

Mobile Dev 2

CS571: Building User Interfaces

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Today's Warmup

- Set back and relax! :)
- We'll try our in-class exercise through "Expo Snacks" today instead of downloading starter code.

Learning Objectives

1. Be able to create a scrollable interface.
2. Be able to create generic custom components.
3. Be able to perform animations.
4. Be able to provide for navigation.

How can I display more?

Introducing the `ScrollView`.

ScrollView

Like a `View`, but scrollable! Make sure that it is in a view that is flex-ible.

```
<View style={{flex: 1}}>  
  <ScrollView>  
    { /* A bunch of content here! */ }  
  </ScrollView>  
</View>
```

Snack Solution

Card

React Native does not have the concept of a "card"...

1. Use a third-party library like `react-native-paper`.
2. Create our own component!

Some Card

Some Card

Some Card

Some Card

Card

```
export default function BadgerCard(props) {  
  return <Pressable onPress={props.onPress}>  
    <View style={[styles.card, props.style]}>  
      {props.children}  
    </View>  
  </Pressable>  
}
```

Pressable | React Native Paper Card

Card

Adding in the `styles.card` ...

```
const styles = StyleSheet.create({  
  card: {  
    padding: 16,  
    elevation: 5,  
    borderRadius: 10,  
    backgroundColor: 'slategray',  
  }  
})
```


Card

Using the BadgerCard...

```
function App() {  
  return <View style={styles.main}>  
    <BadgerCard  
      onPress={() => Alert.alert("Hello", "World!")}  
      style={{backgroundColor: "red"}}  
    >  
      <Text>Testing Custom Card</Text>  
    </BadgerCard>  
  </View>  
};
```

Adding Gestures

```
export default function BadgerCard(props) {  
  return <Pressable  
    onPress={props.onPress}  
    onLongPress={props.onLongPress}  
  >  
    <View style={[styles.card, props.style]}>  
      {props.children}  
    </View>  
  </Pressable>  
}
```

Snack Solution

Animations

Providing *feedback* in a *visually aesthetic* way.

Animations using **Animated**

We must specify *what* we want to animate, and *how* we want to animate it.

```
import { Animated } from 'react-native'
```



[Animated Docs](#)

Animated : Choosing *What*

Animated provides animations for...

- View
- Text
- Image
- ScrollView

... e.g. `<Animated.View>{/* ... */}</Animated.View>`

Animated : Choosing *What*

```
<Animated.View style={{ opacity: op }}>  
  <Image  
    style={styles.pic}  
    source={{  
      uri: props.img,  
    }}></Image>  
  <Text>{props.name}</Text>  
</Animated.View>
```

Could apply the animation to the **Image** and **Text** individually, or wrap both in a **View**.

Animated : Choosing *How*

A much more complicated question!

- Do I want the component to fade in?
- Do I want the component to grow in size?
- Do I want the component to bounce around?
- Do I want to do a combination of these things?
 - Do I want to do it in sequence?
 - Do I want to do it in parallel?

Animated : Choosing *How*

Also consider...

- When should it be triggered?
 - On component load?
 - On button press?
 - On gesture?
- How long should it last?
 - Can it be started or stopped?

Expo Snack

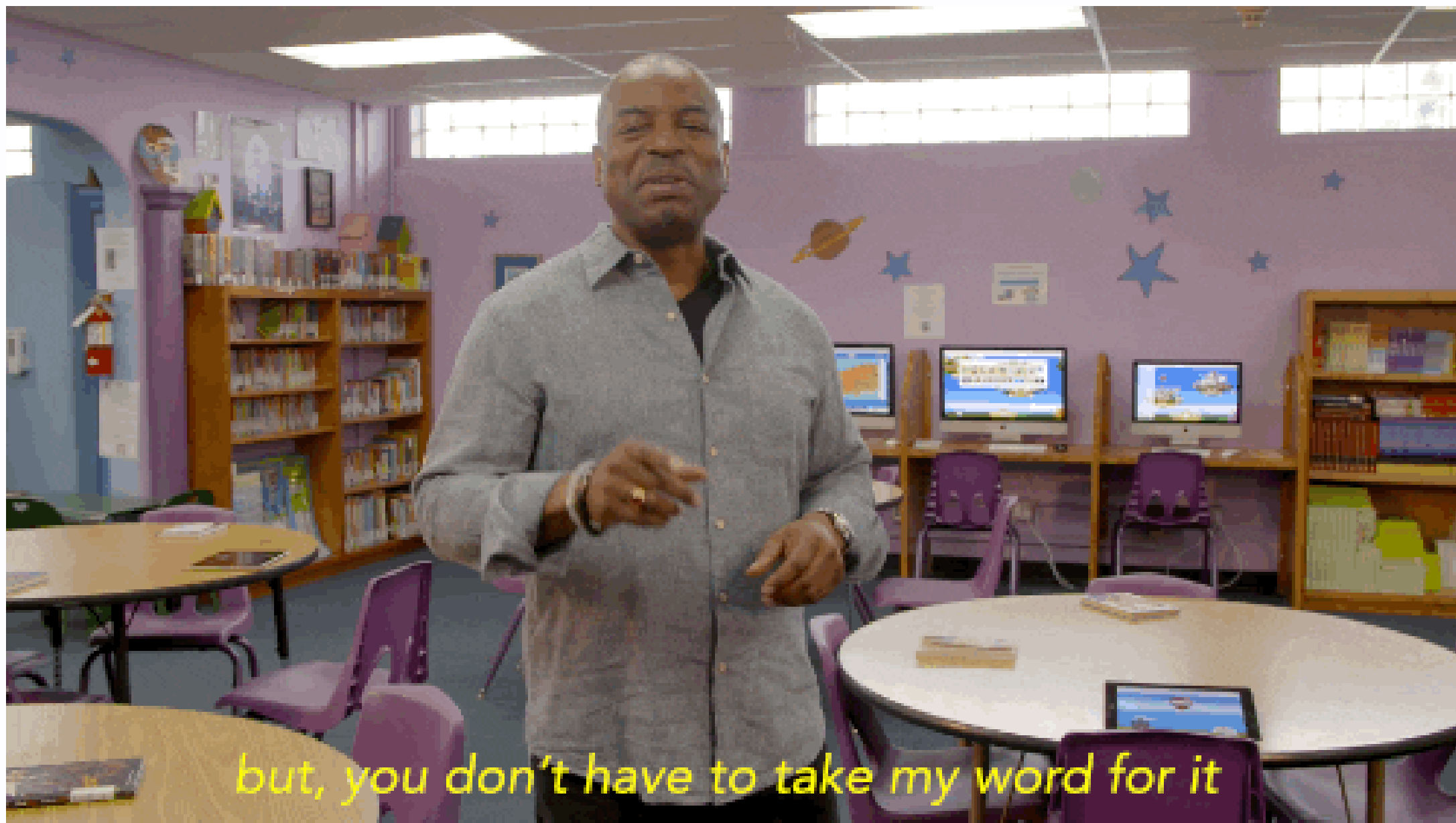
Animated

`Animated.Value` is used in combination with `useRef`.

```
const opVal = useRef(new Animated.Value(0))
```

To run this animation...

```
useEffect(() => {  
  Animated.timing(opVal.current, {  
    toValue: 1,  
    duration: 10000,  
    useNativeDriver: true  
  }).start() // don't forget this!  
}, [])
```



What does this do?

```
Animated.timing(opVal.current, {  
  toValue: 1,  
  duration: 10000, // in ms  
})
```

Increases the `Animated.Value` stored within `opVal` from 0 to 1 over 10 seconds.

What does this do?

```
Animated.timing(opVal.current, {  
  toValue: 1,  
  duration: 10000, // in ms  
  useNativeDriver: true  
})
```

Uses the animation libraries *native* to Android/iOS as opposed to JavaScript calculated values.

Cannot be done for animations like increasing size!

What does this do?

```
Animated.timing(opVal.current, {  
  toValue: 1,  
  duration: 10000, // in ms  
  useNativeDriver: true  
}).start()
```

Starts the animation.

What does this do?

```
Animated.timing(opVal.current, {  
  toValue: 1,  
  duration: 10000, // in ms  
  useNativeDriver: true  
}).start((finished) => {  
  // TODO I'm done!  
})
```

Optional: Run a function on animation completion.

What does this do?

```
useEffect(() => {  
    Animated.timing(opVal.current, {  
        toValue: 1,  
        duration: 10000,  
        useNativeDriver: true  
    }).start() // don't forget this!  
}, [])
```

We know what `useEffect` does!

Runs the animation on component load.

What does this do?

```
const opVal = useRef(new Animated.Value(0))
```

Creates a *reference* to `Animated.Value`. Can be referred to with `opVal.current`.

Notice: This is *not* a state variable! A change to `opVal`'s referenced value will not trigger a re-render. In fact, animations **occur outside of React**.

Animated

Can control many animations using...

- `Animated.parallel`
- `Animated.sequence`
- `Animated.loop`

`start()` and `stop()` apply to the set of animations

In parallel...

```
useEffect(() => {
  Animated.parallel([
    Animated.timing(height.current, {
      toValue: 800,
      duration: 10000,
      useNativeDriver: false, // cannot use native driver for height/width!
    }),
    Animated.timing(width.current, {
      toValue: 500,
      duration: 10000,
      useNativeDriver: false,
    })
  ]).start()
}, []);
```

In sequence...

```
useEffect(() => {
  Animated.sequence([
    Animated.timing(sizeVal.current, {
      toValue: 500,
      duration: 10000,
      useNativeDriver: false,
    }),
    Animated.timing(sizeVal.current, {
      toValue: 0,
      duration: 10000,
      useNativeDriver: false,
    })
  ]).start()
}, []);
```

In loop...

```
useEffect(() => {
  Animated.loop( // not an array!
    Animated.sequence([
      Animated.timing(sizeVal.current, {
        toValue: 500,
        duration: 10000,
        useNativeDriver: false,
      }),
      Animated.timing(sizeVal.current, {
        toValue: 0,
        duration: 10000,
        useNativeDriver: false,
      })
    ])
  ).start()
}, []);
```

Animated Demo

Expo Snack

Animated

You cannot *directly* add/subtract/multiply/divide `Animated.value` . Instead, you must use...

- `Animated.add(v1, v2)`
- `Animated.subtract(v1, v2)`
- `Animated.multiply(v1, v2)`
- `Animated.divide(v1, v2)`

Animated

e.g. start at 50 and grow from there.

```
<Animated.View
  style={{
    backgroundColor: "blue",
    height: Animated.add(height.current, 50),
    width: Animated.add(width.current, 50)
  }}>
</Animated.View>
```

Your turn!

Take [this snack](#) and make it so that the Badgers fade in as they are added.

Hint: Only change the `Badger` component.

[Expo Solution](#)

Navigation in React Native

A more mobile-centric library.

React Navigation Alternatives

React Native is a framework* but still lacks support for things like navigation.

- [React Router](#) previously!
- [React Navigation](#) new!
- `return isHome ? <HomeScreen> : <SettingsScreen>`

React Navigation

We will use...

- Tab Navigation: `@react-navigation/bottom-tabs`
- Drawer Navigation: `@react-navigation/drawer`
- Stack Navigation: `@react-navigation/native-stack`

...others exist!

Navigation Basics

- Must be nested inside of a `NavigationContainer`
- Create navigators via a function `createNAVIGATOR()`
e.g. `createBottomTabNavigator()`
- Navigators consist of a *navigator* and a set of *screens*

```
<NavigationContainer>  
  <SomeNav.Navigator>  
    <SomeNav.Screen name="Bookstore" component={BookstoreScreen}/>  
    <SomeNav.Screen name="Book" component={BookScreen}/>  
  </SomeNav.Navigator>  
</NavigationContainer>
```

Navigation Basics

- `useNavigation` is a custom React hook that can be used to help us navigate
 - Supports `navigate`, `reset`, `goBack` among others
- Information can be passed from screen to screen via *route params* (see Native Stack Navigator example)
- Navigators can be styled
- Navigators can be nested

Tab Navigation

```
const SocialTabs = createBottomTabNavigator();

<NavigationContainer>
  <SocialTabs.Navigator>
    <SocialTabs.Screen name="NewsFeed" component={NewsFeedScreen}/>
    <SocialTabs.Screen name="Notifications" component={NotificationScreen}/>
    <SocialTabs.Screen name="AboutMe" component={AboutMeScreen} />
  </SocialTabs.Navigator>
</NavigationContainer>
```

Expo Snack Solution

Drawer Navigation

```
const SocialDrawer = createDrawerNavigator();

<NavigationContainer>
  <SocialDrawer.Navigator>
    <SocialDrawer.Screen name="NewsFeed" component={NewsFeedScreen}/>
    <SocialDrawer.Screen name="Notifications" component={NotificationScreen}/>
    <SocialDrawer.Screen name="AboutMe" component={AboutMeScreen} />
  </SocialDrawer.Navigator>
</NavigationContainer>
```

Expo Snack Solution

Stack Navigation

```
const BadgerStack = createNativeStackNavigator();

<NavigationContainer>
  <BadgerStack.Navigator>
    <BadgerStack.Screen name="People" component={AllBadgersScreen}/>
    <BadgerStack.Screen name="Person" component={SpecificBadgerScreen}/>
  </BadgerStack.Navigator>
</NavigationContainer>
```

Expo Snack Solution

Stack Navigation

Can push a screen onto the history stack via
`navigation.push(screenName, params)`

- `screenName` is the name of the screen to navigate to, e.g. `Book`
- `params` is an optional object of parameters *sent* to the receiving screen.
- `params` is *received* as `props.route.params`

Nested Navigation

- Navigators can be nested.
 - Stack in Tabs
 - Stack in Drawer
 - Stack in Tabs in Drawer (e.g. Example Below)
 - Stack in Stack in Tabs
 - Stack in Stack in Stack in Stack in Stack
- Make use of the `headerShown` option!

Expo Snack Solution

Questions?