

Mobile Dev 3

CS571: Building User Interfaces

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Today's Warmup

- Again, we'll fork an existing snack for our in-class exercise! :)
- Download and import [today's Postman collection](#)!
- Replace `ENTER_YOUR_BID` with your Badger ID.
- Toy around with it! What's different from the HW6 API? Also, [read the docs](#).

What will we learn today?

1. Be able to provide for richer navigation, including data passing, switch navigation, modals, and dynamically-loaded lists.
2. Be able store and send secrets using mobile devices.
3. Be able to tap into advanced mobile features such as sensors, gestures, and animations.
4. Be able to build and deploy your application.

A Quick Note on Accessibility

1. Logically group elements with an `accessible` prop.
2. Provide `accessibilityLabel` (primary information) and `accessibilityHint` (auxiliary information) for each of these elements.
3. Make other considerations: color contrast, reliance on gestures and visual cues, among other [W3 recommendations](#).
4. Test it yourself! Use VoiceOver or TalkBack.

[Read the full documentation here.](#)

Richer Navigation

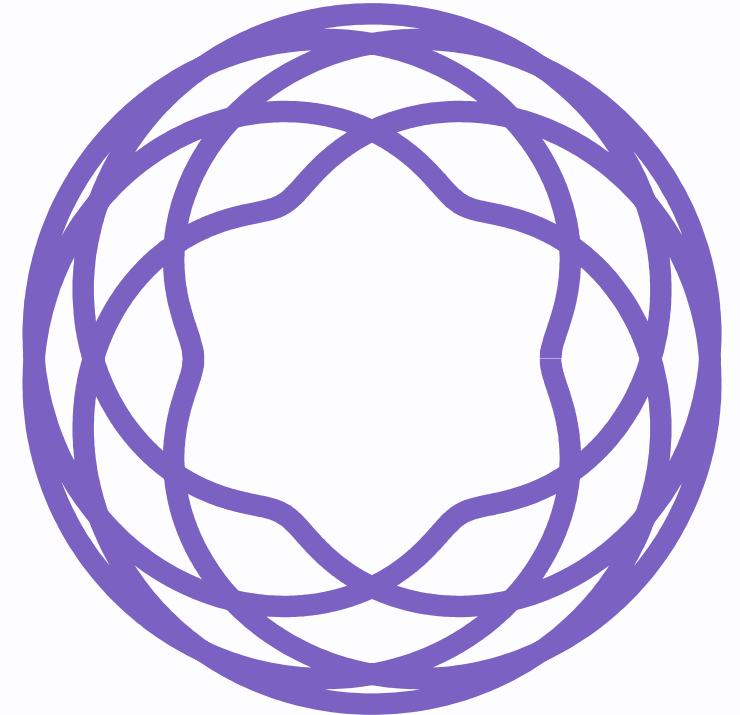
React Navigation

Last time we covered...

- Stack Navigation
- Tabs Navigation
- Drawer Navigation

How do we pass data down?

- Using context
- Using **render callbacks**



Passing Data Down

Problem: Create a drawer with many tools in it.

```
const [tools, setTools] = useState([
  { name: 'Hammer', weight: 2, dangerous: false },
  { name: 'Screwdriver', weight: 1, dangerous: false },
  { name: 'Sawzall', weight: 6, dangerous: true }
]);
```

Hammer

Screwdriver

Sawzall

Passing Data Down

Displaying the tool data.

```
export default function ToolScreen(props) {  
  return <View>  
    <Text>I am a {props.name}</Text>  
    <Text>I weigh {props.weight} pounds</Text>  
    {  
      props.dangerous ?  
        <Text>I am dangerous</Text> :  
        <Text>I am not dangerous</Text>  
    }  
  </View>  
}
```



sawzall

I am a sawzall

I weigh 6 pounds

I am dangerous

Creating Navigator

```
<NavigationContainer>  
  <ToolDrawer.Navigator>  
    <ToolDrawer.Screen name="Landing" component={LandingScreen}/>  
    <ToolDrawer.Screen name="Hammer" component={ToolScreen}/>  
    <ToolDrawer.Screen name="Screwdriver" component={ToolScreen}/>  
    <ToolDrawer.Screen name="Sawzall" component={ToolScreen}/>  
  </ToolDrawer.Navigator>  
</NavigationContainer>
```

- ✗ hardcoding tool names
- ✗ not passing tool data

Snack Example

```
<NavigationContainer>
  <ToolDrawer.Navigator>
    <ToolDrawer.Screen name="Landing" component={LandingScreen}/>
    {
      tools.map(tool => {
        return <ToolDrawer.Screen
          key={tool.name}
          name={tool.name}
          component={ToolScreen}
        />
      })
    }
  </ToolDrawer.Navigator>
</NavigationContainer>
```

Similar Solution: [BadgerChat](#)

✗ not passing tool data

```
<NavigationContainer>
  <ToolDrawer.Navigator>
    <ToolDrawer.Screen name="Landing" component={LandingScreen}/>
    {
      tools.map(tool => {
        return <ToolDrawer.Screen key={tool.name} name={tool.name}>
          {(props) => <ToolScreen {...props} {...tool}/>}
        </ToolDrawer.Screen>
      })
    }
  </ToolDrawer.Navigator>
</NavigationContainer>
```

✓ correct way!

Snack Example

Switch Navigation

There is a fourth, "informal" navigation.

⚠ Do not use the one from React Navigation! It is very out-of-date. It existed in React Navigation < 4.x.

"Switch" Navigation

```
isSignedIn ? (  
  <>  
    <Stack.Screen name="Home" component={HomeScreen} />  
    <Stack.Screen name="Profile" component={ProfileScreen} />  
    <Stack.Screen name="Settings" component={SettingsScreen} />  
  </>  
) : (  
  <>  
    <Stack.Screen name="SignIn" component={SignInScreen} />  
    <Stack.Screen name="SignUp" component={SignUpScreen} />  
  </>  
);
```

React Navigation AuthFlow

"Switch Navigation"

Premise: perform a conditional render.

If the user is signed in, show them their needs feed.

Else give the user the option to sign in or sign up.

Snack Solution

HW9 Demo

Switch navigation and data passing.

Modal

A secondary window.

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

Find My Badgers



Blerim



Ruben



Desimir

ADD BADGER

CLEAR BADGER



Desimir

desimir.andelkovic@example.com

062-6230-849

CONTACT

CLOSE MODAL



Desimir

ADD BADGER

CLEAR BADGER

Modal

Reminder: A modal is a secondary overlay that *requires* user interaction before continuing.

This is a *controlled component*, e.g.

```
const [modalVisible, setModalVisible] = useState(false);
```

Modal Snack

Modal

A modal is nothing more than a secondary overlay that is **visible** or not! You still need to style it.

```
const styles = StyleSheet.create({
  modalView: {
    margin: 20,
    alignItems: 'center',
    shadowColor: '#000',
    shadowOpacity: 0.25,
    shadowRadius: 4,
    elevation: 5,
    // ...
  }
});
```

[Modal Docs](#) | [Find My Badgers Modal](#)

FlatList

A ScrollView that incrementally loads.

For you to learn! [Read the docs.](#)

FlatList

Can you turn [this ScrollView](#) into a FlatList using just the documentation?

Bonus: Can you implement pull-to-refresh?

Snack Solution

Managing Secrets

What's so secret?

A JSON Web Token (JWT)!

```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.  
eyJpZCI6MjgsInVzZXJuYW1lIjoidGVzdDEyN  
DU2NyIsIm1hdCI6MTY5OTkxNDQxMiwiZXhwIj  
oxNjk5OTE4MDEyfQ.Z0WiskxiQUTzEhHocjzg  
4y5QaFE0Cgg4Zz8sLszSMB0
```

What is this? A signed access token good for a set period of time.

Authentication

Web Development

- Interface with the *user's browser*.
- Prefer HTTP-Only cookies.

Mobile Development

- Interface with the *user's operating system*.
- Prefer OS-level secure encrypted storage.

Authentication

Web: Specify *option* `include: 'credentials'`

```
fetch("https://example.com/api/submit", {  
  method: "POST",  
  credentials: "include",  
  // ...  
})
```


Authentication

Mobile: Specify...

- *header* Authorization
- *value* Bearer <JWT>

```
fetch("https://example.com/api/submit", {  
  method: "POST",  
  headers: {  
    "Authorization": "Bearer eyJhbGciOiJIUzI1NiIs..."  
  }  
})  
// ...
```

If the request has a body, don't forget **Content-Type** !

HW9 Demo

Secrets and Authorization

Download and import today's [Postman collection](#).

Secure Storage

Uh oh! We have to store a JWT?

- React has no built-in way to handle credentials! 😬
- [expo-secure-store](#)
 - Only works on Android and iOS -- not web!
- Stores key/value pairs to *persistent* storage.
- Up to 2KB of data per value (small!)
- Cannot store emojis 😞
- Additional options for passcode 🔒 and biometrics 👉

Secure Storage

Secure storage is asynchronous in nature.

- `getItemAsync(key)`
- `setItemAsync(key, val)`
- `deleteItemAsync(key)`

Note: Key refers to a storage key (think HashMap) *not* an encryption key! Very similar to `localStorage` except operations are asynchronous!

Secure Storage

`expo-secure-store` shows an example of `async` / `await` ... What is this?...

Same thing as `then` and `catch` on a `Promise` (think `fetch`)... just a slightly different syntax!

We'll cover `async` / `await` in our next series!

Secure Storage

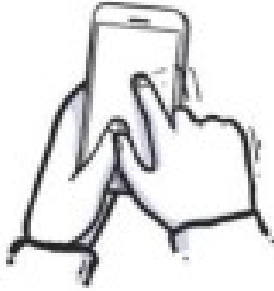
CS571-ifying the expo-secure-store example.

Use your phone, not the web!

Advanced Gestures

Making use of diverse mobile inputs 🙌 🙏 🖐️ 🤲 👍

SWIPE



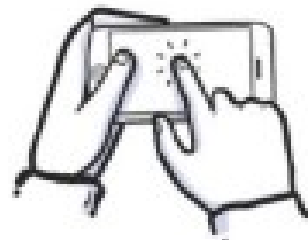
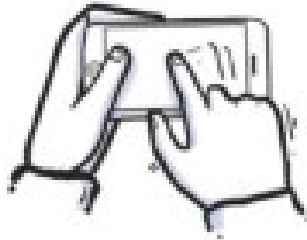
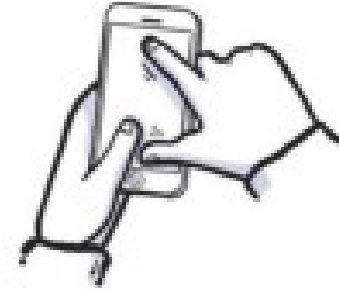
TAP



PINCH



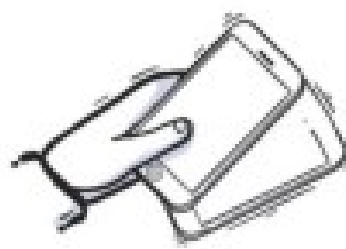
ZOOM



TILT



SHAKE



MULTI TOUCH

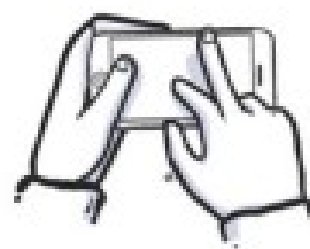


Image Source

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Gestures

React Native **provides methods** to detect when and where the user's fingers move.

Higher-level gesture response libraries...

- react-native's **PanResponder**
- **react-native-gesture-handler**
- component libraries, e.g. **react-native-paper**

Component Library Gestures

react-native's Button `onPress`

react-native-paper's Card `onPress` and `onLongPress`

react-native-elements' Slider `onSliding`

react-native-maps' Marker `onDrag`

react-navigation's Drawer gesture

Sensors

Use `expo-sensors` instead of `react-native-sensors`

- `Accelerometer`
- `Barometer`
- `Gyroscope`
- `LightSensor`
- `Magnetometer`
- `Pedometer`

Not all devices have all sensors!

Other Sensors

- expo-camera
- expo-battery
- expo-haptics
- expo-av
- expo-brightness

Beware of **permissions!**

Deployment

Getting your app to a production environment.

Deployment

iOS vs Android Market Share

Region	iOS	Android	Other
USA	54%	45%	1%
North America	52%	47%	1%
Asia	16%	83%	1%
Worldwide	28%	71%	1%

Source: [GlobalStatCounter](#)

Deployment

Use Expo Application Services (EAS)

```
npm install -g eas-cli
```

```
eas build -p android  
eas build -p ios
```

An `.apk` gets deployed to the Google Play Store

An `.ipa` gets deployed to the iOS App Store

Deployment

No web server for deployment! Hosted on Google Play Store or iOS App Store.

App goes through a review process.

- **Google Play Store:** Hours to Days
- **iOS App Store:** Days to Weeks

Deployment Considerations

- Reliability
- Performance
- Monitoring
- Business Value of Delivery
- App Store Optimization (ASO)

Questions?