="1"
        android:background="@android:color/transparent"
        android:ems="10"
        android:enabled="false"
        android:hint="Chat with your group!"
        android:inputType="textMultiLine|textCapSentences"
        android:maxLines="5"
        android:paddingEnd="5dp"
        android:paddingLeft="15dp"
        android:paddingRight="5dp"
        android:paddingStart="15dp"
        android:textAppearance="?android:attr/textAppearanceSmall" />

    <!--<ImageButton-->
        <!--android:id="@+id/chat_message_attach"-->
        <!--android:layout_width="wrap_content"-->
        <!--android:layout_height="wrap_content"-->
        <!--android:background="?attr/selectableItemBackgroundBorderless"-->
        <!--android:paddingBottom="10dp"-->
        <!--android:paddingLeft="5dp"-->
        <!--android:paddingRight="5dp"-->
        <!--android:paddingTop="10dp"-->
        <!--android:src="@drawable/ic_attach" />-->

</LinearLayout>
```

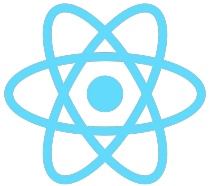




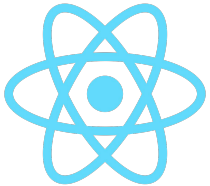


```
let textLayer = CATextLayer()
...

self.view.layer.addSublayer(textLayer)
```

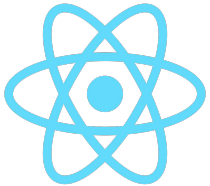


How do we build layouts in React Native?



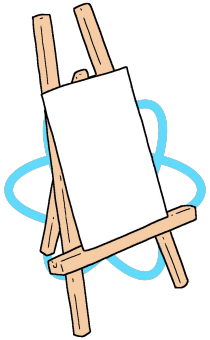
How do we build layouts in React Native?

Programmatically (in markup style) — this means no drag and drop interface builder.



Originally, the process of creating a View using React looked like this:

```
var ourView = React.createElement(View, null);
```



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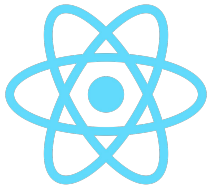

Originally, the process of nesting Text within a View using React looked like this:

```
var ourNestedView = React.createElement(
  View,
  {
    foo: 'bar'},
  React.createElement(
    Text,
    null,
    '42'
  )
);
```

Originally, the process of nesting Text within a View using React looked like this:

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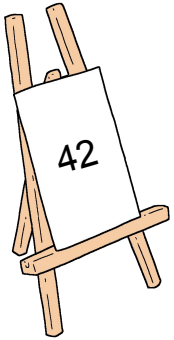

JSX

An extension to JavaScript that you will use to build your UI interfaces.

Without JSX

```
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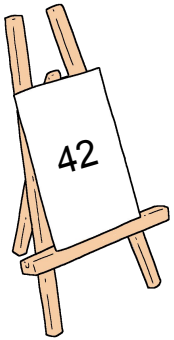
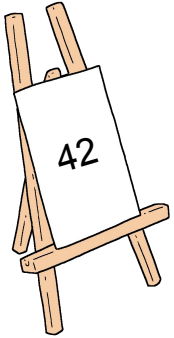
  {
    foo: 'bar'},
  React.createElement(
    Text,
    null,
    '42'
  )
);
```



With JSX

```
const ourNestedView = (
  <View
    foo='bar'>
    <Text>42</Text>
  </View>
)
```



JSX

```
const ourNestedView = (
  <View
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  </View>
)
```

No JSX

```
var ourNestedView = React.createElement(
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    '42'
  )
);
```

JSX is a shortcut for using the React.createElement() API

JSX Benefits

```
const ourNestedView = (
  <View
    foo='bar'>
    <Text>42</Text>
  </View>
)
```

- UI has a clear hierarchical structure. What you see in code mirrors what you will get.

JSX Benefits

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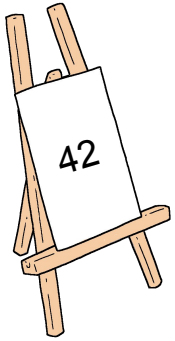

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JSX Benefits

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- UI has a clear hierarchical structure. What you see in code mirrors what you will get.
- This makes it easier for designers to contribute to code.
- You get the accessibility of templates AND the power of JS.

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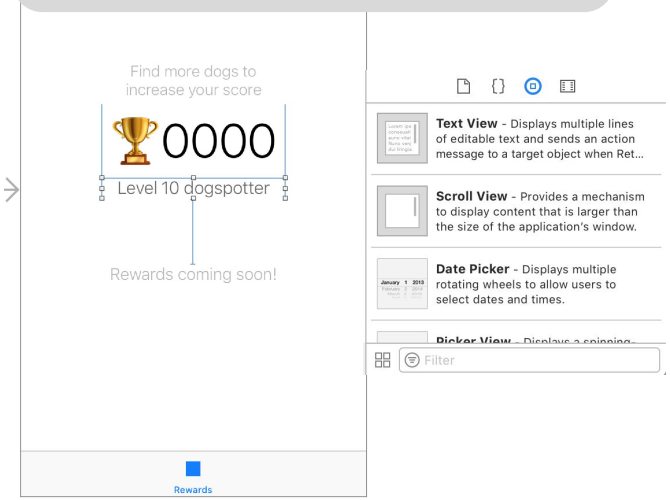
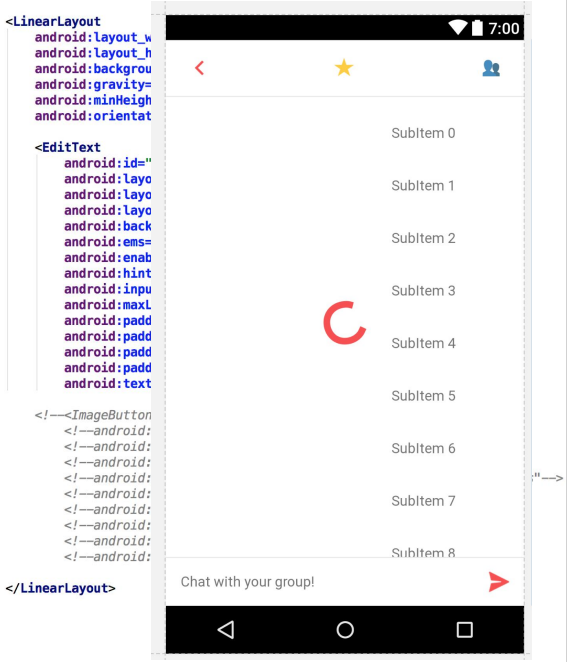
```



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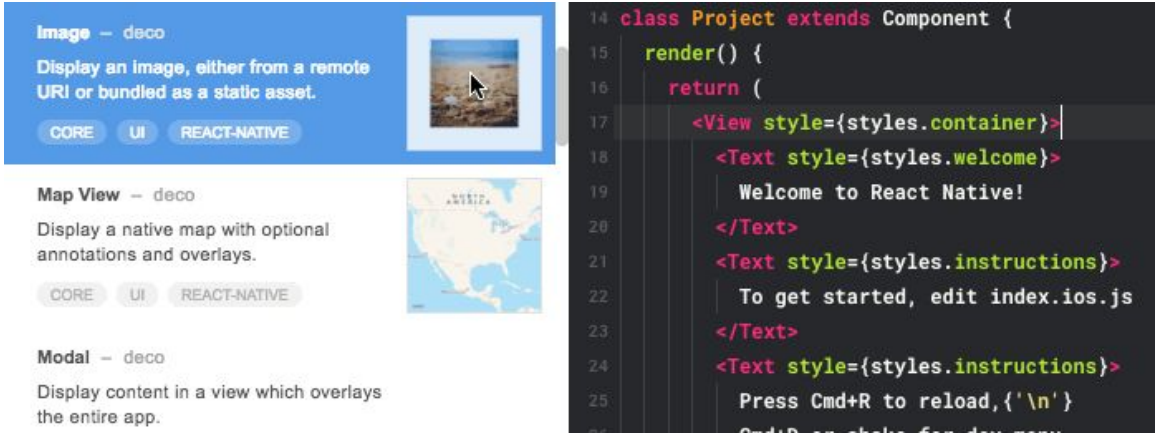


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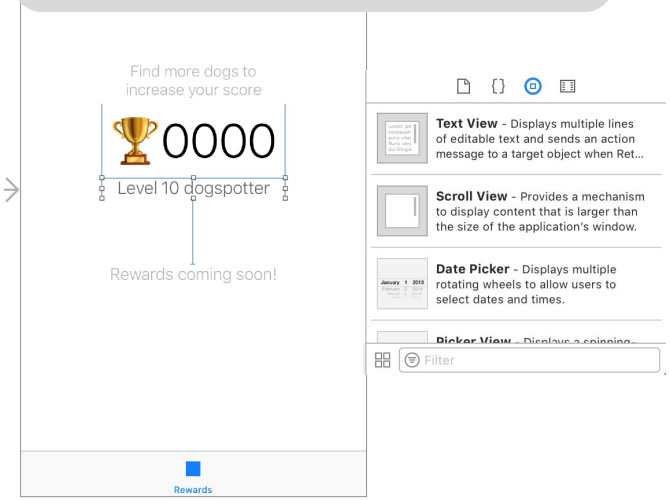

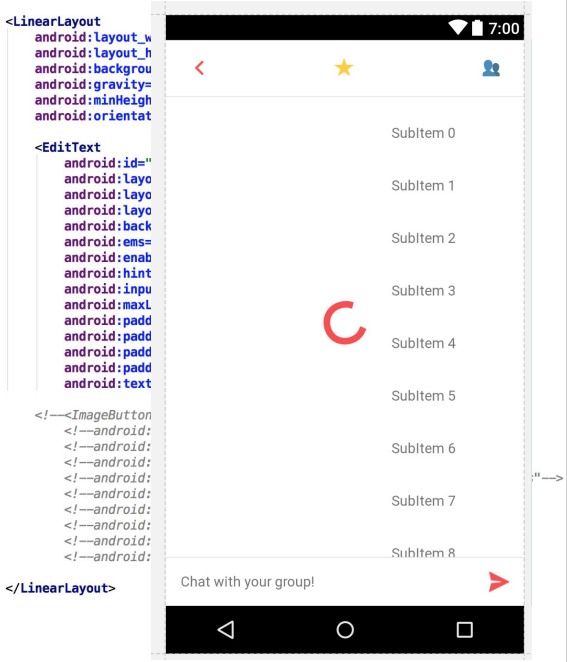


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Creating an empty project

```
render() {
    return (
      <View style={styles.container}>
        <Text>Open up App.js to start working on your app!</Text>
        <Text>Changes you make will automatically reload.</Text>
        <Text>Shake your phone to open the developer menu.</Text>
      </View>
    );
}
```

```
render() {
    return (
      <View style={styles.container}>
        <Text>Open up App.js to start working on your app!</Text>
        <Text>Changes you make will automatically reload.</Text>
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      </View>
    );
}
```

```
const ourNestedView = (
  <View
    foo='bar'>
    <Text>42</Text>
  </View>
)
```

```
render() {
    return ourNestedView;
}
```

```
const ourNestedView = (
  <View
    foo='bar'>
    <Text>42</Text>
  </View>
)
```

```
render() {
    return (
      <View style={styles.container}>
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      </View>
    );
}
```

React Native calls the render function every time a change occurs.

```
render() {
    return (
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        <Text>Shake your phone to open the developer menu.</Text>
      </View>
    );
}
```

React Native calls the render function every time a change occurs.

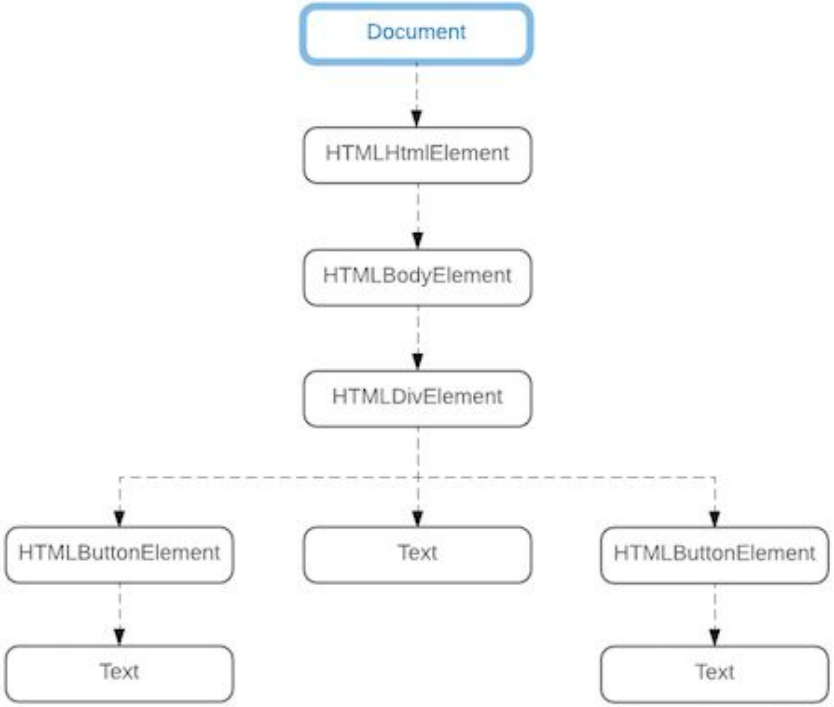
Sneak Peek: there's something called the "state" of a component. It's basically a variable that says what to render. When the values of this variable are changed, the render function is called again. You will learn more about a component's state on week 2.

Virtual DOM (Document Object Model)

A virtual representation of a desired view state

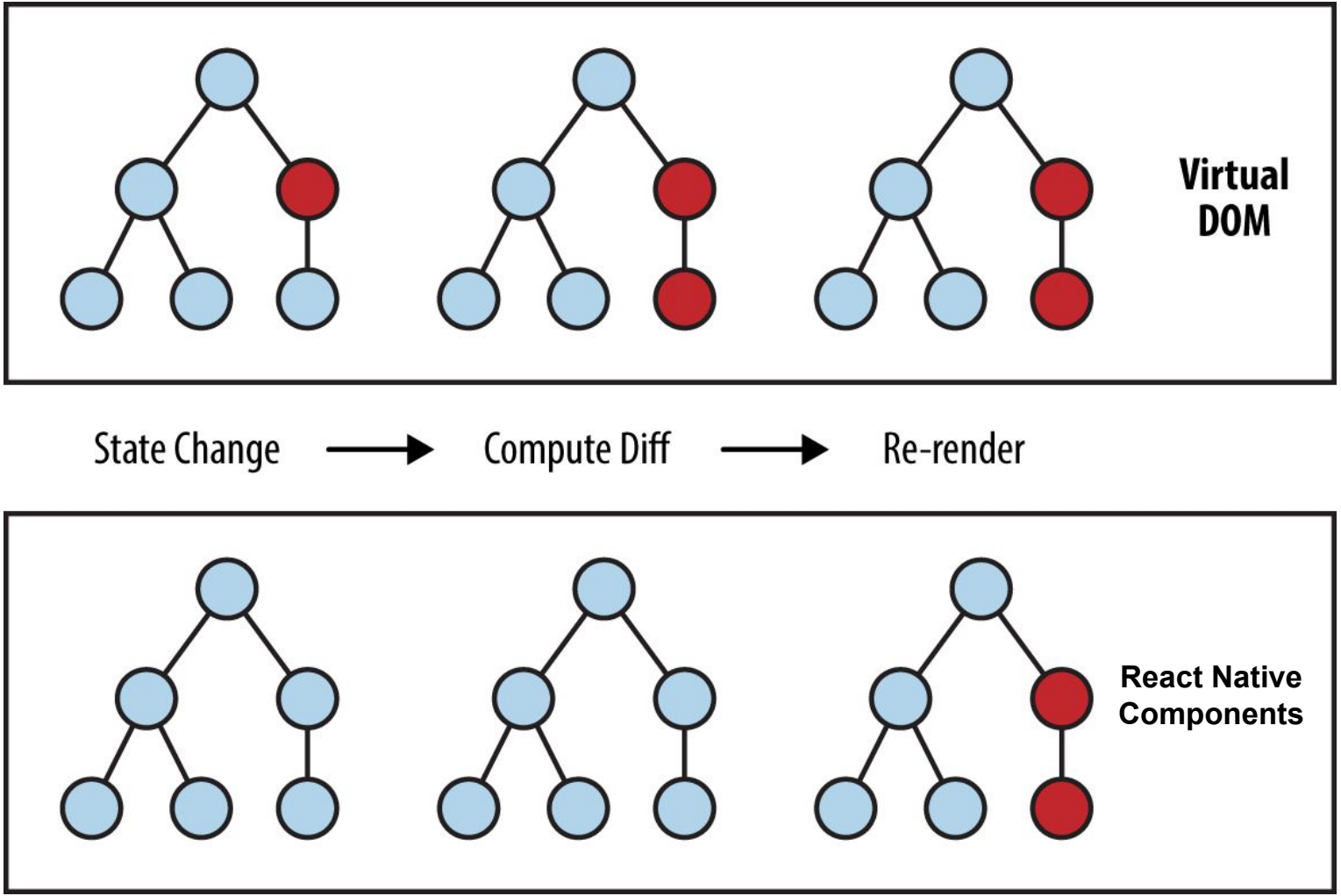
(not necessarily the same thing as the DOM on a browser)

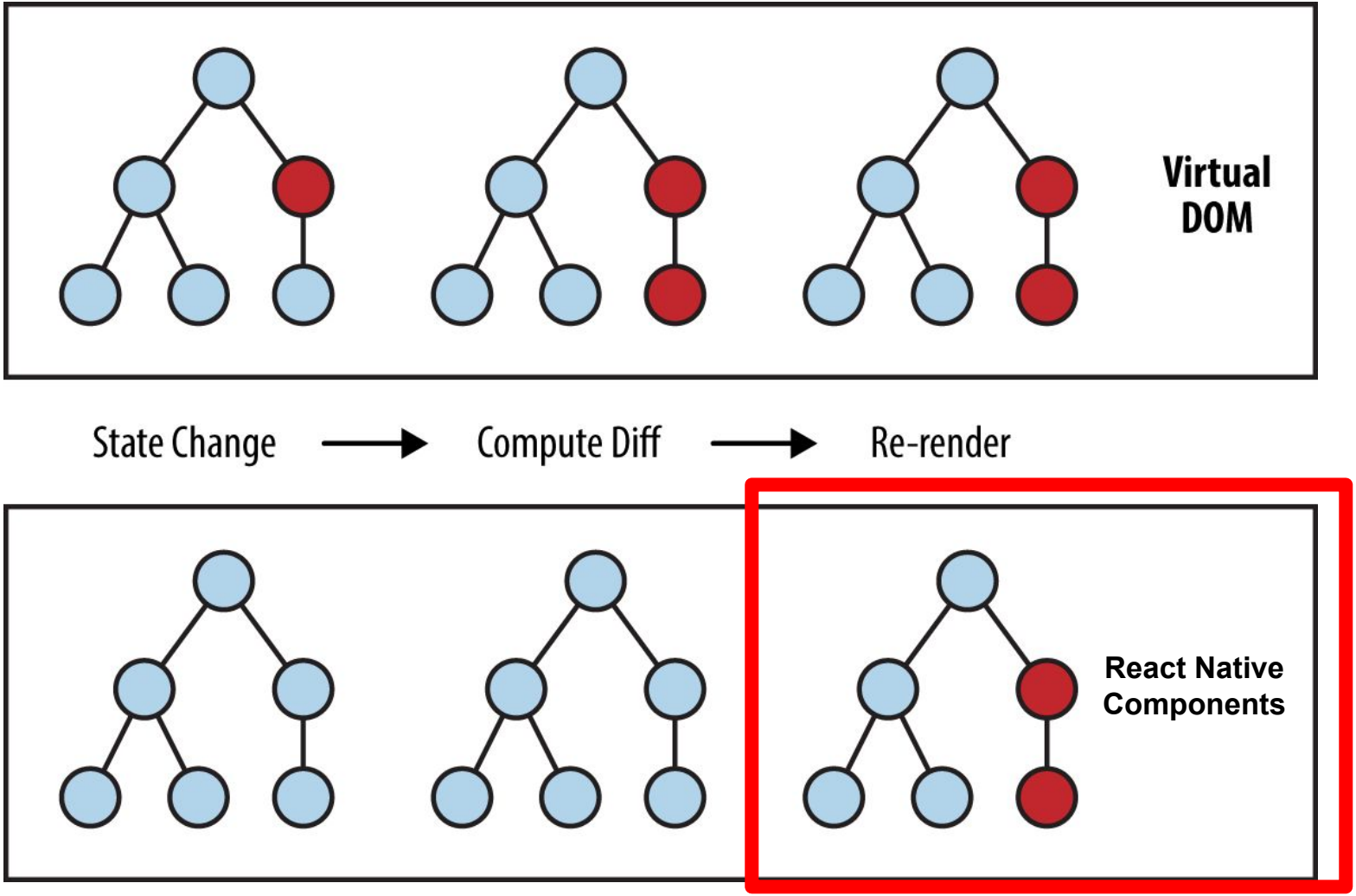
Virtual DOM (Document Object Model)



```
render() {
    return (
      <View style={styles.container}>
        <Text>Open up App.js to start working on your app!</Text>
        <Text>Changes you make will automatically reload.</Text>
        <Text>Shake your phone to open the developer menu.</Text>
      </View>
    );
}
```

React Native calls the render function every time a change occurs.


Virtual DOM
State Change
Compute Diff
Re-render
React Native Components


Virtual DOM
State Change
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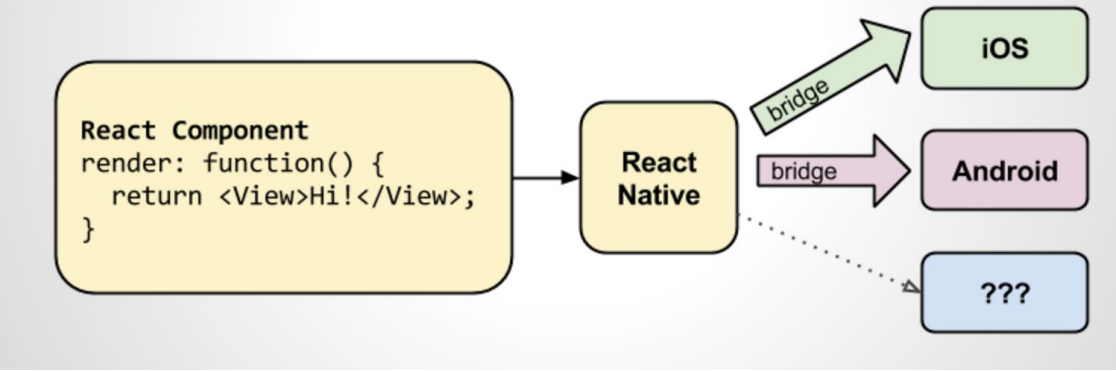
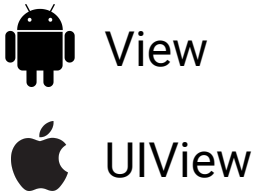

React Component
render: function() {
return <View>Hi!</View>;
}
React Native
bridge
bridge
iOS
Android
???

```
const ourNestedView = (
  <View
    foo='bar'>
    <Text>42</Text>
  </View>
)
```



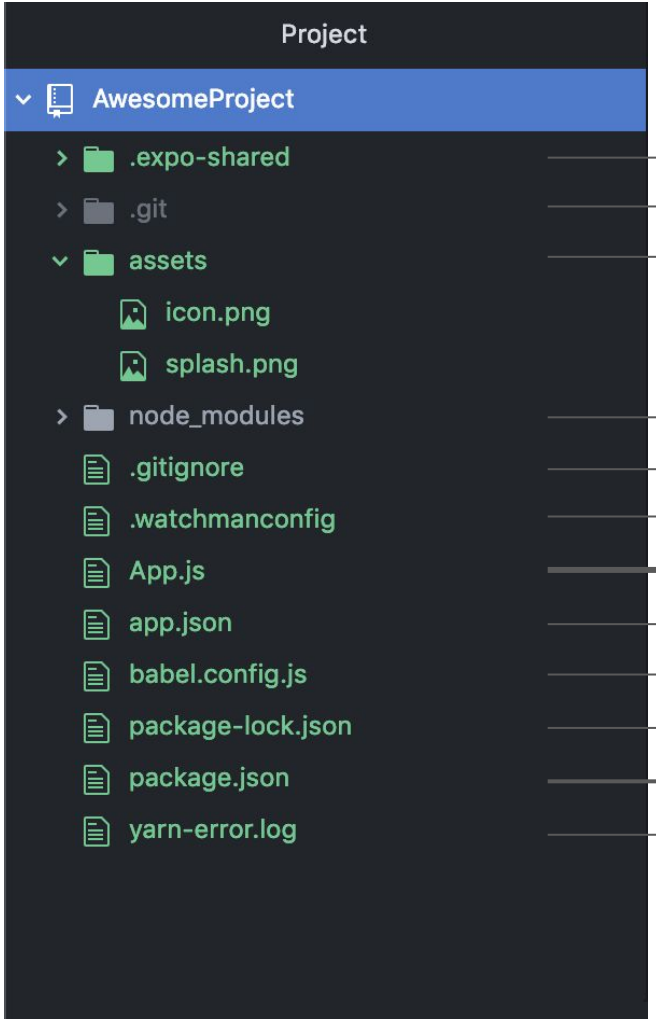
View

UIView

TextView

UILabel

Back to project



.expo-shared | hidden folder, !important

.git | hidden folder, git info, !imp

assets | project assets e.g. icon

node_modules | all modules for project

.gitignore | hidden file, git stuff, !imp

.watchmanignore | hidden file, !imp

App.js | Your code, very very important

app.json | app metadata, !too imp

Babel.config.js | !imp unless you know babel

Package-lock.json | auto gen, modules config

Package.json | packages of your project, imp

yarn-error.log | !imp, error log

```
const styles = StyleSheet.create({
  container: {
    flex: 1,
    backgroundColor: '#fff',
    alignItems: 'center',
    justifyContent: 'center',
  },
});
```

Basically “CSS” brought to a mobile platform

https://github.com/vhpoet/react-native-styling-cheat-sheet

Office Hours

OH start on week 2. Email us directly if you're not available at these times

Abdallah AbuHashem
Monday (12-1 PM) @ Huang Basement
By appointment

Vy Mai
Tuesday (3-4 PM) @ Old Union
By appointment

Cisco Vlahakis
Wednesday (8-9 PM) @ Huang Basement
By appointment

Tiffany Manuel
Thursday (2-3 PM) @ Huang Basement
By appointment

CS47: Cross-Platform Mobile Development

Lecture 1B: Introduction to Javascript (ES6)

James Landay
Abdallah AbuHashem
Tiffany Manuel
Cisco Vlahakis
Vy Mai

https://cs-47.stanford.edu

cs-47.slack.com

Fall 2019