Comp 322/422 - Software Development for Wireless and Mobile Devices

Fall Semester 2019 - Week 9

Dr Nick Hayward

DEV week assessment

Course total = 25%

- begin development of a mobile application from scratch
  - ***NOT*** *a responsive website viewed on a mobile device*
  - *must apply technologies taught up to and including DEV week, e.g.*
    - Apache Cordova, React Native, &c.
    - combine technologies taught to fit your mobile app...
- can be platform agnostic (cross-platform) or specific targeted OS, e.g.
  - *cross-platform app that builds for Android and iOS*
  - *targeted build for Android or iOS*
  - *consider choice, and explain why?*
- outline concept, research conducted to date
- consider applicable design patterns
- are you using any sensors etc?
  - *how, why?*
- prototyping
  - *demo current prototypes*
  - *any working tests or models etc*
- anything else to help explain your mobile app...

DEV Week Demo

DEV week assessment will include the following:

- brief presentation or demonstration of current project work
  - *~ 10 minutes per group*
  - *analysis of work conducted so far*
    - e.g. during semester & DEV week
  - *presentation and demonstration...*
    - outline mobile app
    - show prototypes and designs
    - explain what does & does not work
    - ...

React Native - Layout and Styles

flex and CSS inspired

- UI structure in React Native is achieved using *Flexbox*
  - *originally defined for web development*
- currently used to help with UI layout patterns and designs
- *Flexbox* usage slightly different for React Native
  - *no CSS syntax for styles*
- React Native styles are written, manipulated, and contained in JavaScript
- benefits of component structure to store and abstract our UI layouts and styles

React Native - Layout and Styles - add some flex

intro

> *Flexbox works the same way in React Native as it does in CSS on the web, with a few exceptions. The defaults are different, with flexDirection defaulting to column instead of row, and the flex parameter only supporting a single number.*

- React Native uses the *flexbox* algorithm
  - *specify layout and design for its components, and their children*
- benefit of *flexbox* layouts
  - *adaptation to multiple screen sizes, aspect ratios, and orientations...*
- for React Native, there tends to be three predominant uses
  - `alignItems`
  - `flexDirection`
  - `justifyContent`

React Native - Layout and Styles - add some flex

`flexDirection`

- by defining a component's `flexDirection`
  - *setting organisational pattern for its subsequent children*
  - *might be set to a horizontal row or a vertical column*
- by default, `flexDirection` will be set to a column
  - *change to `row`*

```
const styles = StyleSheet.create({
  container: {
    flex: 1,
    flexDirection: 'row',
  },
});
```

- a `View` with the style for `container`
  - *will use all of the available screen space*
  - *and render its child components in a row pattern*
  - *cascading from row to row...*

React Native - Layout and Styles - add some flex

`justifyContent`

- then update this style to define how child components start to fill each row
  - *setting their `justifyContent` value*
- options include
  - *`flex-start`*
  - *`flex-end`*
  - *`space-around`*
  - *`space-between`*

```
const styles = StyleSheet.create({
  container: {
    flex: 1,
    flexDirection: 'row',
    justifyContent: 'flex-end'
  },
});
```

React Native - Layout and Styles - add some flex

`alignItems`

- align items offers a simple, complementary option to `flexDirection`
- if the direction for the primary axis, set using `flexDirection`, is *column*
  - *`alignItems` will define the secondary axis as row*
- options include
  - *`flex-start`*
  - *`flex-end`*
  - *`center`*
  - *`stretch`*
- caveat to using the `stretch` value
  - *need to ensure no fixed dimensions set for any children of flex component*

```
const styles = StyleSheet.create({
  container: {
    flex: 1,
    flexDirection: 'column',
    justifyContent: 'flex-start',
    alignItems: 'stretch',
  },
});
```

more layout options

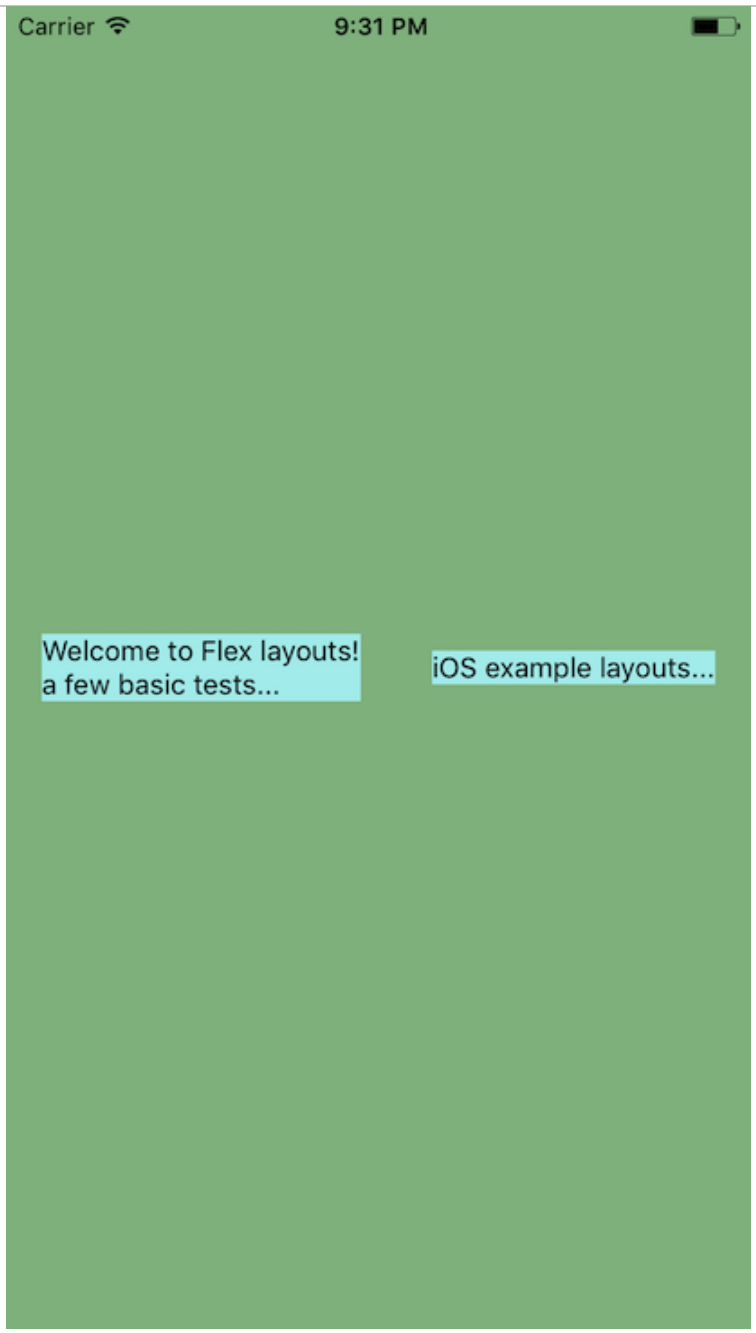
- further options may be specified as props
  - *add to a given component or stylesheet...*
- full details can be found at the following URL,
  - *Layout Props*

React Native - Layout and Styles - add some flex

basic flex usage - part I

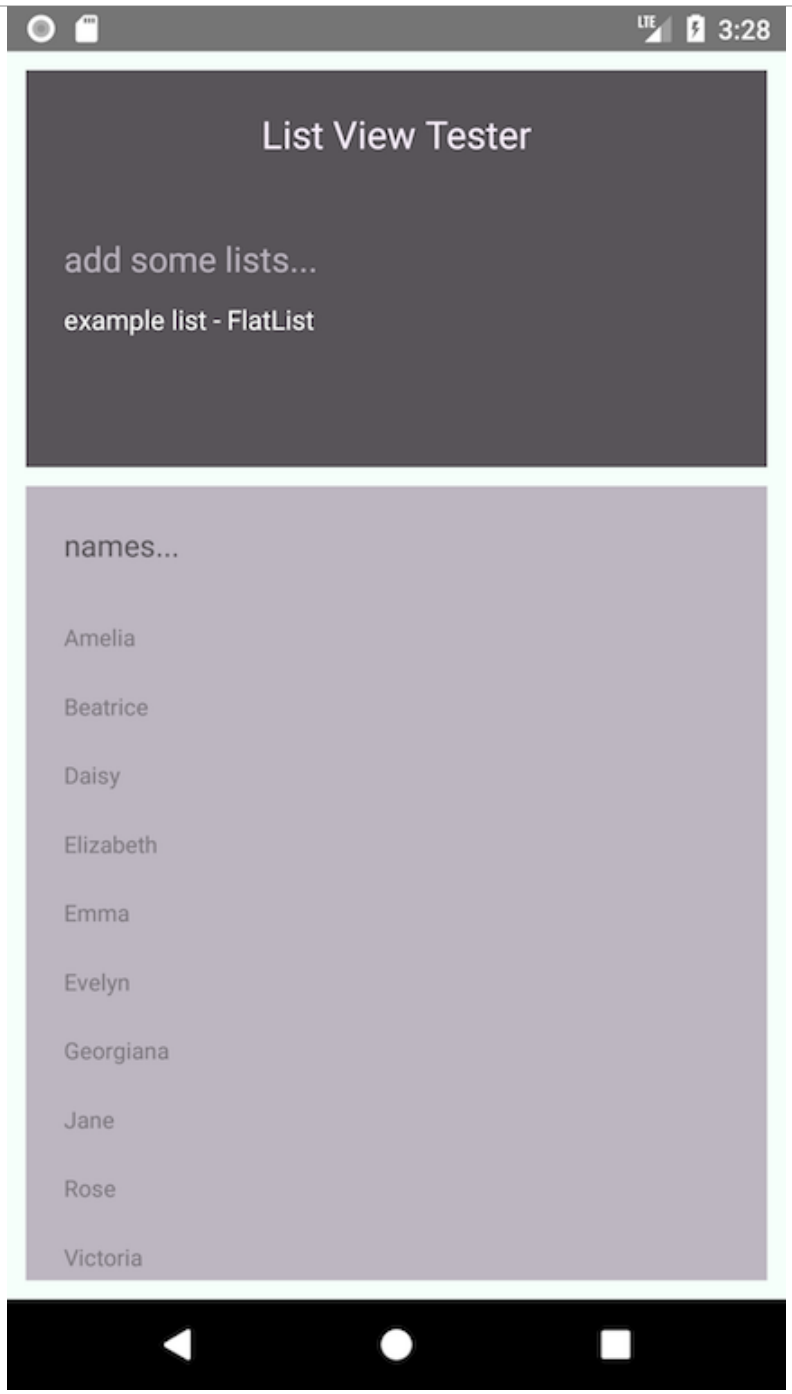
```
...
export default class BasicFlexApp extends Component {
  render() {
    return (
      <View style={styles.container}>
        <View style={styles.col}>
          <Text>
            Welcome to Flex layouts!
          </Text>
          <Text>
            a few basic tests...
          </Text>
        </View>
        <View style={styles.col}>
          <Text>
            {instructions}
          </Text>
        </View>
      </View>
    );
  }
}

const styles = StyleSheet.create({
  container: {
    flex: 1,
    flexDirection: 'row',
    justifyContent: 'space-around',
    alignItems: 'center',
    backgroundColor: 'darkseagreen',
  },
  col: {
    flexDirection: 'column',
    backgroundColor: 'paleturquoise',
  },
});
```

Image - React Native - Flex Basics



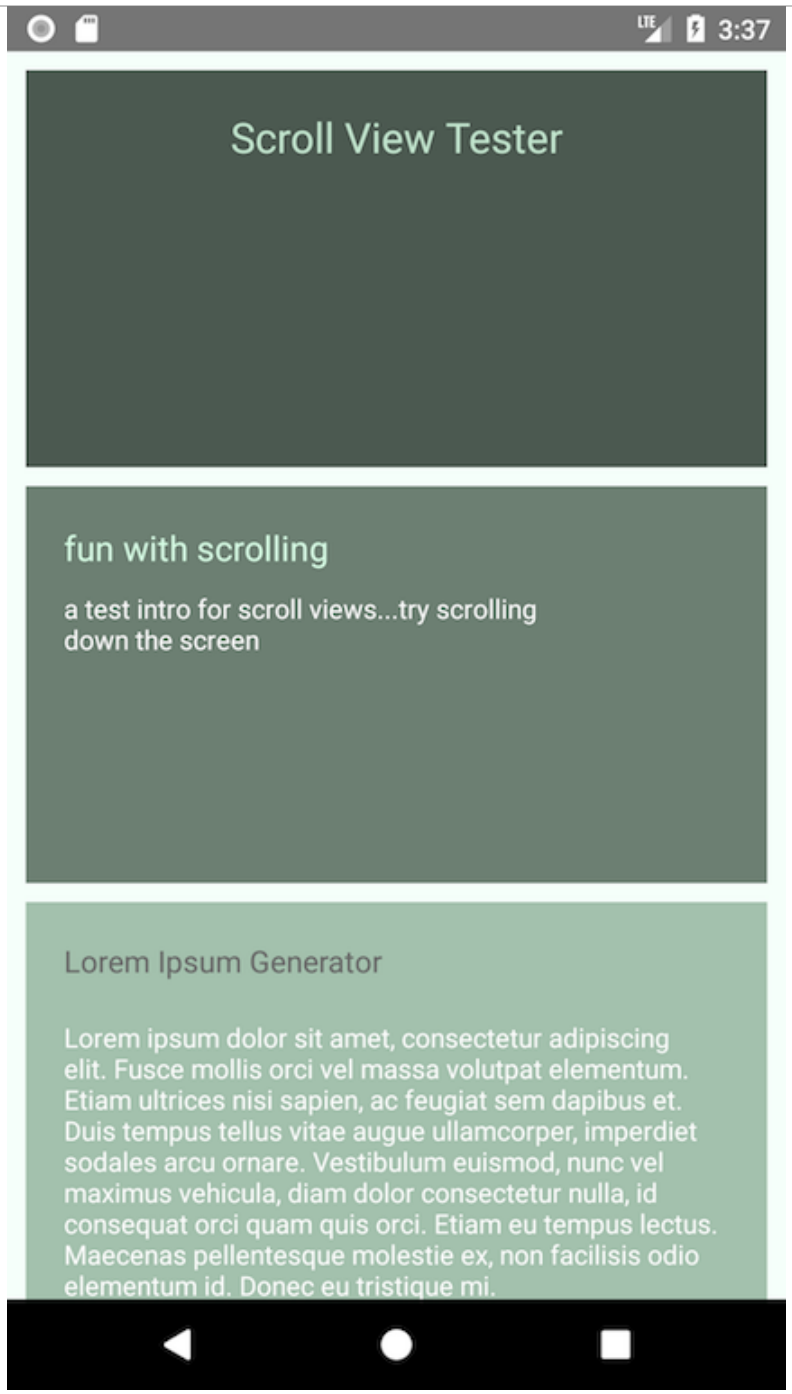
React Native Flex Basics

Image - React Native - Flex Basics - List View



React Native List View

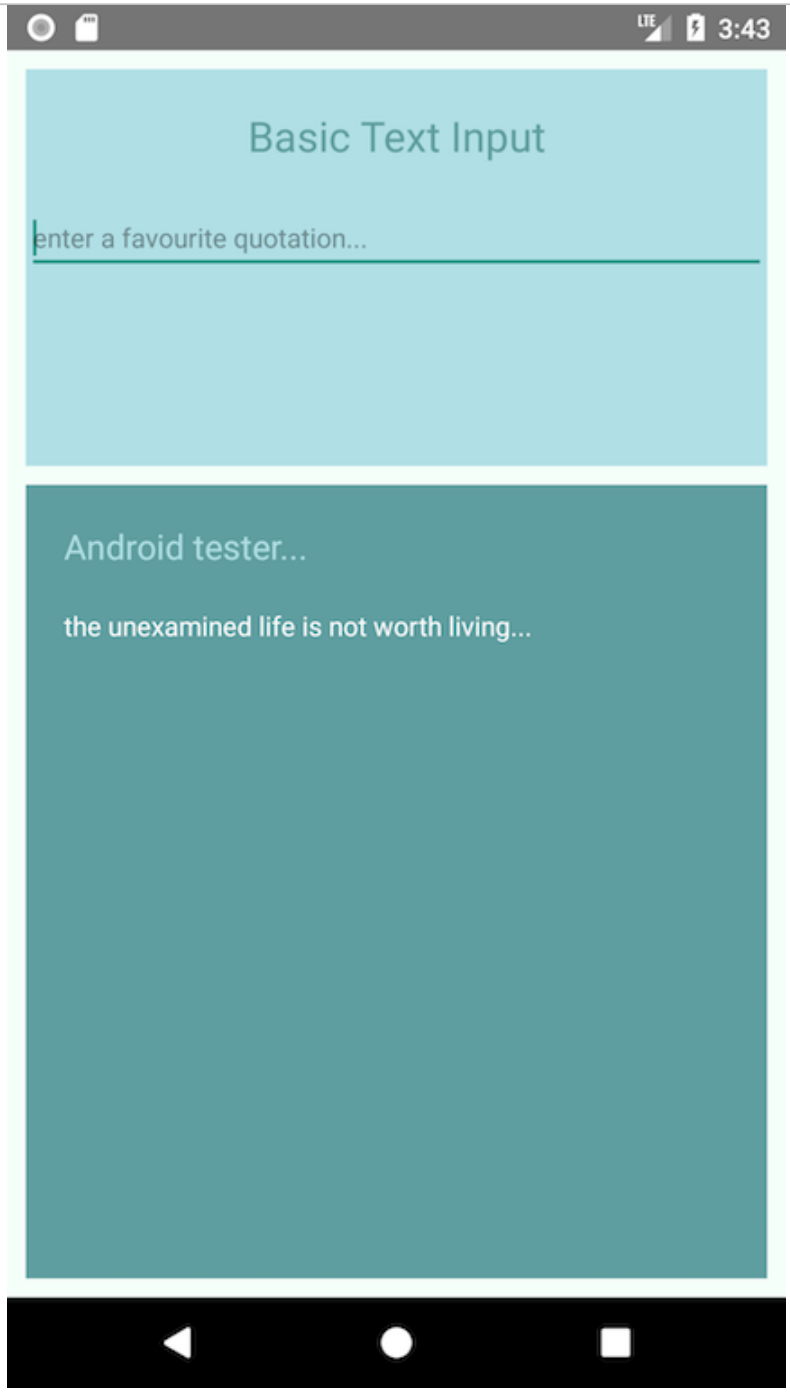
Image - React Native - Flex Basics - Scroll View



React Native Scroll View

Image - React Native - Styles

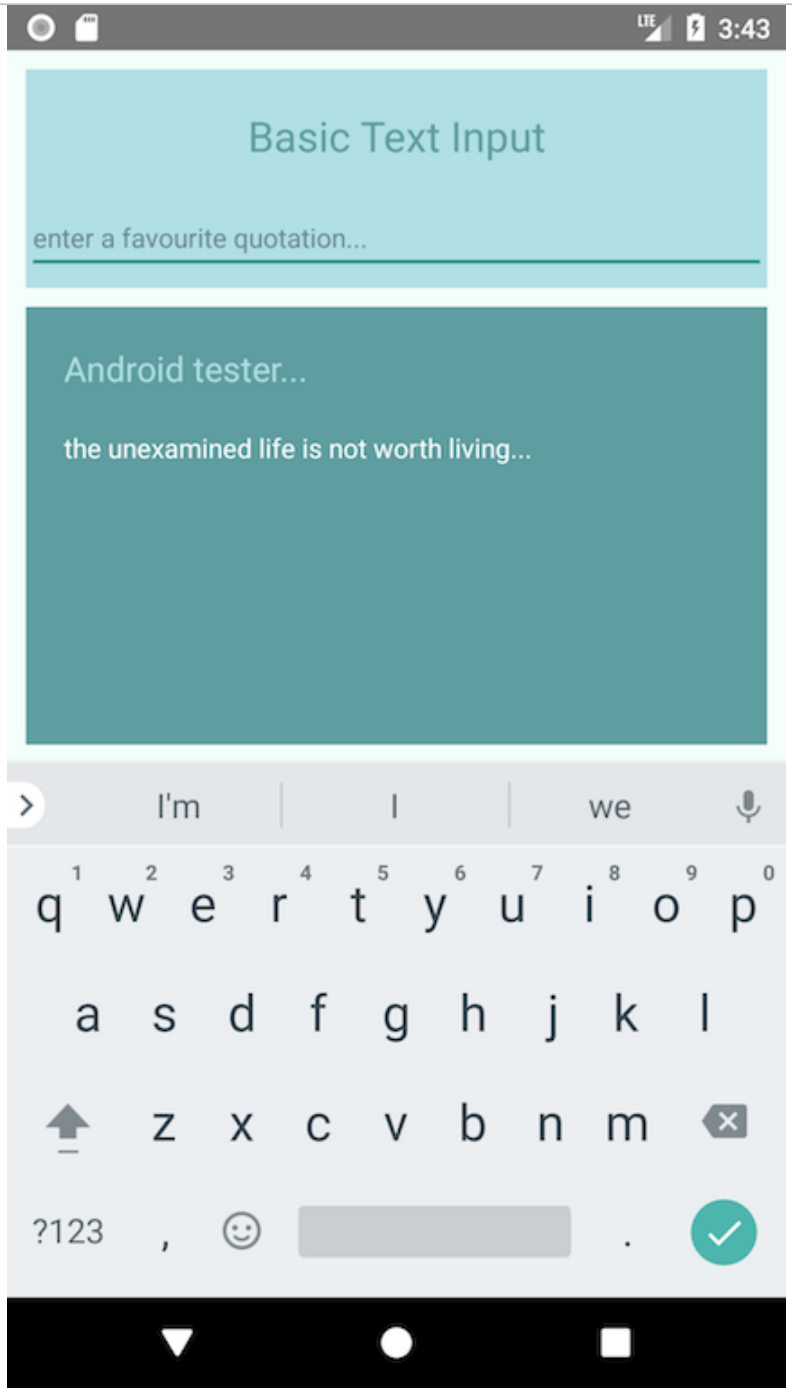
text input



React Native Styles - Text Input

Image - React Native - Styles

text input with keyboard



React Native Styles - Text Input

React Native - Layout and Styles

basic styling

- similar to CSS usage with standard client-side apps
  - *styles are defined and set for colour, size, background colour...*
- property names for these styles specified using a camelCase pattern. e.g.

```
fontWeight
fontSize
backgroundColor
```

- styles may be set using a plain JavaScript variable
  - *acts as a container for multiple styles*
- using `StyleSheet.create()`
  - *we can pass an object defining multiple custom style properties*
  - *properties include name/value pairs*
  - *the value is set as an object with the defined styles, e.g.*

```
const styles = StyleSheet.create({
  headermain: {
    fontWeight: 'bold',
    fontSize: 25,
    color: 'green',
  },
});
```

React Native - Layout and Styles

`style` usage

- to add a style to a component
  - *set value of the `style` prop to a standard JavaScript object, e.g.*

```
<Text style={styles.headermain}>Main Header</Text>
```

- in this example,
  - *simply using the property from the `styles` object*
  - *this will add the required `style` values for the defined prop*

React Native - Layout and Styles

Platform specific styles

```
import { Platform, StyleSheet } from 'react-native';

const styles = StyleSheet.create({
  container: {
    flex: 1,
    justifyContent: 'center',
    alignItems: 'center',
    backgroundColor: '#F5FCFF',
  },
  welcome: {
    ...Platform.select({
      ios: {
        fontFamily: 'Arial',
        color: 'cadetblue',
      },
      android: {
        fontFamily: 'Roboto',
        color: 'green',
      },
    }),
    textAlign: 'center',
    margin: 10,
    fontSize: 20,
  },
});
```

React Native - Layout and Styles

Style inheritance - part I

- React Native documentation suggests a preferred pattern for setting parent styles
  - *styles may then be inherited for children*
- pattern uses nested components with a custom parent defined with abstracted styles
- child component may then inherit such styles
  - *or override with specific component-level styles*

```
class MyAppText extends Component {
  render() {
    return (
      <Text>
        {this.props.children}
      </Text>
    );
  }
}
```

- e.g. a parent component is created for an app's rendering of basic text
- this will simply return any child text as a default `Text` component
- we may also create custom styles to add to this new component

```
textdefault: {
  fontSize: 15,
  color: '#000'
}
```

Style inheritance - part 2

- usage may then be as follows,

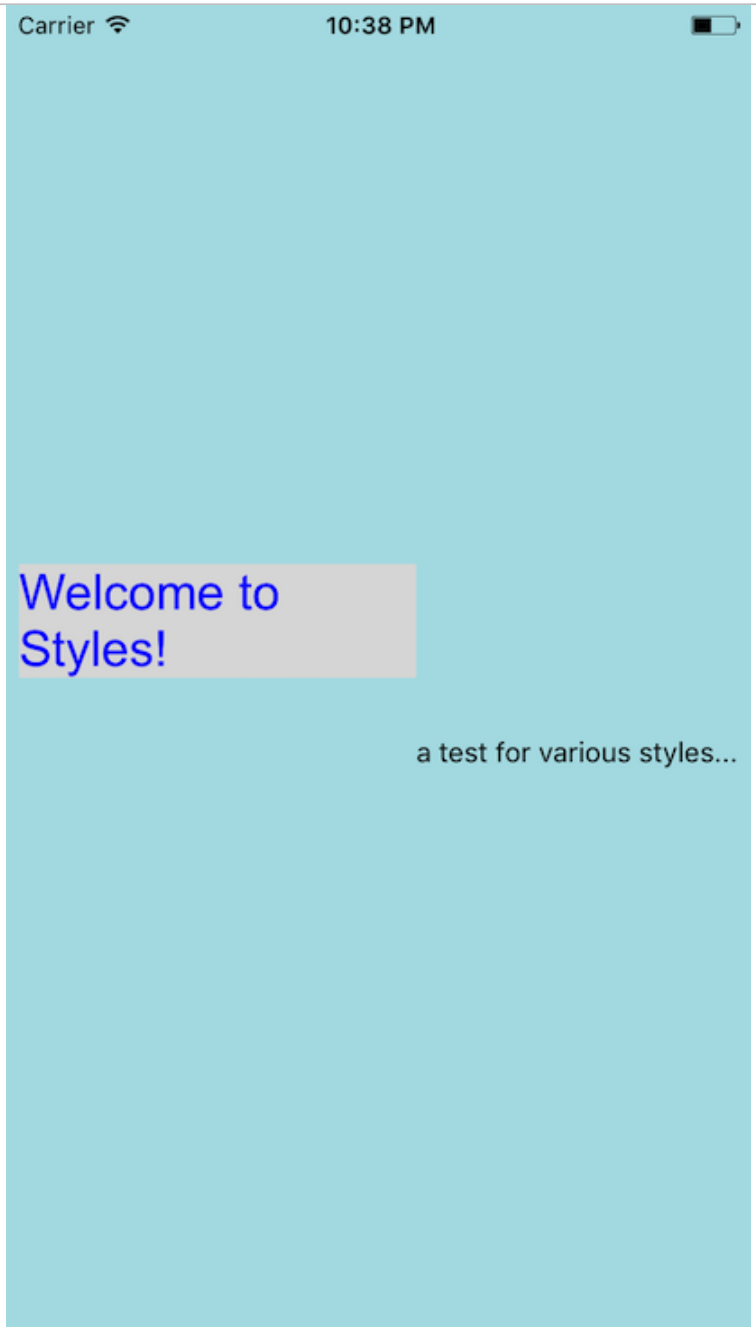
```
<MyAppText style={styles.textdefault}>
  some app text...
  <Text style={styles.welcome}>Welcome to Styles!</Text>
</MyAppText>
```

- the *child* text in the `MyAppText` component
  - *initially styled with the `textdefault` styles*
- we may then override or supplement these styles
  - *e.g. with specific styles on a given child component*

```
welcome: {
  ...Platform.select({
    ios: {
      fontFamily: 'Arial',
      color: 'blue',
    },
    android: {
      fontFamily: 'Roboto',
      color: 'green',
    },
  }),
  fontSize: 25,
  textAlign: 'auto',
  backgroundColor: '#ddd',
}
```

Image - React Native - Styles

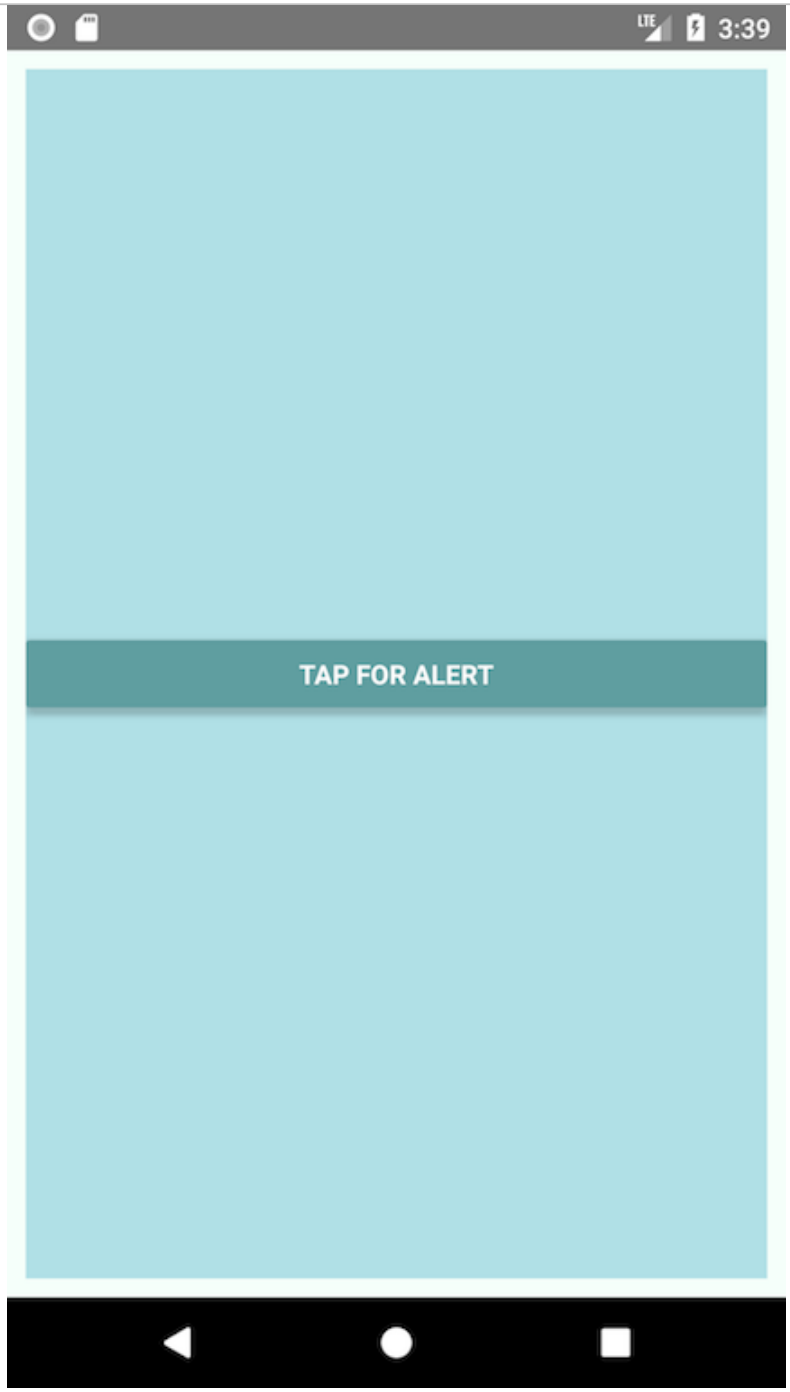
basic styles



React Native Styles - Inherit

Image - React Native - Styles

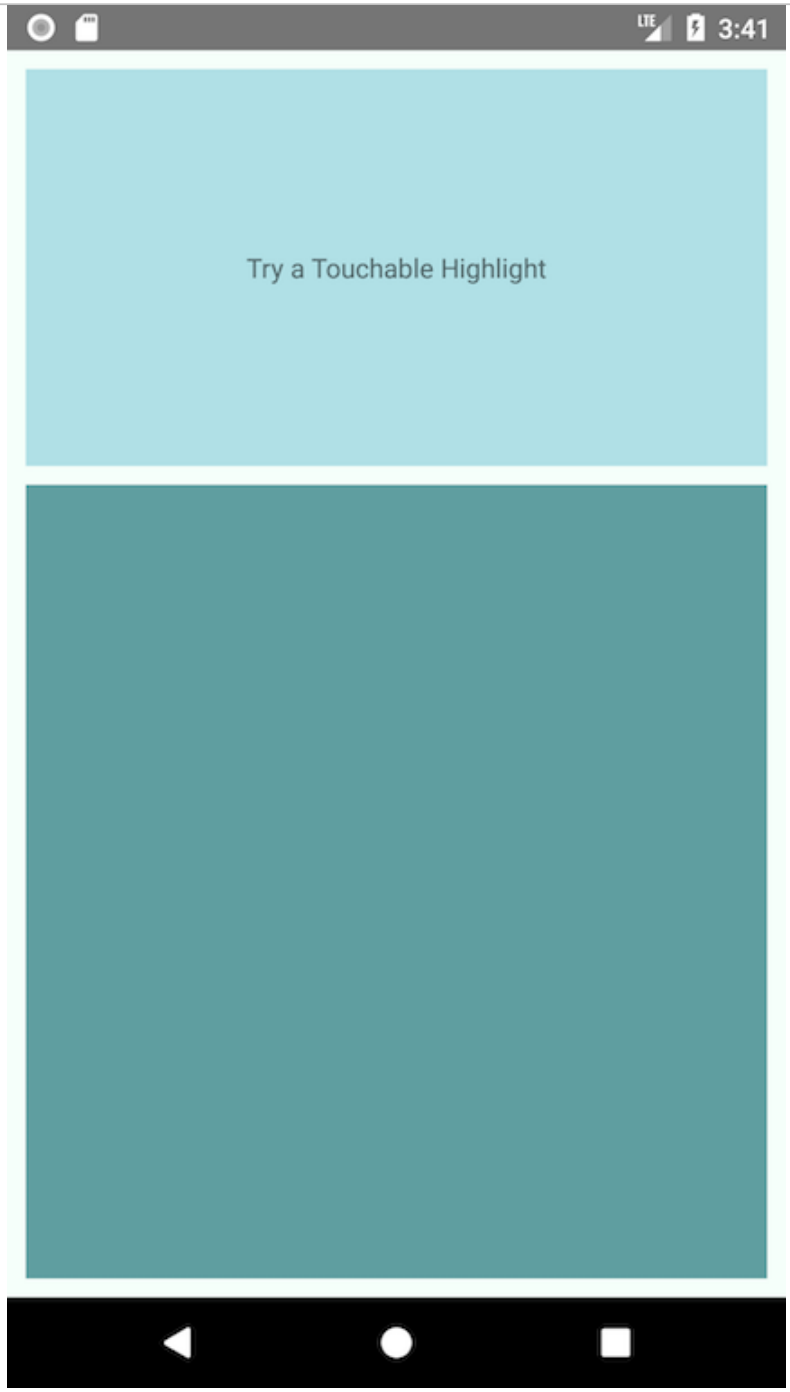
basic buttons



React Native Styles - Buttons

Image - React Native - Styles

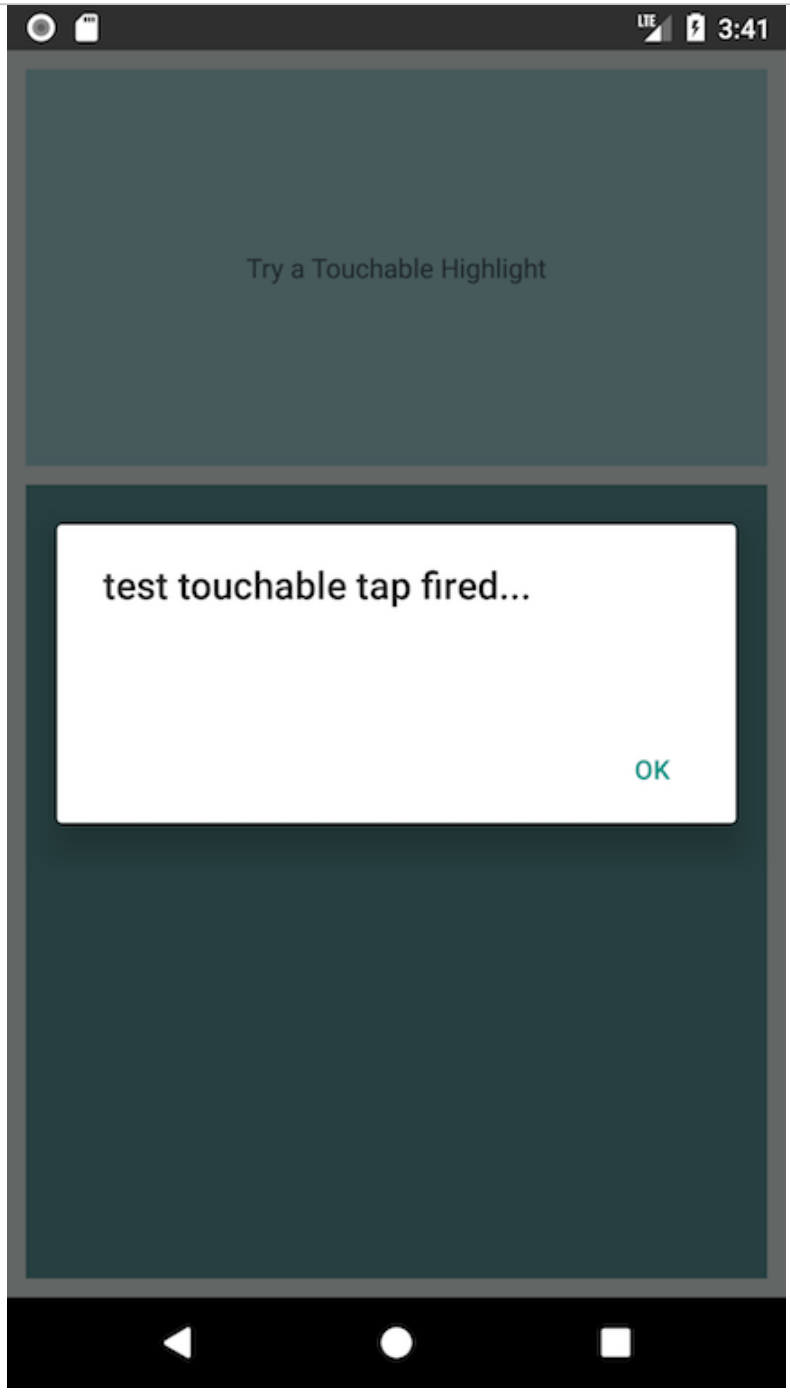
basic touchable



React Native Styles - Touchable

Image - React Native - Styles

basic touchable with alert



React Native Styles - Touchable

React Native - State

intro

- React and React Native manage data using either `props` or `state`
- `props` are set by the parent, and remain immutable for a component's lifetime
- if we need to modify data whilst an app is running, we can use `state`
- React has a distinct pattern to `state` usage
  - *`state` should be initialised in the constructor for a component &c.*
  - *`setState` may then be used to modify and update `state`*

React Native - State

general usage

- use `state` to manage data within an app
  - *from basic UI updates to data from a remote DB or API*
- as the data is updated
  - *we can modify `state` within our app*
- `state` may be managed within a React Native app
  - *or by using containers such as Redux, MobX...*
- *Redux* and *MobX* are predominantly used with React based apps
  - *standalone libraries for state management*
- by introducing a container such as *Redux*
  - *circumvent direct management of `state` with `setState`*
  - *`state` updates rely upon Redux management.*

React Native - State

state usage - example

- basic example of `state` usage and maintenance
  - *may set a static message using `props`*
  - *then update a notification using `state`*

```
// import React, Component module as Component from base React
import React, { Component } from 'react';
// import Text as Text &c. from React Native
import { AppRegistry, Text, View } from 'react-native';

// abstracted component for rendering *tape* text
class Tape extends Component {
  // instantiate object - expects props parameter, e.g. text & value
  constructor(props) {
    // calls parent class' constructor with `props` provided - i.e. uses Component to setup props
    super(props);
    // set initial state - e.g. text is shown
    this.state = { showText: true };

    // set timer for tape output
    setInterval(() => {
      // update state - pass `updater` and use callback (optional for setState)
      // `updater` prevState is used to set state based on previous state
      this.setState(prevState => {
        // setState callback - guaranteed to fire after update applied
        return { showText: !prevState.showText };
      });
    }, 1500);
  }

  // call render function on object
  render() {
    // set display boolean - showText if true, else output blank...
    let display = this.state.showText ? this.props.text : ' ';
    return (
      // output text component with text from props or blank...
      <Text>{display}</Text>
    );
  }
}
```

React Native - State

state usage - example outline - part 1

- define the required imports for React and React Native
  - *including existing components we need for this basic app*
  - *import `AppRegistry`, `Text`, `View` components*
- define our required custom components
  - *one abstracted for broader re-use*
  - *another for use in the current specific app*
- `Tape` class is an abstracted component
  - *used for rendering passed text with a timer*
  - *constructor instantiates an object with passed `props`*
  - *e.g. passed text for rendering*
- in the `Tape` class constructor
  - *`super` is used to call parent class' constructor with `props` provided*
  - *i.e. uses Component to setup props*
- then set the initial `state` on the instantiated object
  - *default to `true` for this component*

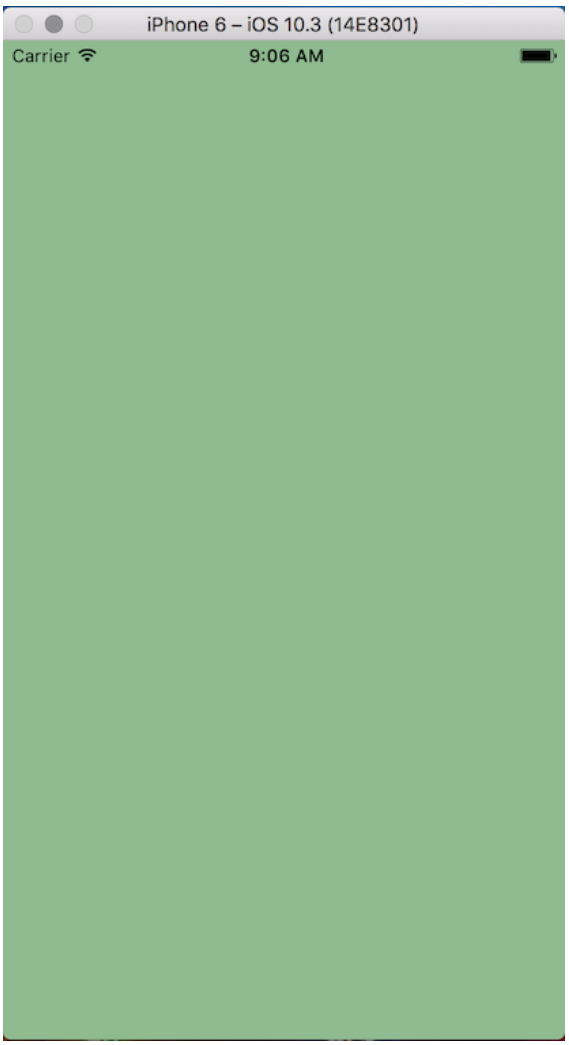
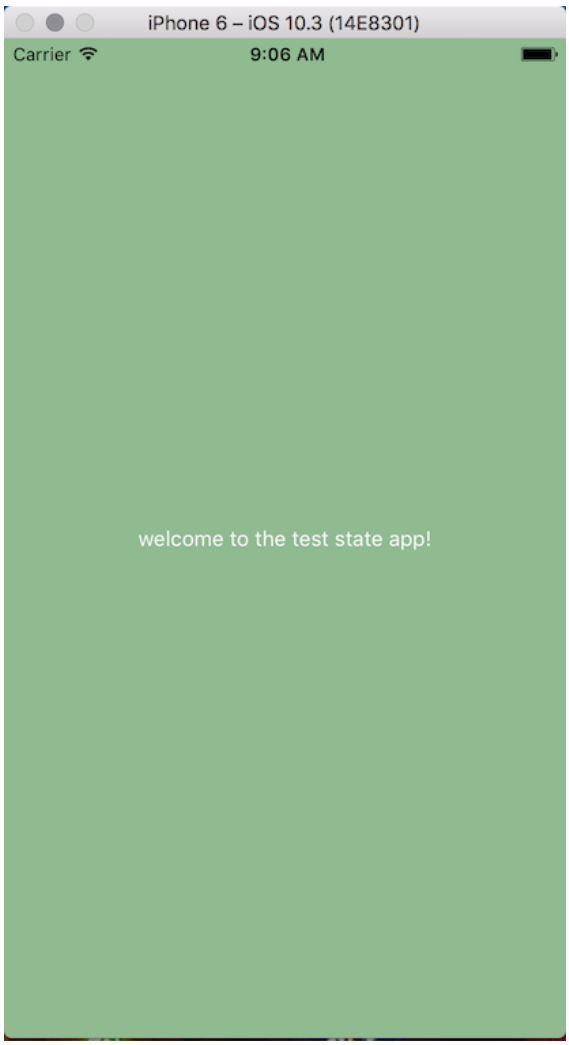
React Native - State

state usage - example outline - part 2

- call the JS function `setInterval()` to create a basic timer
  - *creates the simple UI animation - delay is set to 1500 milliseconds*
- main focus of this function is to modify `state`
  - *this may trigger an update*
- call `setState` on the current object
  - *function is called with a passed `updater` and a callback*
- `prevState` is available for the `setState` function
  - *used to set state based on previous known state*
- `state` itself may not necessarily be triggered immediately
  - *React may delay an update until it has a worthwhile queue*
- we can call an immediate callback as this `setState` is registered
- we simply change the boolean value for `showText`
  - *e.g. false to true, true to false*
- then call the `render()` function on the current object
  - *outputting text passed using `props`*
- simply check the boolean value in `state`
  - *then render a `text` component with `props` text or a blank space*

Image - React Native - State

basic usage

State Off	State On
	

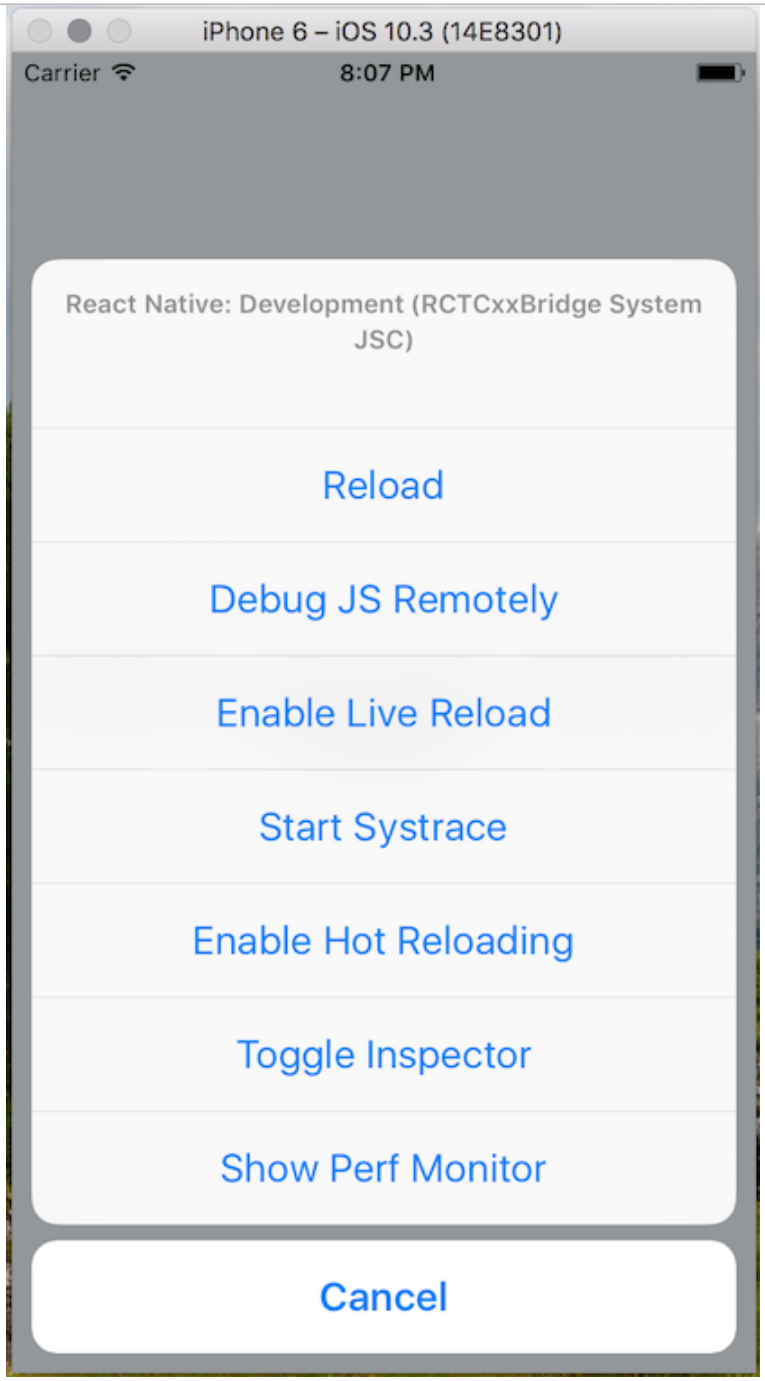
React Native - Debugging an app

Chrome DevTools

- debugging mobile may become problematic, time consuming...
- React Native's *JavaScript* event loop
  - *may be connected to Chrome's DevTools*
  - *DevTools is a quick and useful debugging option*
- use key combinations to show dev menu in simulator
  - *Windows 10* = `Ctrl+D`
  - *OS X* = `Cmd+D`
- various options for testing &c.

Image - React Native - Chrome DevTools

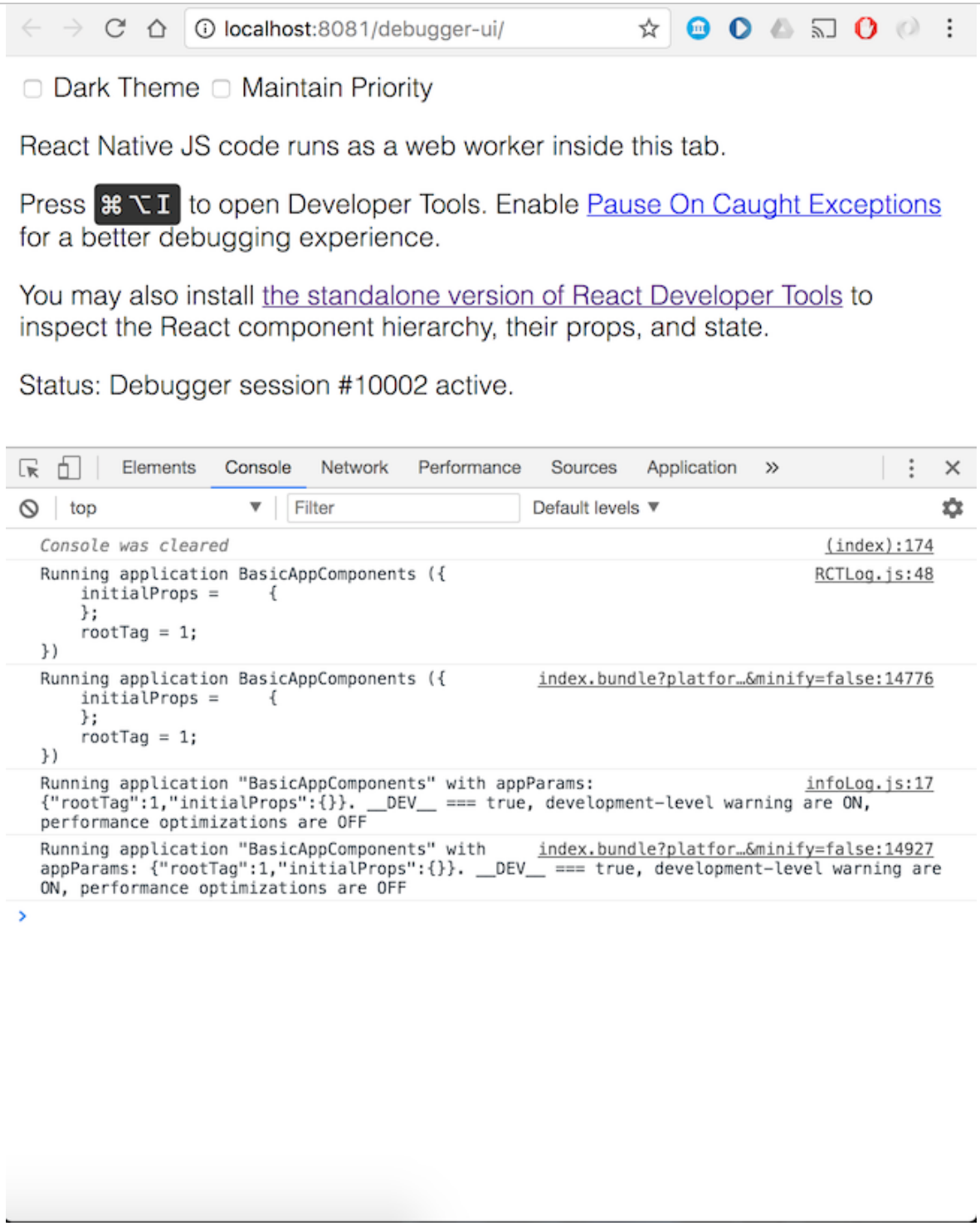
iOS simulator options



react Native Options in iOS Simulator

Image - React Native - Chrome DevTools

developer tools



React Native Debugging in Chrome DevTools

Image - React Native - Debug Options

inspector

React Native Inspector

React JavaScript Library

a React approach to development - part 1

- **unidirectional data flow**
  - *a key concept that React introduced for UI development*
- the UI of an application is now a function of the state of the application
- instead of the need to update the UI directly we can now modify **state**
  - *unlike tradition UI development*
- e.g. in JavaScript we add an eventListener to an element
  - *check for user interaction &c.*
  - *update the UI directly*
- with React we record the event in the UI
  - *then update the state of the component*
- React with then propagate this change to the UI
- it's the change in state that causes components to be updated

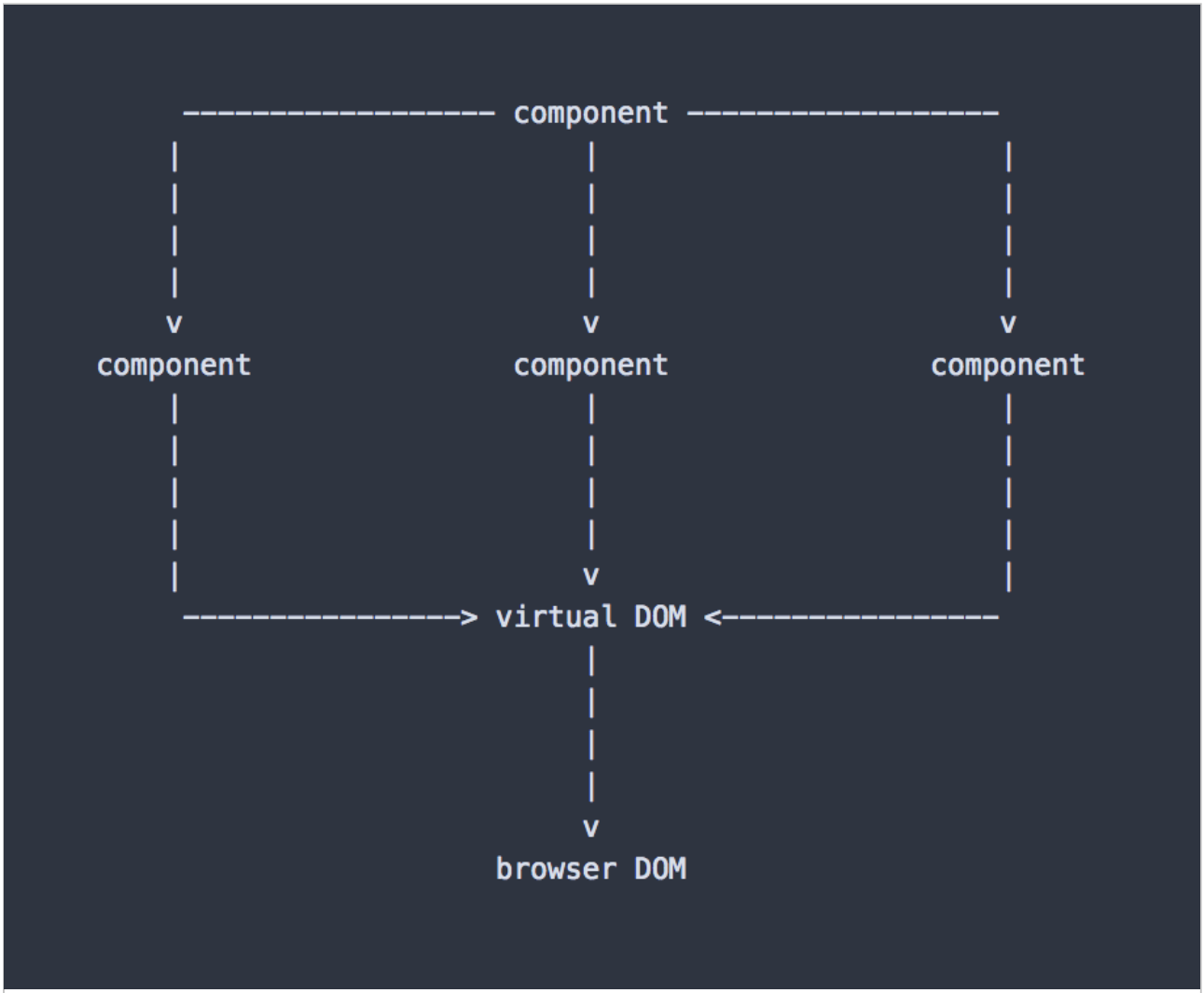
React JavaScript Library

a React approach to development - part 2

- components play a crucial role in React development
- dividing the logic and structure of our UI into **reusable** components
- inherently easier to test and reuse a given component across an application
- **DRY**, or **Don't Repeat Yourself**
  - *becomes key for how we conceive and use components*
- React components also inherently create a declarative pattern and structure
  - *helps with development of these apps*
- useful feedback for the layout and development of an app
  - *tree-like data structure of component usage*
- code inherently becomes easier to read...

React JavaScript Library

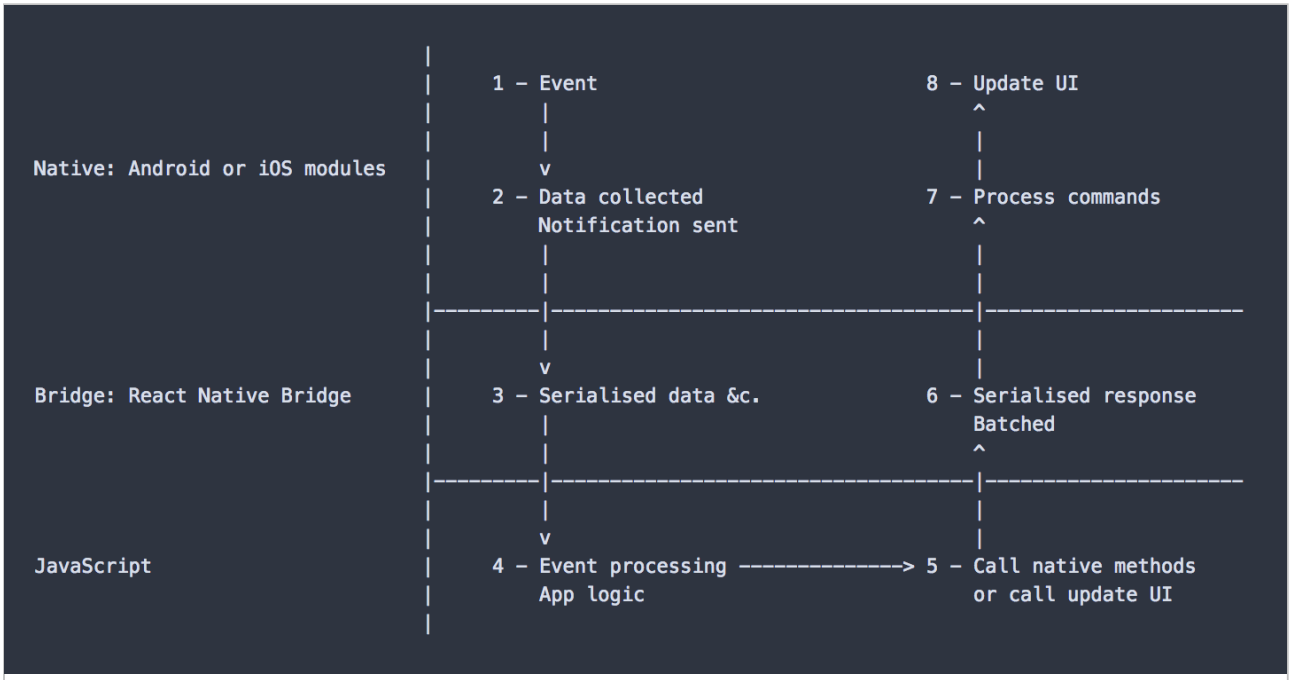
data flow



React Data Flow

Image - React Native - Structure

structural considerations



React Native Structure

React Native - Native APIs and Threading

structural considerations

- a separate Native modules thread
  - *used to access and process Native API requests...*
- e.g. access a device's camera, photos, geolocation, gestures...
- JavaScript layer also has a runtime thread
  - *a JavaScript event loop*
- complex calculations can become expensive in the JavaScript layer
- many, consistent UI updates will also become expensive and drag on perfomance

React JavaScript Library

getting started - part 1

- many different options for using React
- create a new app using React
  - *e.g. Create React App - GitHub*
- add React to an existing app
  - *e.g. using NPM to install React and dependencies*

```
npm init
npm install --save react react-dom
```

- import React into a project using the standard Node `import` options, e.g.

```
import React from 'react';
import ReactDOM from 'react-dom';
```

React JavaScript Library

getting started - part 2

- for earlier versions of React and JSX
  - *pre-compile JSX into JavaScript before deploying our application*
  - *used React's JSXTransformer option to compile and monitor JSX for dev projects*
- as React has evolved over the last year
  - *still use this underlying concept*
  - *Babel in-browser JSX transformer for explicit ES6 support (if required...)*
- Babel will add a check to our app to allow us to use JSX syntax
  - *React code then understood by the browser*
- dynamic transformation works well for most test scenarios
  - *preferable to pre-compile for production apps*
  - *should help to make an app faster for production usage*

React JavaScript Library

JSX - intro

- JSX stands for **JavaScript XML**
  - *follows an XML familiar syntax for developing markup within React components*
- JSX is not compulsory within React
  - *might be omitted due to compile requirements for an app*
- JSX may be useful for an app
  - *it makes components easier to read and understand*
  - *its structure is more succinct and less verbose*
- A few defining characteristics of JSX
  - *each JSX node maps to a function in JavaScript*
  - *JSX does not require a runtime library*
  - *JSX does not supplement or modify the underlying semantics of JavaScript*

React Native

JSX intro and usage

- Facebook considers JSX as a XML-like extension to ECMAScript
  - *without any defined semantics*
  - *NOT intended to be implemented by engines or browsers*
  - *not a proposal to incorporate JSX into the ECMAScript spec itself*
  - *used to transform syntax into standard ECMAScript*
- for React Native
  - *these JavaScript objects are passed to the React Native Bridge*
  - *then translated into native components.*
- e.g. a standard `<Text>` component in JSX may be written as follows

```
<Text style={styles.description}>
  A test React Native app...
</Text>
```

- JSX will then be transpiled by the React Native bridge into the following JavaScript

```
React.createElement(
  Text,
  { style: styles.welcome },
  "A test React Native app..."
);
```

React Native

JSX hierarchies

- benefit of JSX with React Native is its use with hierarchies
  - *such as a standard `<View>` and nested `<Text>` component structure*

```
<View style={styles.container}>
  <Text style={styles.description}>
    A test React Native app...
  </Text>
</View>
```

- transpiled into the following JavaScript

```
React.createElement(
  View,
  null,
  React.createElement(
  Text,
  { style: styles.welcome },
  "A test React Native app..."
  )
);
```

React Native

JSX children

- a primary feature of JSX with React Native
  - *option to pass children to a React component*
  - *enables effective component composition*
- seen regularly with hierarchy composition
  - *e.g. hierarchy of `<View>` and `<Text>`*

```
<View style={styles.container}>
  <Text style={styles.description}>
    A test React Native app...
  </Text>
</View>
```

- we may create a simple component and encapsulate this structure

```
class Container extends Component {
  render() {
    return (
      <View style={styles.container}>{ this.props.children }</View>
    )
  }
}
```

- then reuse this component as necessary

```
<Container>
  <Text style={styles.description}>
    A test React Native app...
  </Text>
</Container>
```

JSX props and children

- seen example usage of props with styles, data, and now *children*
- as we pass a standard prop, such as `style`
  - *passing a property to the defined React component*
- property is accessible inside this component using the standard syntax

```
this.props.propName
```

- as we define a component
  - *children is default prop React passes to this component for the hierarchy*
  - *becomes the component reference for any children in this hierarchy*

```
this.props.children
```

React JavaScript Library

JSX - benefits

- why use JSX, in particular when it simply maps to JavaScript functions?
- many of the inherent benefits of JSX become more apparent
  - *as an application, and its code base, grows and becomes more complex*
- benefits can include
  - *a sense of familiarity - easier with experience of XML and DOM manipulation*
  - *eg: React components capture all possible representations of the DOM*
  - *JSX transforms an application's JavaScript code into semantic, meaningful markup*
  - *permits declaration of component structure and information flow using a similar syntax to HTML*
  - *permits use of pre-defined HTML5 tag names and custom components*
  - *easy to visualise code and components*
  - *considered easier to understand and debug*
  - *ease of abstraction due to JSX transpiler*
  - *abstracts process of converting markup to JavaScript*
  - *unity of concerns*
  - *no need for separation of view and templates*
  - *React encourages discrete component for each concern within an application*
  - *encapsulates the logic and markup in one definition*

JSX - composite components

- example React component might allow us to output a custom heading

```
class OutputHeading extends Component {
  render() {
    return (
      // render passed props `output` value, pass heading size...
      <Text style={this.props.style}>{this.props.output}</Text>
    );
  }
}
```

- currently return a standard `Text` component
- now update this example to work with dynamic values
- JSX considers values dynamic if they are placed between curly brackets `{..}`
  - *treated as JavaScript context*

```
<OutputHeading output='Component Heading Tester' style={styles.heading3} />
```

JSX - conditionals

- a component's markup and its logic are inherently linked in React
- this naturally includes *conditionals*, *loops*...
- adding `if` statements directly to JSX will create invalid JavaScript

1. ternary operator

```
...
this.state.isComplete ? 'is-complete' : ''
...
```

2. variable

```
getIsComplete: function() {
  return this.state.isComplete ? 'is-complete' : '';
},
render() {
  var isComplete = this.getIsComplete();
  return (
    <Test complete={isComplete}>...</Test>
  );
}
```

3. function call

```
getIsComplete: function() {
  return this.state.isComplete ? 'is-complete' : '';
},
render() {
  return (
    <Test complete={this.getIsComplete()}>...</Test>
  );
}
```

- to handle React's lack of output for *null* or *false* values
  - *use a boolean value and follow it with the desired output*

JSX - special considerations for attributes - part 1

- in JSX, there are special considerations for attribute
  - `key`
  - `ref`

1. `key`

- an optional unique identifier that remains consistent throughout render passes
- informs React so it can more efficiently select when to reuse or destroy a component
- helps improve the rendering performance of the application.
- eg: if two elements already in the DOM/View need to switch position
  - *React is able to match the keys and move them*
  - *does not require unnecessary re-rendering of the complete DOM/View*

JSX - special considerations for attributes - part 2

2. `ref`

- `ref` permits parent components to easily maintain a reference to child components
  - *available outside of the render function*
- to use `ref`, simply set the attribute to the desired reference name

```
render() {
  return (
    <TextInput ref='myInput' ... />
  );
}
```

- able to access this `ref` using the defined `this.refs.myInput`
  - *access anywhere in the component*
  - *object accessed through this `ref` known as a backing instance*
- **NB:** not the actual DOM/View
  - *a description of the component React uses to create the view when necessary*

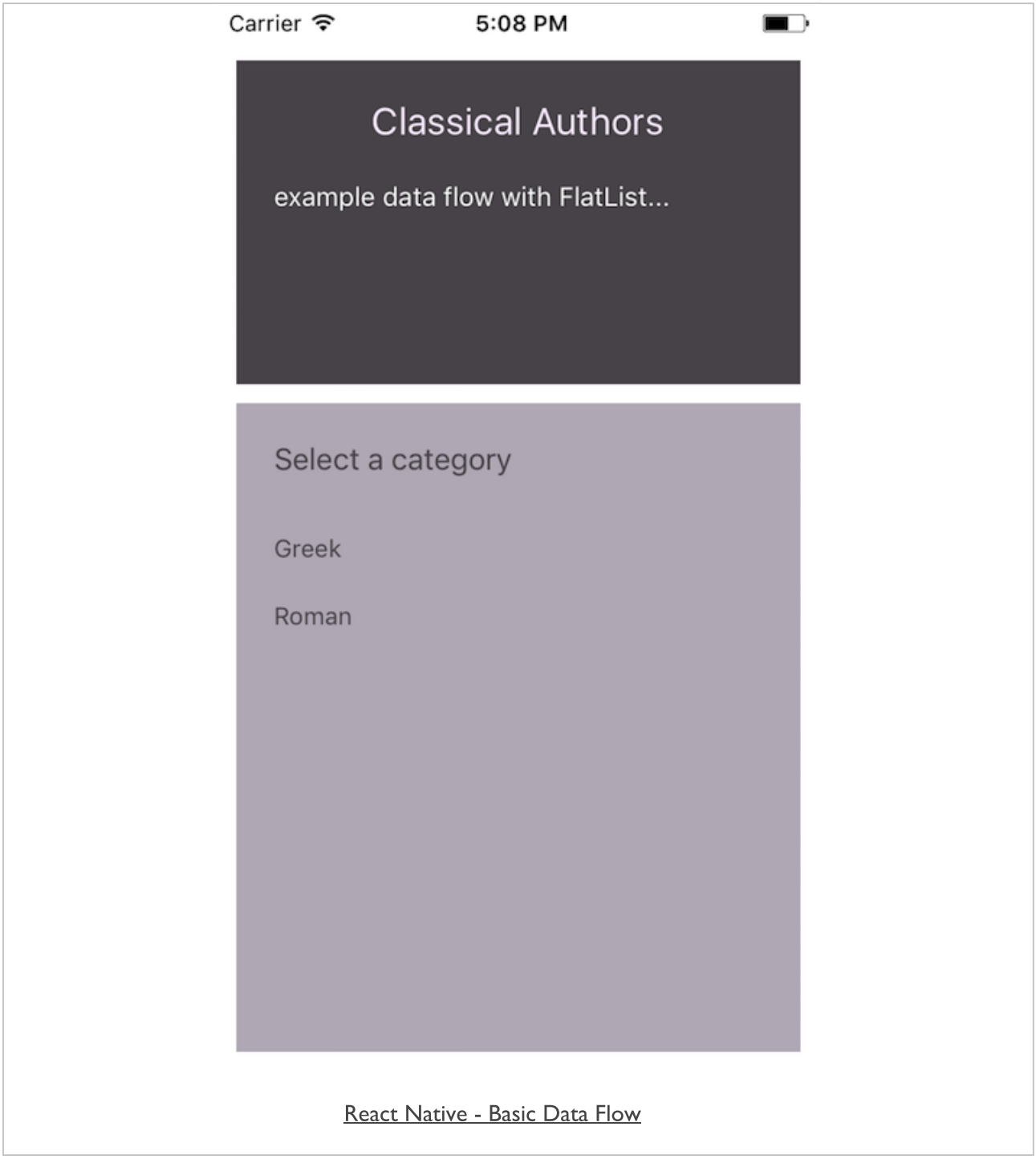
React JavaScript Library

data flow

- data flows in one direction in React
  - *namely from **parent to child***
- helps to make components nice and simple, and predictable as well
- components take *props* from the parent, and then render
- if a *prop* has been changed, for whatever reason
  - *React will update the component tree for that change*
  - *then re-render any components that used that property*
- Internal state also exists for each component
  - *state should only be updated within the component itself*
- we can think of data flow in React
  - *in terms of* `props` *and* `state`

Image - React Native - Data Flow

basic data flow with FlatList



React Native - Basic Data Flow

React Native - Data Flow

basic data flow with FlatList - example

```
// custom abstracted component - expects props for list data...
class ListClassics extends Component {
  render() {
    return (
      <FlatList
        data={this.props.data}
        renderItem={({item}) => <Text style={styles.listItem}>{item.key}</Text>}
      />
    );
  }
}

// default component - use View container, render list &c. with passed props...
export default class DataFlow extends Component {
  render() {
    let classics = [{ key: 'Greek'}, {key: 'Roman'}];
    return (
      <View style={styles.container}>
        <View style={styles.headingBox}>
          <Text style={styles.heading1}>
            {intro.heading}
          </Text>
          <Text style={styles.content}>
            {intro.description}
          </Text>
        </View>
        <View style={styles.listBox}>
          <ListClassics data={classics} />
        </View>
      </View>
    );
  }
}
```

data flow - `props` - part I

- `props` can hold any data and are passed to a component for usage
- set `props` on a component during instantiation

```
let classics = [{ key: 'Greek'}, {key: 'Roman'}];
<ListClassics classics={classics}/>
```

- also use the `setProps` method on a given instance of a component

```
var ListClassics = React.createClass({
  render: function() {
    return (
      <li className="classic">{this.props.classics}</li>
    );
  }
});

var classics = [{ key: 'Greek'}];
var listClassics = React.render (
  <ListClassics/>,
    document.getElementById('example')
);

listClassics.setProps({ classics: classics });
```

data flow - `setNativeProps`

- React Native has a similar option called `setNativeProps`
- React.js may directly manipulate a DOM node
- likewise, we may need to directly modify or maniupulate a mobile app
- React Native documentation recommend such usage as follows,

> *Use setNativeProps when frequent re-rendering creates a performance bottleneck*

- not recommended for frequent use
- we may need to use it for
  - *regular animation updates*
  - *form management*
  - *graphics...*
- use with care

data flow - `setNativeProps` example

- define function for `clearTextInput`

```
clearTextInput = () => {
    this._textInput.setNativeProps({text: ''});
  }
```

- call `clearTextInput()` function on touch press

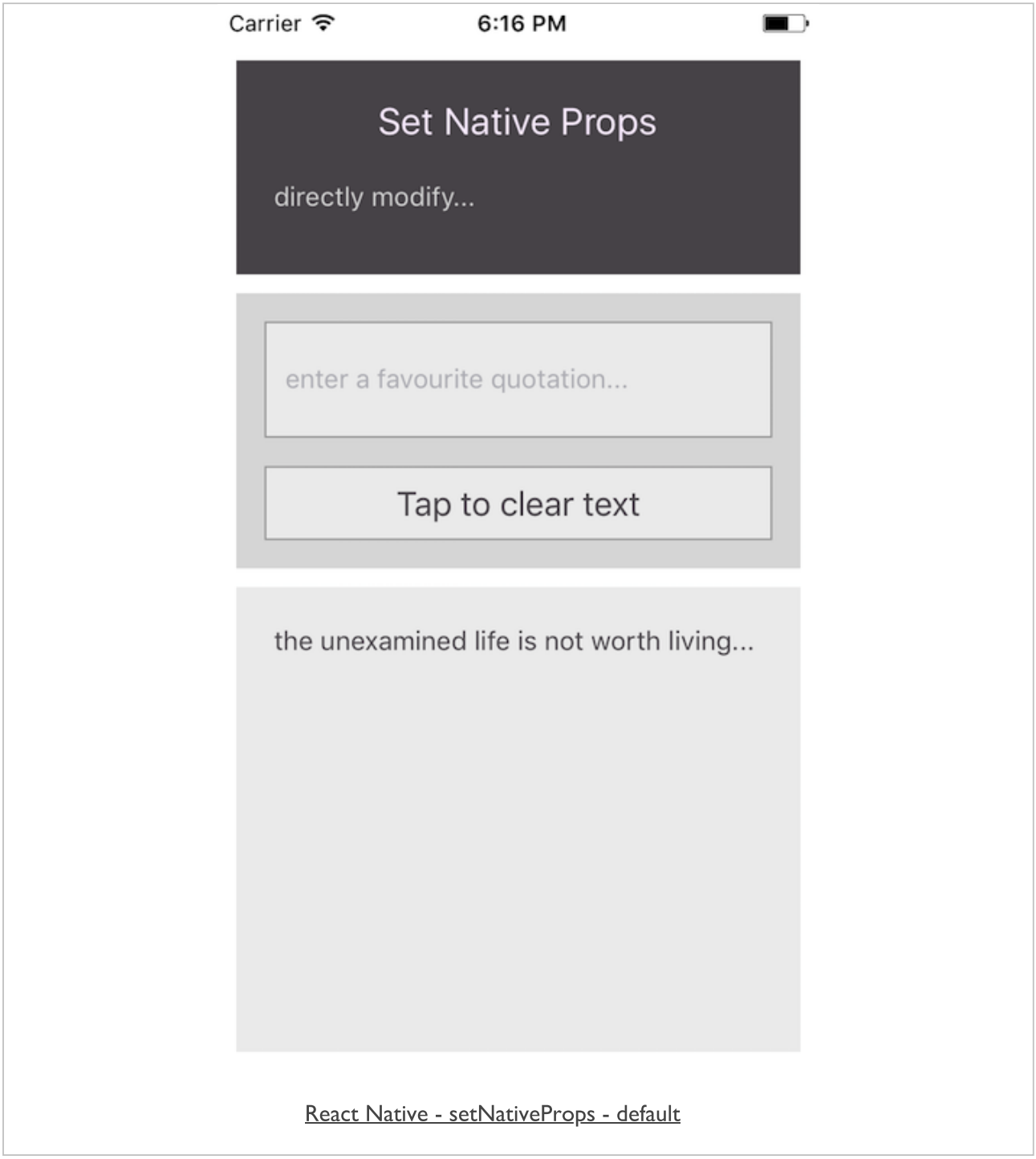
```
<Button
    onPress={this.clearTextInput}
    title='Tap to clear text'
  color='#585459'
/>
```

- add TextInput component and define reference

```
<TextInput
  //arrow function call to set value to current component...
  ref={component => this._textInput = component}
  style={styles.textInput}
  placeholder={this.state.quoteInput}
  onChangeText={(quoteText) => this.setState({quoteText})}
  selectionColor='#585459'
/>
```

Image - React Native - Data Flow

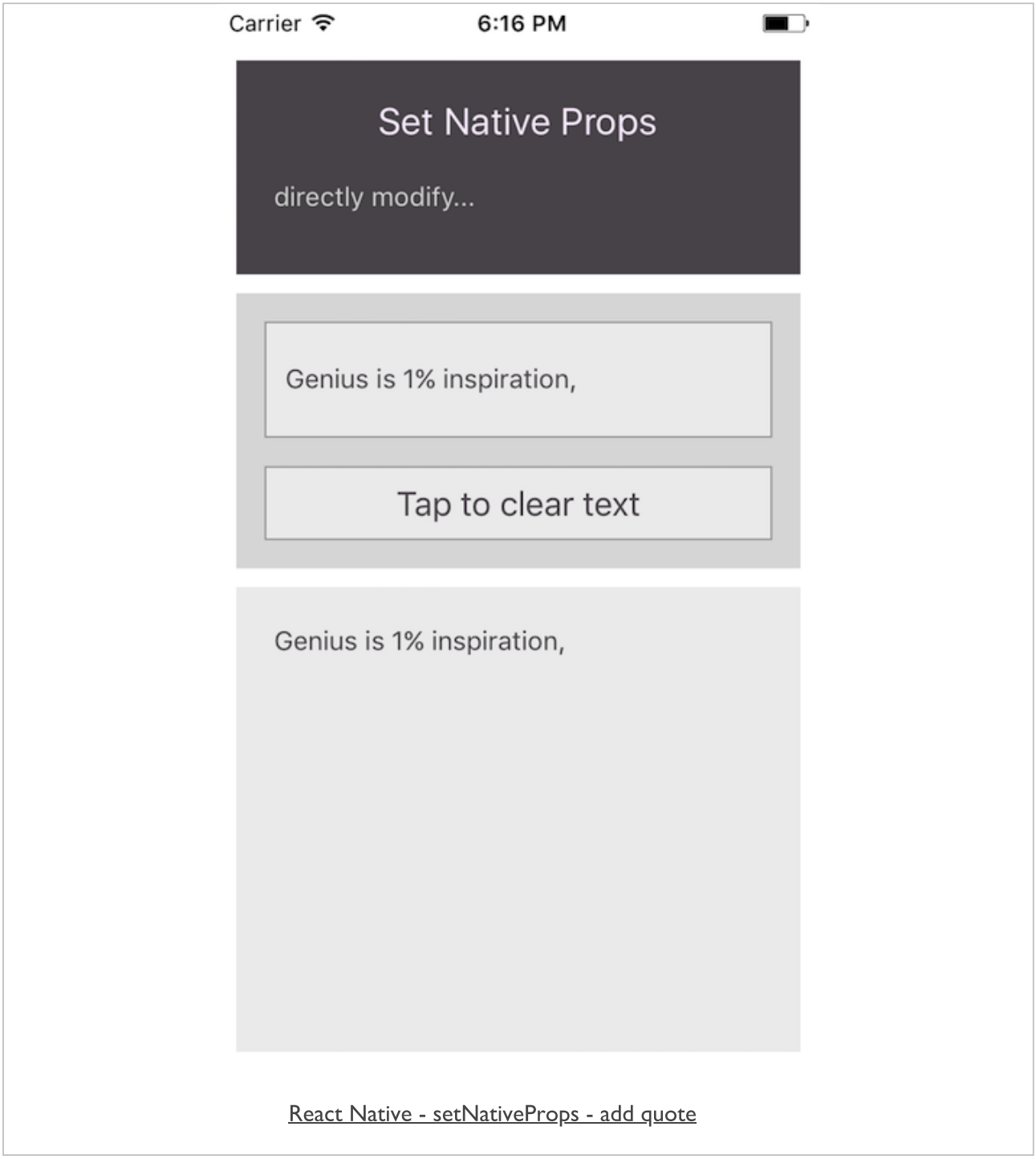
`setNativeProps` example - default



React Native - setNativeProps - default

Image - React Native - Data Flow

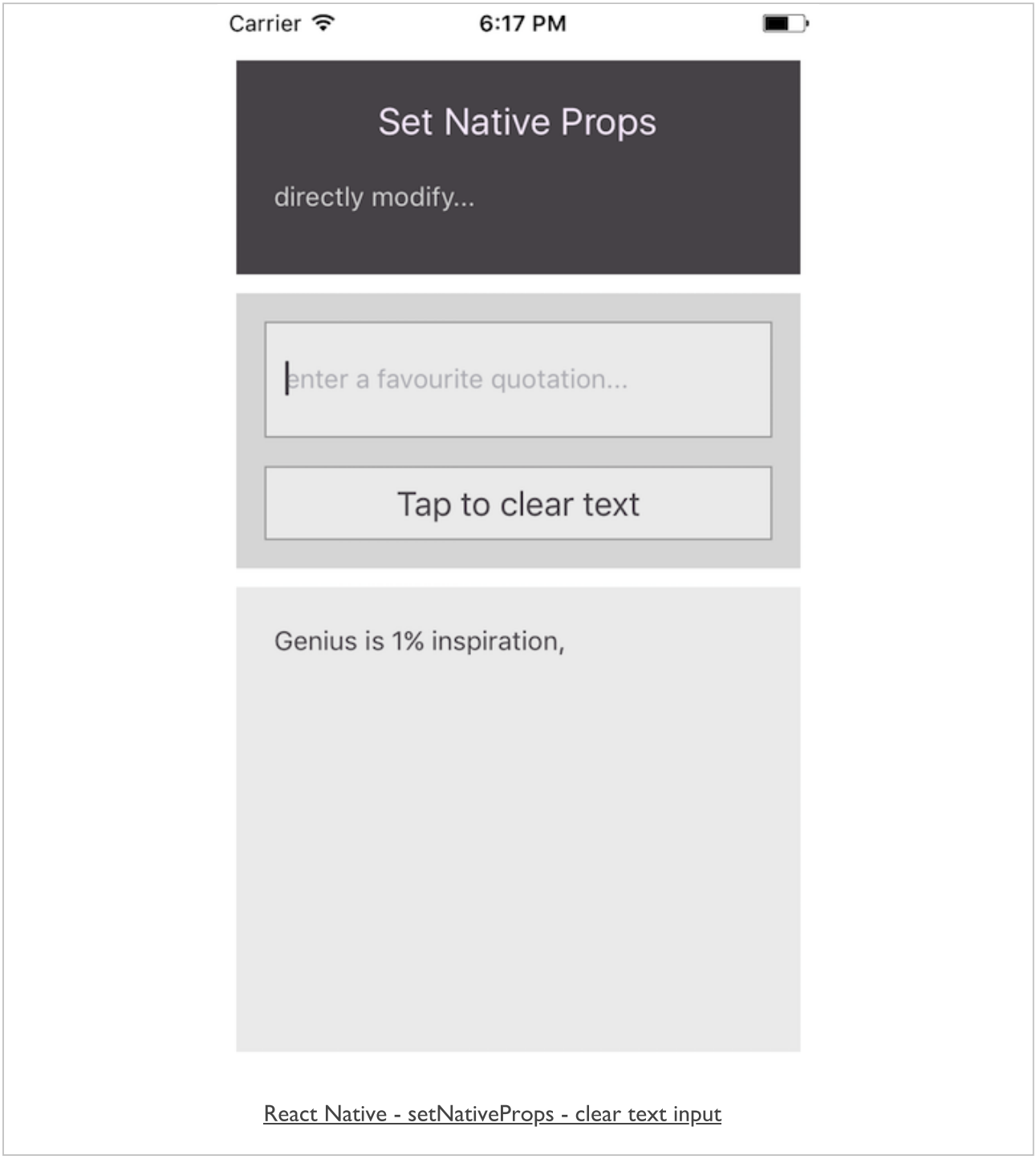
`setNativeProps` example - add quote



React Native - setNativeProps - add quote

Image - React Native - Data Flow

`setNativeProps` example - clear text input



React Native - setNativeProps - clear text input

Extra notes - Cordova, JS, React Native...

lots of extra notes on course website and GitHub Notes repository,

- https://github.com/csteach422/notes/

including,

- Cordova
- CSS
- Data store - incl. MongoDB and updates with Firebase
- design
- HTML & HTML5
- JS - incl. intro, core, logic, async...
- JS patterns
- React Native
- various - incl. Git & Heroku, Heroku & MongoDB

plus more notes will be added on Cordova, React Native, data stores, API usage...

...& see source code examples in the course's **source** repository on GitHub,

- https://github.com/csteach422/source/

References

- Cordova API docs
  - *config.xml*
  - *Globalization*
  - *Hooks*
  - *Merges*
  - *Network Information*
- React Native
  - *MDN - super*
  - *React JS - Component Lifecycle*
  - *React JS - `componentDidUpdate`*
  - *React JS - `shouldComponentUpdate`*
  - *React Native - Layout Props*