

**wix**Engineering

# Detox: tackling flakiness of mobile automation

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A decorative graphic in the bottom right corner consisting of several parallel orange lines of varying lengths that appear to be radiating from a purple diamond shape.

# AGENDA

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**React Native: high level intro**

**Automation Testing**

**Detox: Overview**

**Configuration**

**Detox Object**

**Device Object**

**Actions, Matchers, Expectations**

**Manual Synchronization**

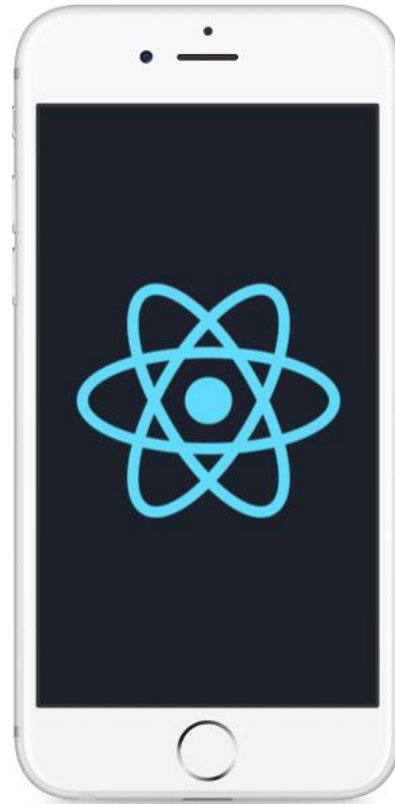
**Demo**

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React Native: a high level intro



# What is React Native?

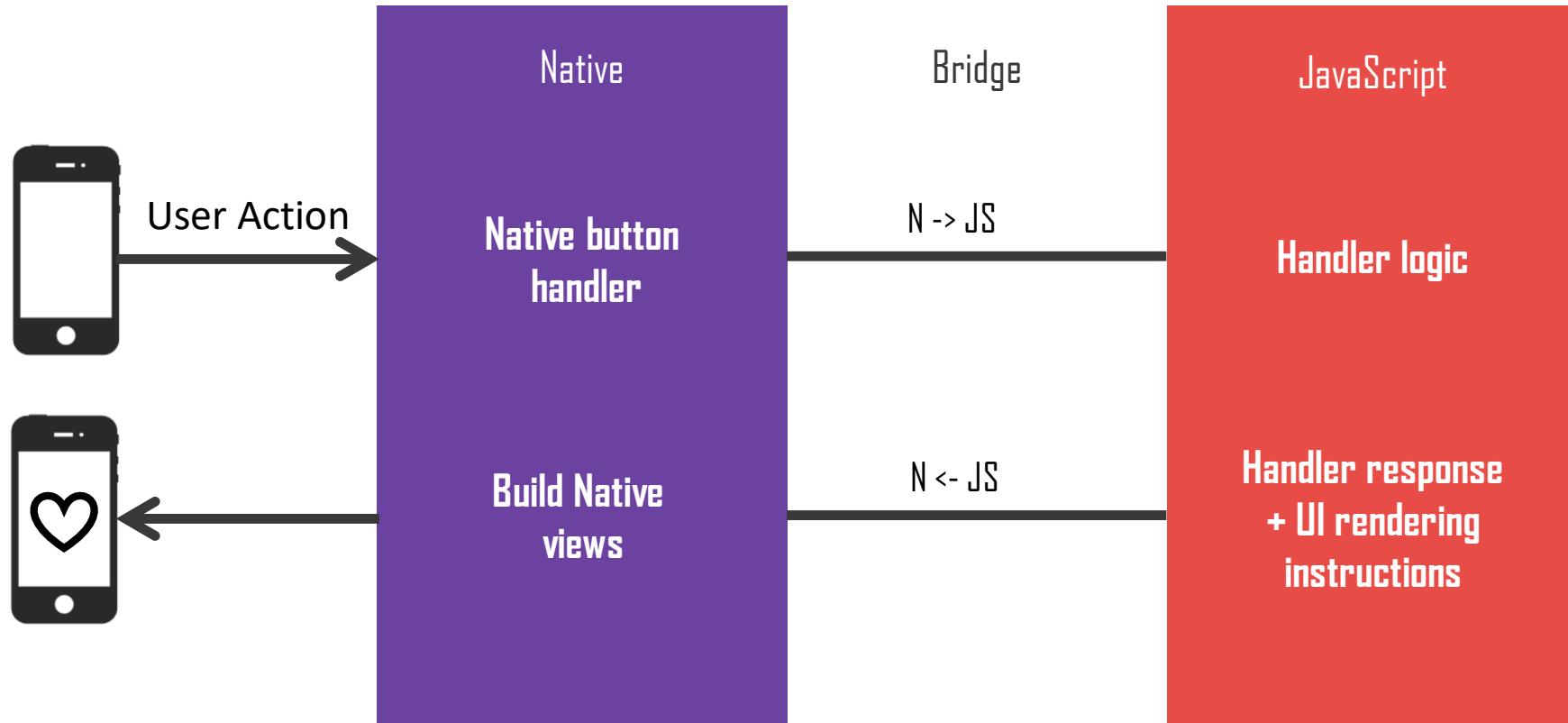


# Terminology

- **Native** – Developed for a specific platform.
- **JS** – Shared code between platforms.
- **Components** – UI elements provided by React Native or build on demand.
- **Bridge** – Used by React Native to pass information between the Native side and JS side and vice versa.

# The Bridge

User clicked a button in app:



# Problems in React Native

- **Maturity** – new technology;
- **Documentation** – it's still in the making;
- No Platforms **parity**;
- No solid **Navigation** solution;
- Testing – native + JavaScript;
- The **bridge** – what should be allowed to go over it;
- **Complex** environment.

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# Automation testing

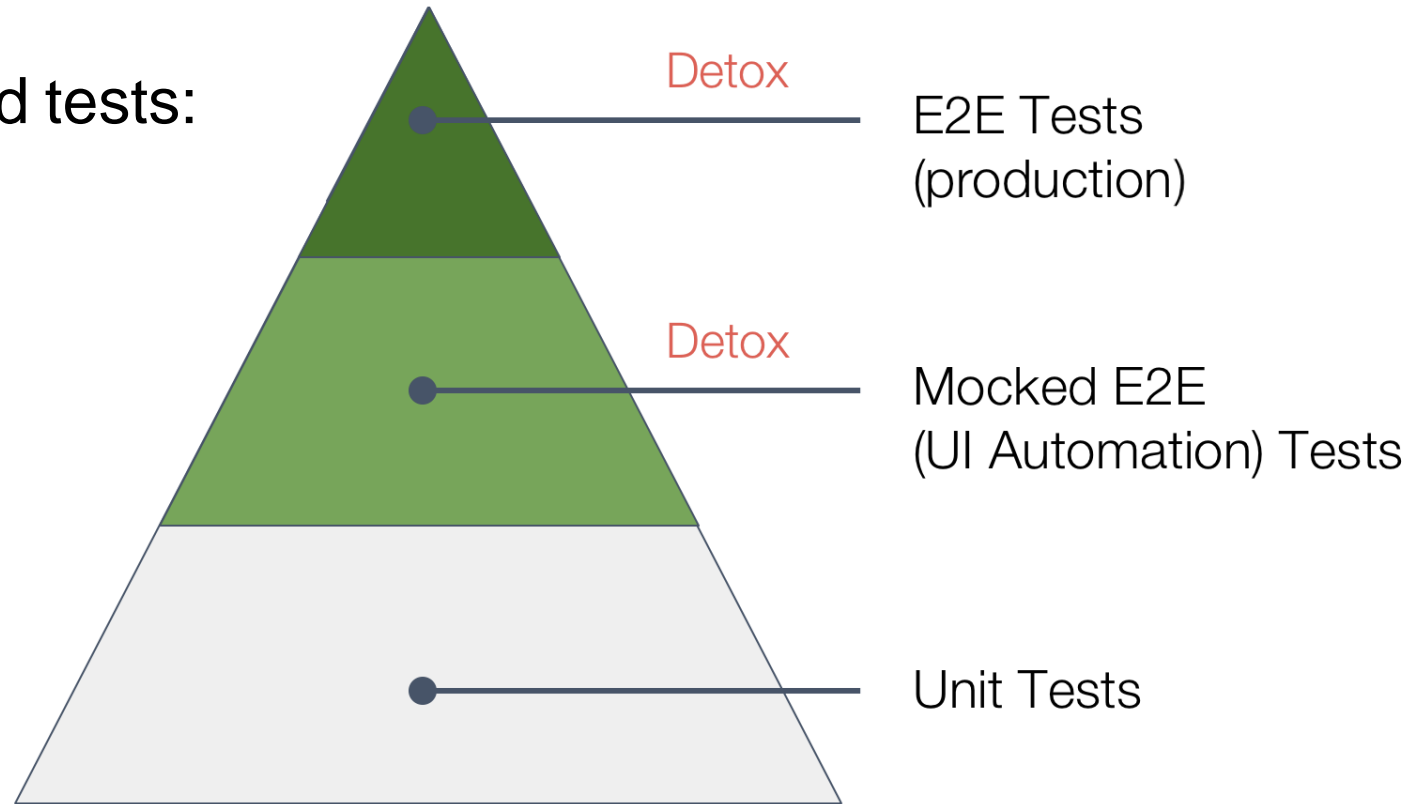




# Types of automated tests

3 main types of automated tests:

- Unit tests;
- Mocked E2E;
- Production E2E.



# Unit Tests

PROS	CONS
Pure code oriented	Pure code oriented
Easy to write + maintain	Does not represent actual user flows
Improves code quality	Does not reflect app quality
Find bugs easily	

# Mocked E2E

PROS	CONS
Closer to code & product	Hard to setup and write
Stable	Gives limited confidence
Easy to maintain	

# Production E2E

PROS	CONS
Real user experience	Slow
Easy to setup	Hard to maintain
Easy to write	Less cost effective
High confidence	<b>Flaky</b>

# E2E Flakiness

Traditional method of dealing with flakiness is adding various  
“sleep”  
commands throughout the test.

Why?

To force a certain execution order.

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# Detox Overview



# What is Detox?

Gray box End-to-End testing and automation library for mobile apps.

# Detox is...

- Cross Platform – iOS and Android;
- Made for CI;
- Test Runner Independent;
- *Automatically Synchronized.*



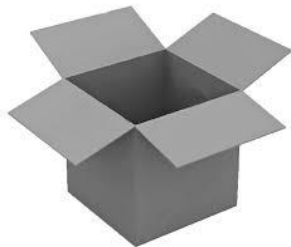
# Black Box vs Gray Box

## Black Box



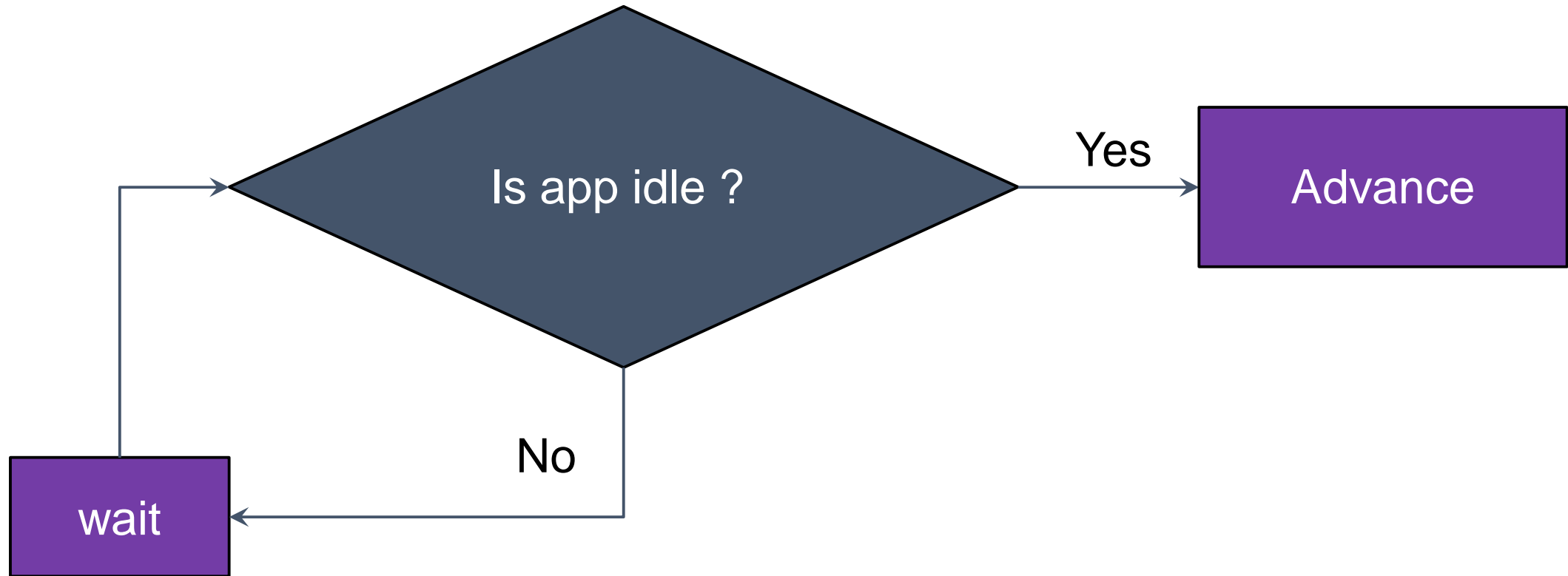
A method of testing stuff from the outside, without knowing what's going on internally.

## Gray Box



Allows the test framework to monitor the app from the inside and actually **synchronize** with it.

# Gray Box Sync



# Two Running Parts

- **The mobile app itself**

Running on simulator(-s);

- **The test suite**

Running on Node.js, outside of the app;

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# Detox Configuration



# Device Configurations

- Defined in `package.json` file;

Param	Details
<code>binaryPath</code>	Relative path to the app due to be tested
<code>type</code>	Device type, available options are <code>ios.simulator</code> , <code>ios.none</code> , <code>android.emulator</code> , and <code>android.attached</code> .
<code>name</code>	Device name, aligns to the device list available through <code>xcrun simctl list</code>
<code>build</code>	[optional] Build command (either <code>xcodebuild</code> , <code>react-native run-ios</code> , etc...)

## Example:

```
"detox": {  
  ...  
  "configurations": {  
    "ios.sim.debug": {  
      "binaryPath": "ios/build/Build/Products/Debug-iphonesimulator/example.app",  
      "build": "xcodebuild -project ios/example.xcodeproj -scheme example -configuration Debug  
        -sdk iphonesimulator -derivedDataPath ios/build",  
      "type": "ios.simulator",  
      "name": "iPhone 7 Plus"  
    }  
  }  
}
```

# Server and Test Runner

- **Server** configuration can be specified generally or per specific device configuration.
- **Test Runner** configuration is **Mocha** by default, can define a different one (e.g. Jest, AVA).

```
"detox": {  
  ...  
  "session": {  
    "server": "ws://localhost:8099",  
    "sessionId": "YourProjectSessionId"  
  }  
}
```

```
"detox": {  
  ...  
  "test-runner": "jest"  
  "runner-config": "path/to/config.json"  
}
```

# Just Simply Run

```
detox test --configuration yourConfiguration
```



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Detox Object



# detox Object

- Globally available in every test file;
- 4 methods:
  - `detox.init();`
  - `detox.beforeEach();`
  - `detox.afterEach();`
  - `detox.cleanup();`

# detox.init()

- Reads **configuration**;
- Starts a **server**;
- Loads its **expectation** library;
- Starts a **simulator**.

```
const config = require('../package.json').detox;

before(
  async () => {
    await detox.init(config, {launchApp: false});
  }
);
```

# detox.beforeEach()

- Called at the start of every test.

```
declare function beforeEach(  
  testSummary: {  
    title: string;  
    fullName: string;  
    status: 'running';  
  })
```

# detox.afterEach()

- Called at the end of the test;
- Must return `failed` or `passed` value.

```
declare function afterEach(testSummary: {  
  title: string;  
  fullName: string;  
  status: 'failed' | 'passed';  
})
```

# detox.cleanup()

- Should be triggered when `detox.afterEach()` finishes;
- Phase where Detox server shuts down.

```
after(async () => {  
  await detox.cleanup();  
})
```

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Device Object



# device Object

- Globally available in every test file;
- Enables control over attached device;
- 18 different functions to mock real user experience.



# device Object Functions

**device.launchApp()**

device.terminateApp()

**device.sendToHome()**

device.reloadReactNative()

device.installApp()

**device.uninstallApp()**

device.openURL(url)

device.sendUserNotification(params)

device.sendUserActivity(params)

device.setOrientation(orientation)

device.setLocation(lat, lon)

device.setURLBlacklist()

**device.enableSynchronization()**

**device.disableSynchronization()**

device.resetContentAndSettings()

**device.getPlatform()**

device.pressBack() **Android Only**

device.shake() **iOS Only**

# device.launchApp()

## Parameters to set:

new instance

set runtime permissions

add additional launch arguments

launch with notifications

launch with specific language

launch from a fresh installation

launch from URL

launch with user activity

disable touch indicators (iOS)

initialize the URL blacklist



# device.launchApp()

```
await device.launchApp({
  newInstance: true,
  url: url,
  languageAndLocale: {
    language: locale, locale
  },
  permissions: {
    calendar: 'Yes'
  }
});
```

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Actions, Matchers, Expectations



# What are they for?

Matchers

*to specify  
UI elements*

Actions

*to emulate  
user behavior*

Expectations

*to verify  
element  
behavior*

# Matchers

`by.id()`

`by.text()`

`by.label()`

`by.type()`

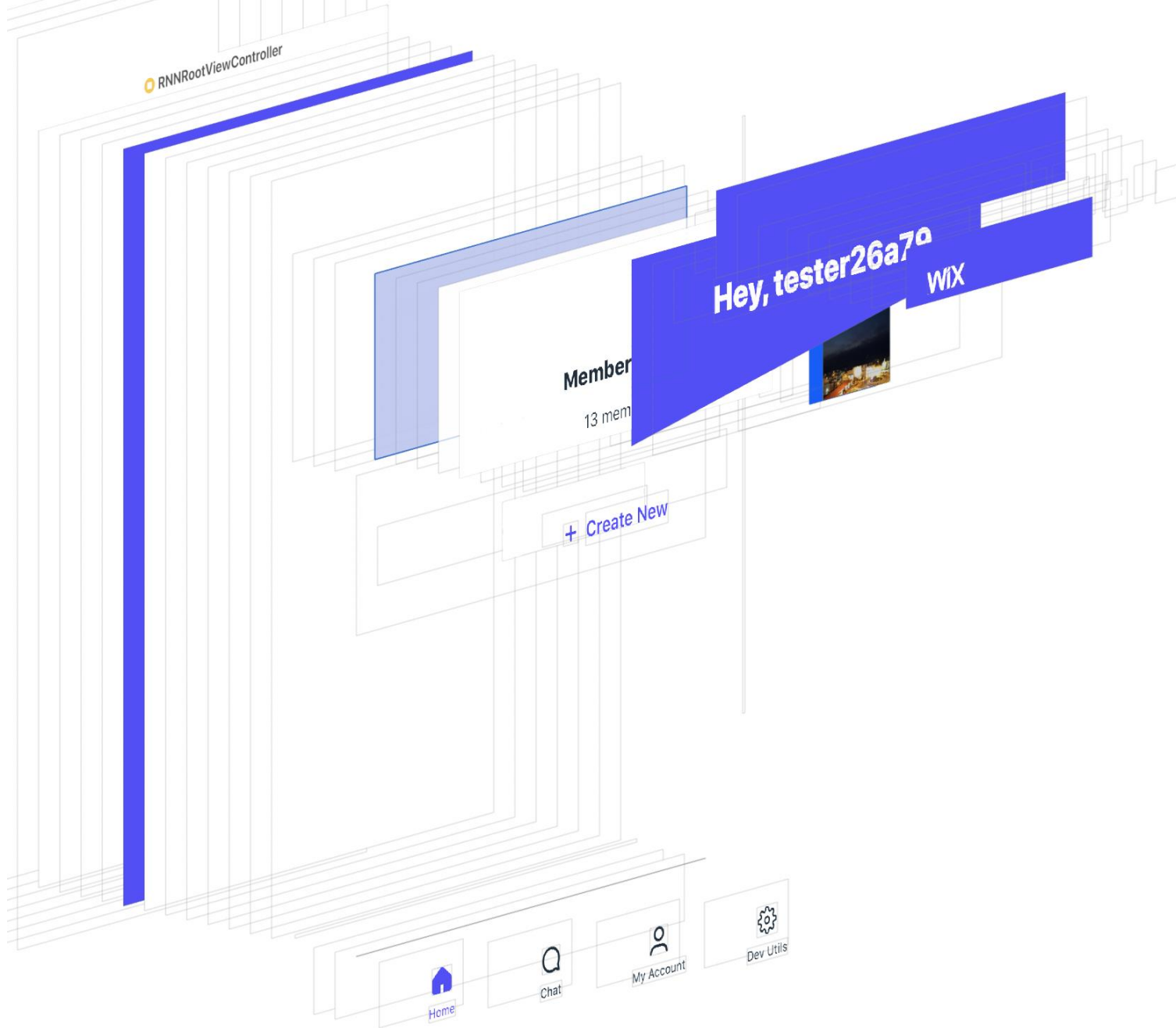
`by.traits()`

**for more  
uniqueness:**

`.withAncestor()`

`.withDescendant()`

`.and()`



**Object**

Class Name **RCTView**

Address **0x7ffe4c5d9170**

**View**

Layer <CALayer: 0x600000636a00>

Layer Class CALayer

Content Mode Redraw

Tag 0

Interaction User Interaction Enabled On  
Multiple Touch On

Alpha 1

Background R:1 G:1 B:1 A:0.85

Tint R:0 G:0.68 B:0.96 A:1

Drawing Opaque On

Hidden Off

Clears Graphics Context On

Clip To Bounds Off

Autosize Subviews On

Stretching x 0 y 0  
width 1 height 1

**Accessibility**

Is Accessibility Element

Value <null>

Elements <null>

Description **Members place 13 members**

Hint <null>

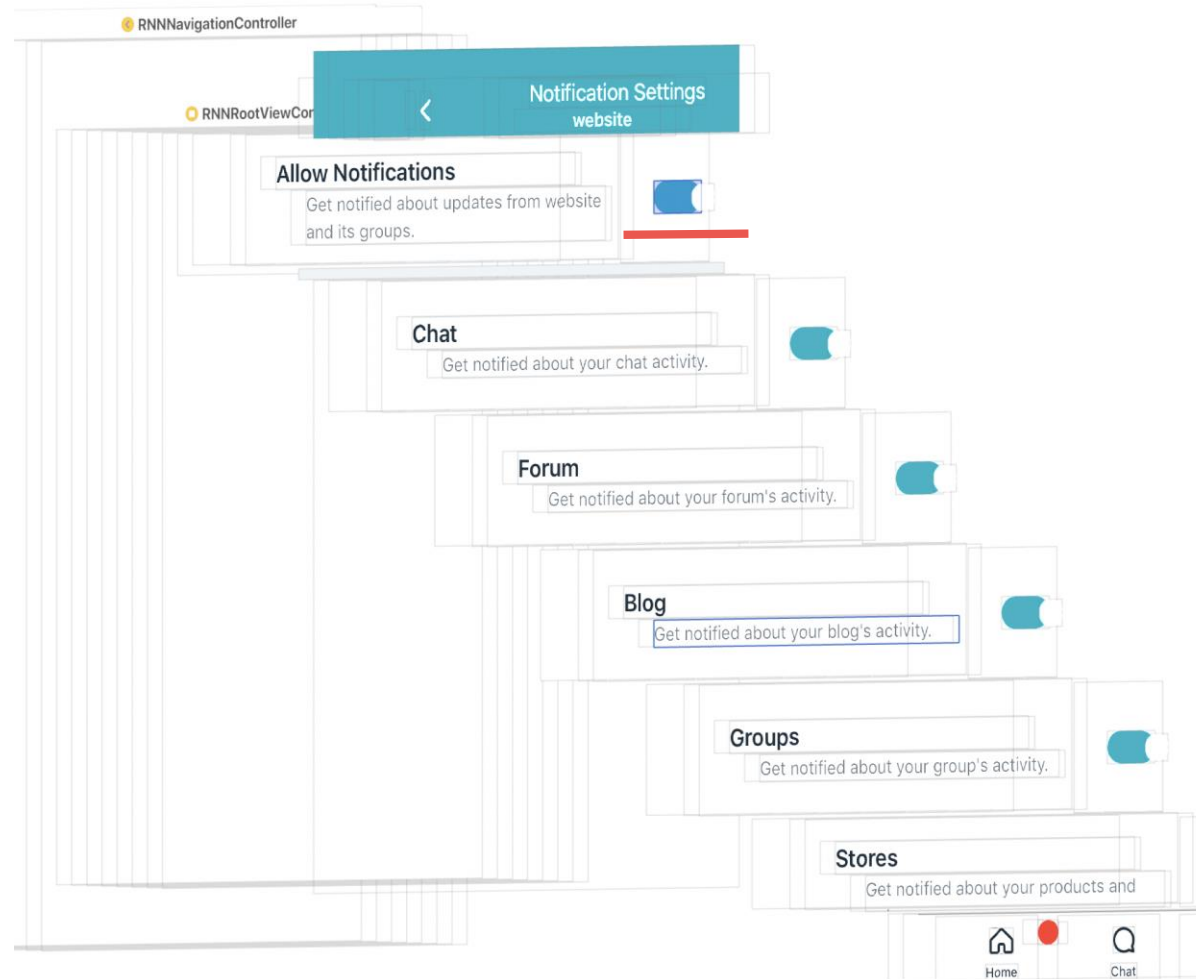
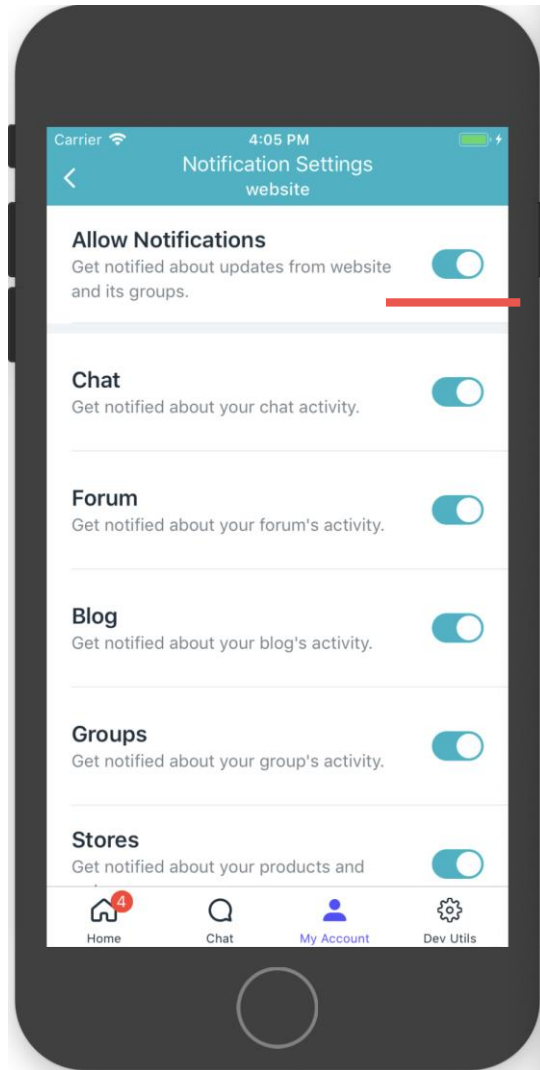
Identifier **wix.core.container.HOME\_SCREEN\_BUSINESS\_ITEM\_f22f88df-5f6e-44a2-af82-b922e225f916**

Actions <null>

Not Focused

Description <RCTView: 0x7ffe4c5d9170; reactTag: 479; frame = (20 8; 335 136); layer = <CALayer: 0x600000636a00>>

# Sometimes it's not that easy...



<b>Object</b>
Class Name RCTView
Address 0x7fcf3bd2e310
<b>View</b>
Layer <CALayer: 0x60800062e7e0>
Layer Class CALayer
Content Mode Scale To Fill
Tag 0
Interaction User Interaction Enabled On
Multiple Touch On
Alpha 1
Background R:0.11 G:0.7 B:0.78 A:1
Tint R:0 G:0.68 B:0.96 A:1
Drawing Opaque On
Hidden Off
Clears Graphics Context On
Clip To Bounds Off
Autosize Subviews On
Stretching x 0 y 0
width 1 height 1
<b>Accessibility</b>
Is Accessibility Element
Value <null>
Elements <null>
Description <empty string>
Hint <null>
Identifier toggle
Actions <null>
Not Focused
Description <RCTView: 0x7fcf3bd2e310; reactTag: 4615; frame = (16 35.5; 42 24); layer = <CALayer: 0x60800062e7e0>>
<b>Hierarchy</b>



# Advanced Matchers

```
await element(by.id('toggle'))  
  .withAncestor(by.id('notification_list_item'))  
  .withDescendant(by.text('Allow Notifications')).toExist();
```

# Actions

`.tap()`

`.longPress()`

`.multiTap()`

`.tapAtPoint()`

`.typeText()`

`.replaceText()`

`.clearText()`

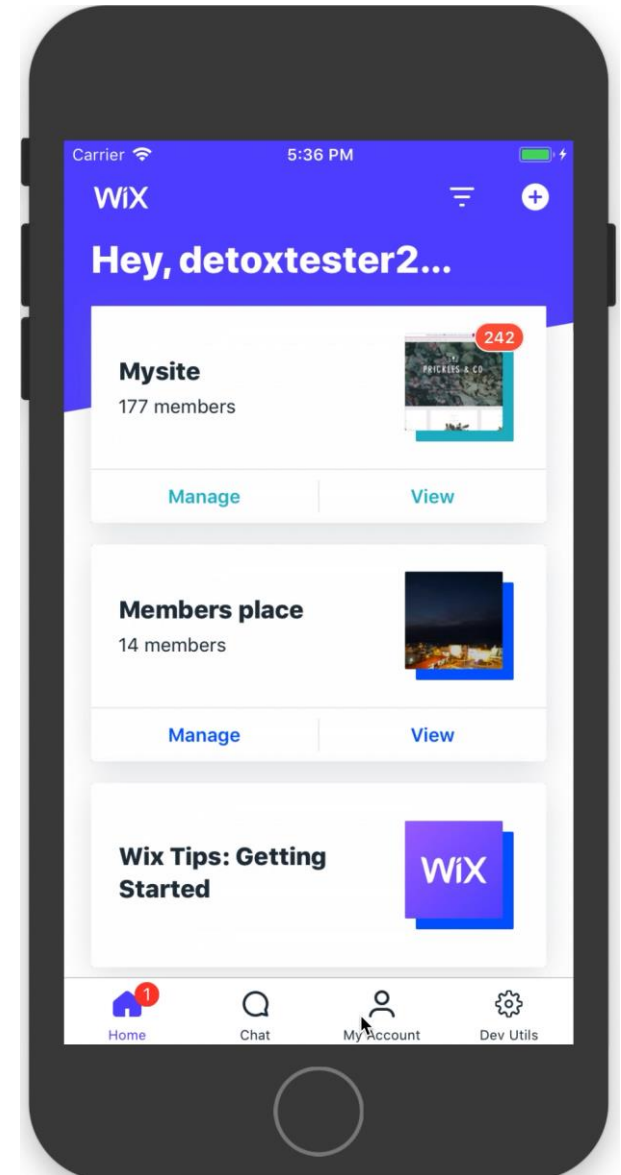
`.scroll()`

`.scrollTo()`

`.swipe()`

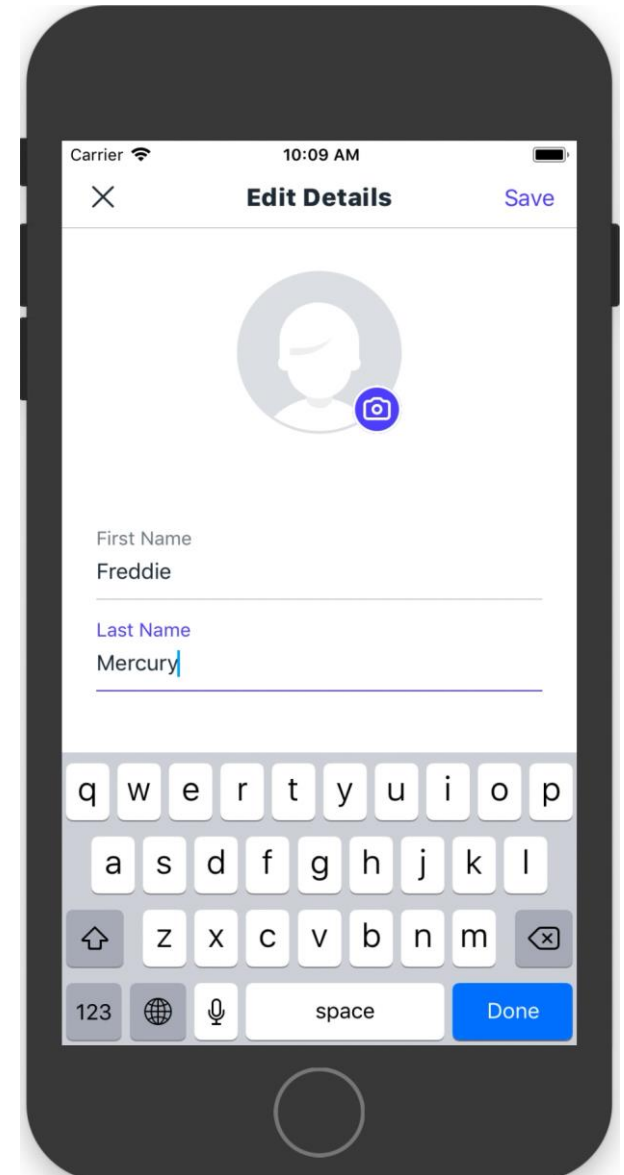
# Tapping

`.tap()`  
`.longPress()`  
`.multiTap()`  
`.tapAtPoint()`



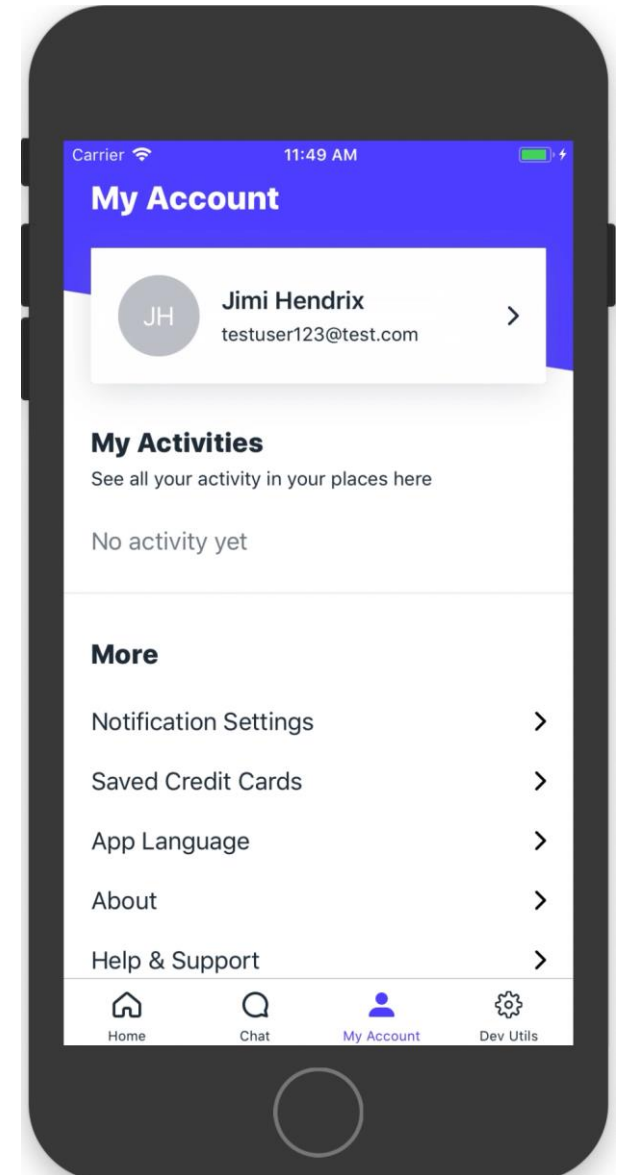
# Typing

`.typeText()`  
`.replaceText()`  
`.clearText()`



# Scroll & Swipe

```
.scroll()  
.scrollTo()  
.swipe()
```



# Expectations

`.toBeVisible()`

`.toBeNotVisible()`

`.toExist()`

`.toNotExist()`

`.toHaveText()`

`.toHaveLabel()`

`.toHaveId()`

`.toHaveValue()`

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# Manual Synchronization



# Synchronization

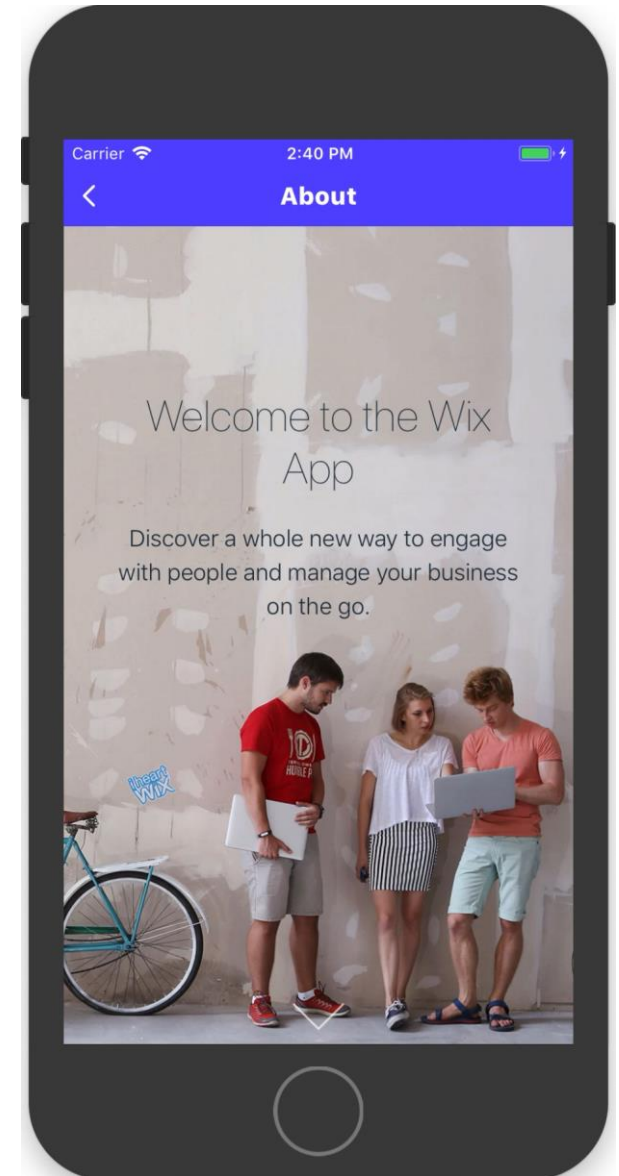
- EarlGrey / Espresso provides a synchronization mechanism;
- Tracks dispatch queue, operation queue, network, animations, etc;
- Waits for app to be idle.

What if app does not become idle?



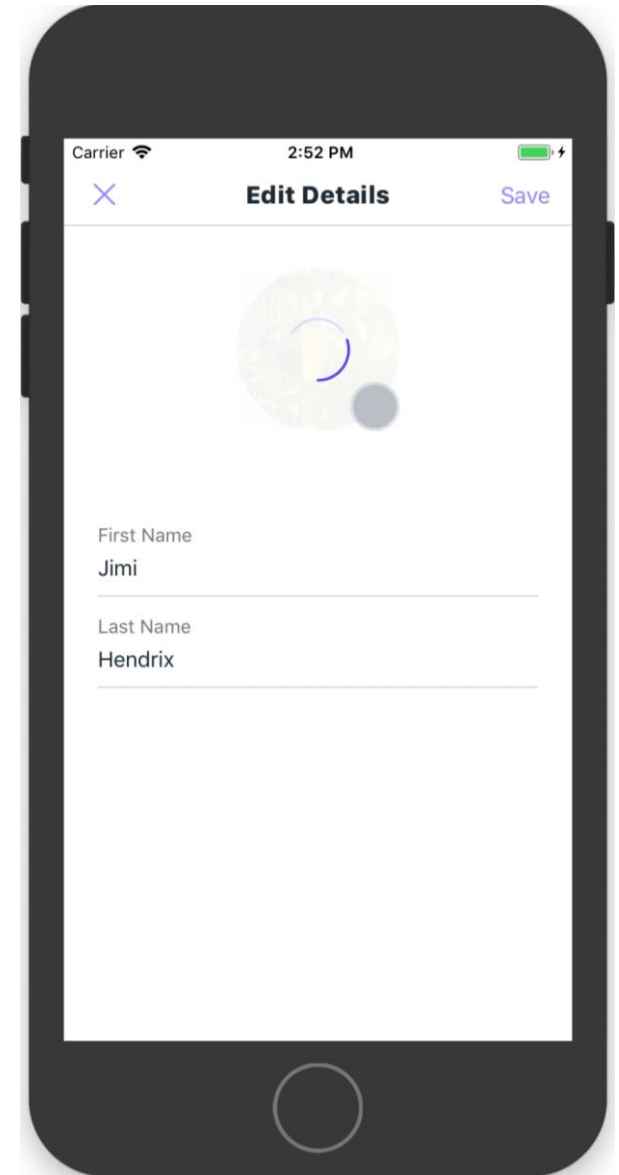
# Disabling

- App is busy – does not reach idle state;
- Usual use case – animated elements;
- Disable before entering screen with such element;



# Enabling

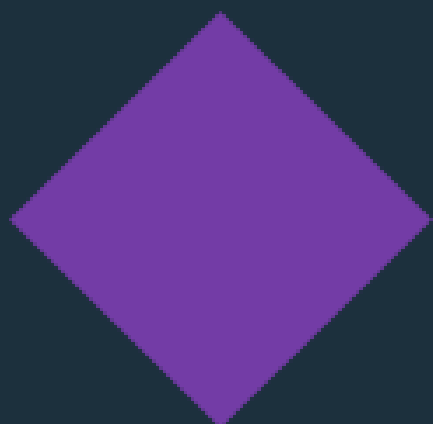
- Enable when in idle screen;
- Resets with every new app instance.



# waitFor()

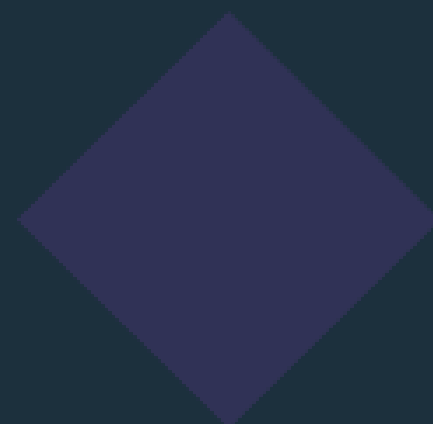
- Manual sync;
- Must have a timeout;
- Use together with an expectation.

```
await waitFor(element(by.id('UniqueId204'))).toBeVisible().withTimeout(2000);  
await expect(element(by.id('UniqueId204'))).toBeVisible();
```



Dem

0



# Demo

## Scenario:

- log into the app;
- join a site with Invite Code;
- verify site in Home tab;
- hide site from Home tab;
- unhide site;
- verify it's visible.



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Q&A

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Detox @ GitHub | <https://github.com/wix/detox>