ITW202: Mobile Application

Unit IV: Developing for Android

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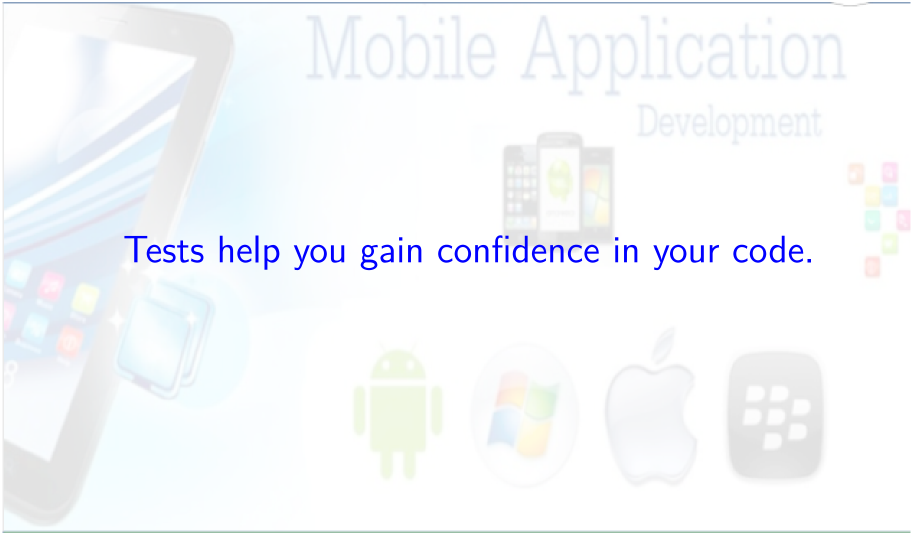
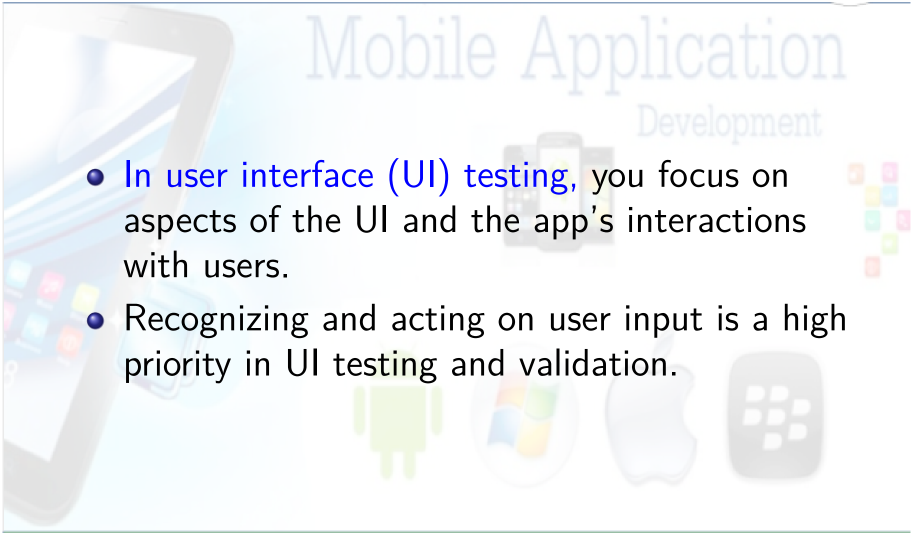
UI testing

UI testing



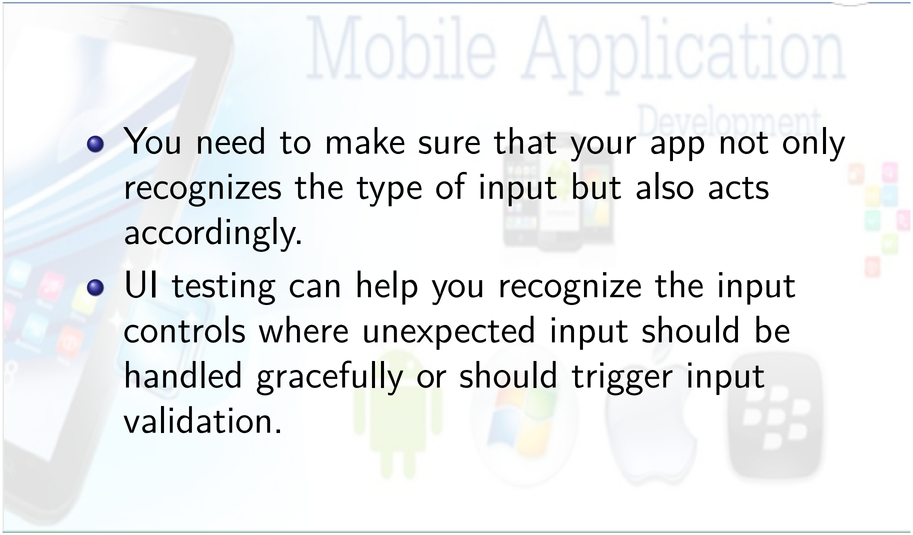
Tests help you gain confidence in your code.

UI testing



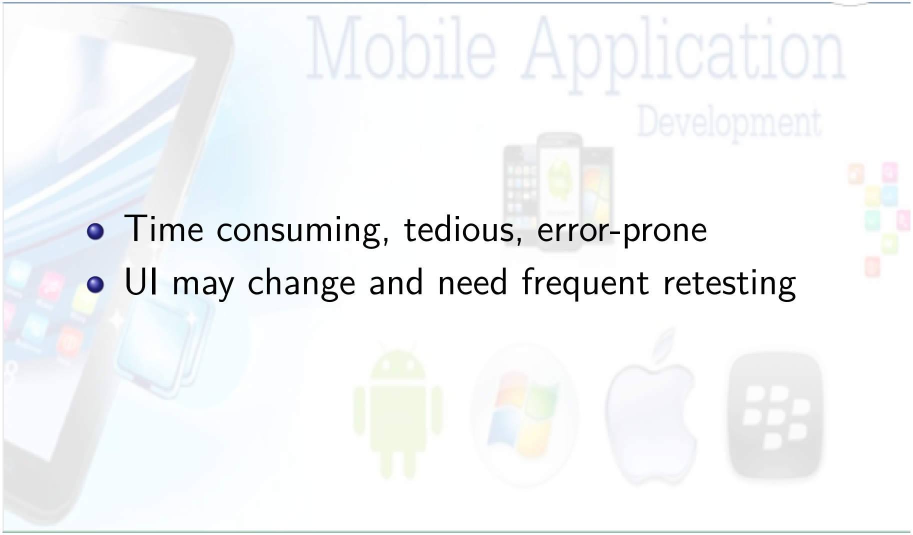
- In user interface (UI) testing, you focus on aspects of the UI and the app's interactions with users.
- Recognizing and acting on user input is a high priority in UI testing and validation.

UI testing



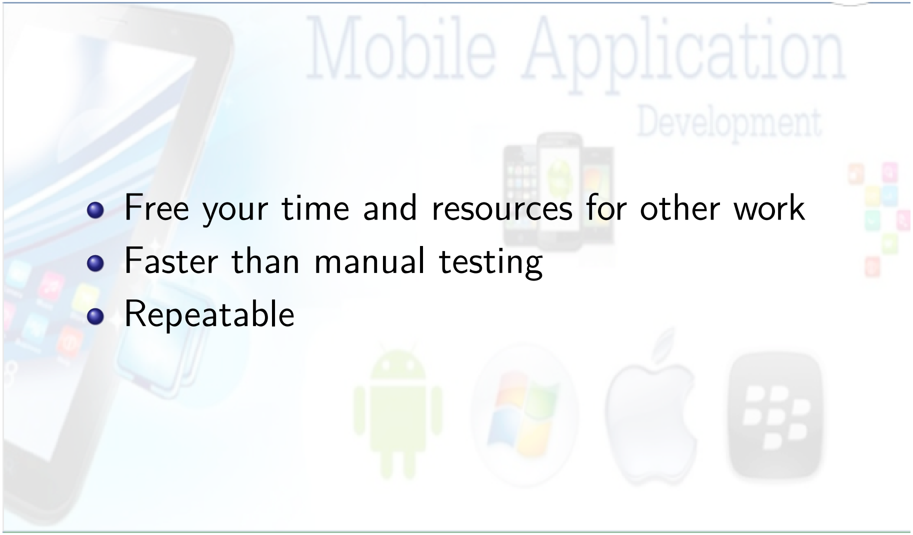
- You need to make sure that your app not only recognizes the type of input but also acts accordingly.
- UI testing can help you recognize the input controls where unexpected input should be handled gracefully or should trigger input validation.

Problems with testing manually



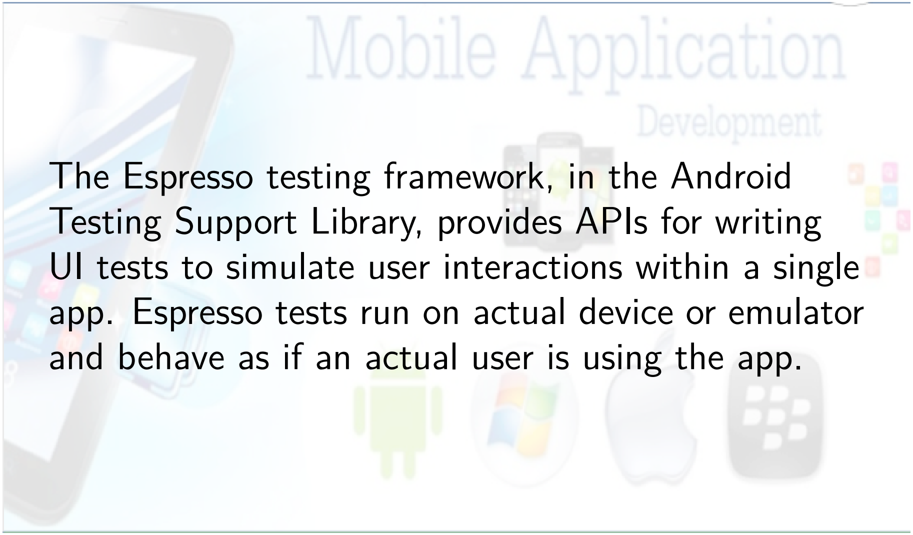
- Time consuming, tedious, error-prone
- UI may change and need frequent retesting

Benefits of testing automatically



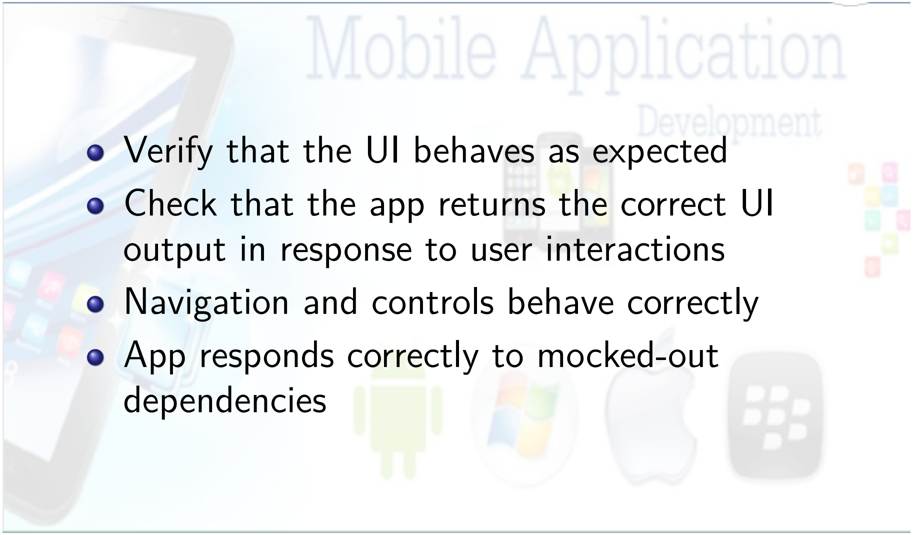
- Free your time and resources for other work
- Faster than manual testing
- Repeatable

Espresso for single app testing



The Espresso testing framework, in the Android Testing Support Library, provides APIs for writing UI tests to simulate user interactions within a single app. Espresso tests run on actual device or emulator and behave as if an actual user is using the app.

Espresso for single app testing

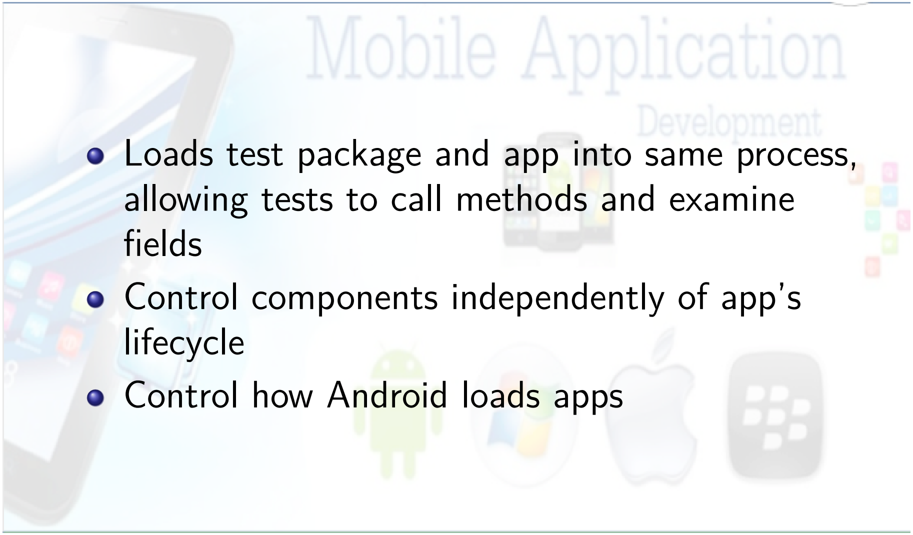


- Verify that the UI behaves as expected
- Check that the app returns the correct UI output in response to user interactions
- Navigation and controls behave correctly
- App responds correctly to mocked-out dependencies

What is instrumentation?

- Android instrumentation is a set of control methods, or hooks, in the Android system, which control Android components and how the Android system loads apps.

What is instrumentation?



- Loads test package and app into same process, allowing tests to call methods and examine fields
- Control components independently of app's lifecycle
- Control how Android loads apps

Benefits of instrumentation

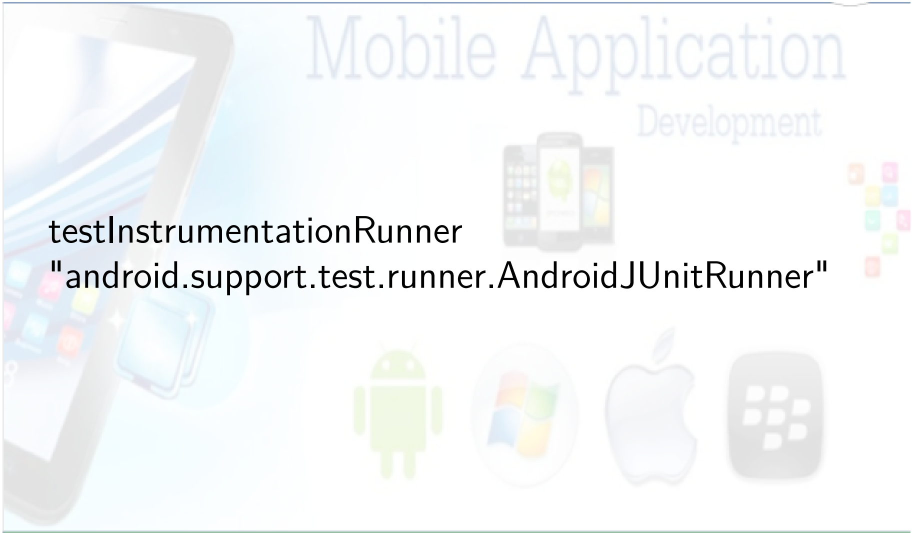
- Tests can monitor all interaction with Android system
- Tests can invoke methods in the app
- Tests can modify and examine fields in the app independent of the app's lifecycle

Test environment And Espresso setup

Add dependencies to build.gradle

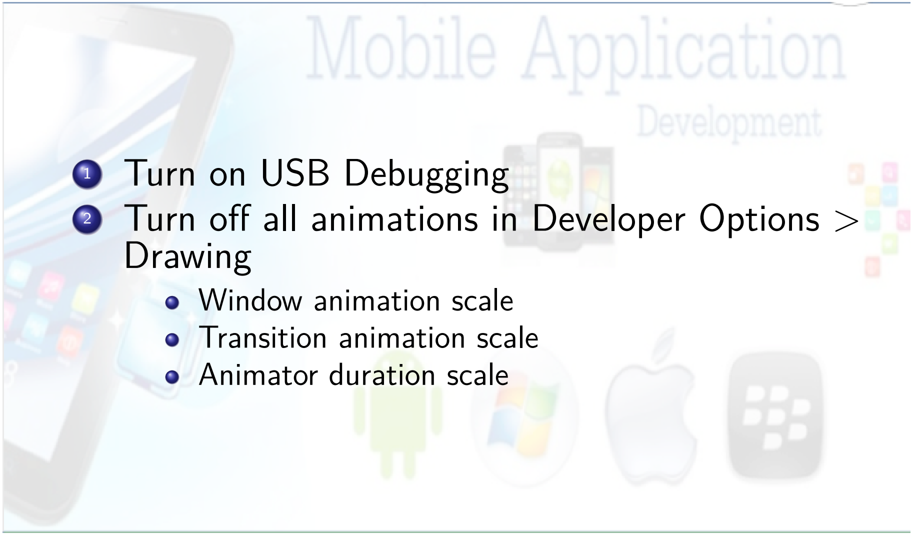
```
testImplementation 'junit:junit:4.12'
androidTestImplementation 'com.android.support.test:runner:1.0.1'
androidTestImplementation
              'com.android.support.test.espresso:espresso-core:3.0.1'
```

Add defaultConfig to build.gradle



```
testInstrumentationRunner
"android.support.test.runner.AndroidJUnitRunner"
```

Prepare your device



1. Turn on USB Debugging
2. Turn off all animations in Developer Options > Drawing
    - Window animation scale
    - Transition animation scale
    - Animator duration scale

Create tests

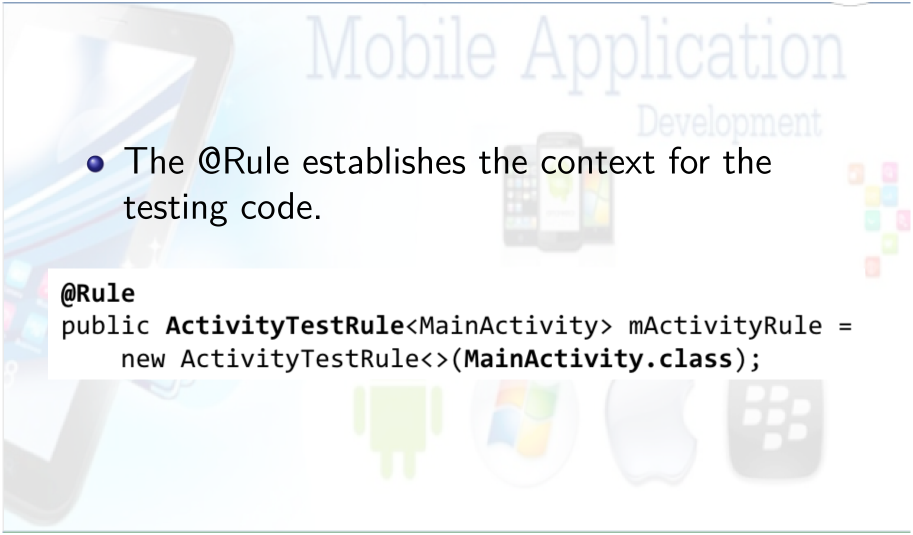
- Store in module-name/src/androidTests/java/
  - In Android Studio: app > java > module-name (androidTest)
- Create tests as JUnit classes

Creating Espresso tests

Test class definition

- @RunWith(AndroidJUnit4.class) — Required annotation for tests
- @LargeTest — Based on resources the test uses and time to run
- @SmallTest — Runs in $<$ 60s and uses no external resources
- @MediumTest — Runs in $<$ 300s, only local network
- @LargeTest — Runs for a long time and uses many resources

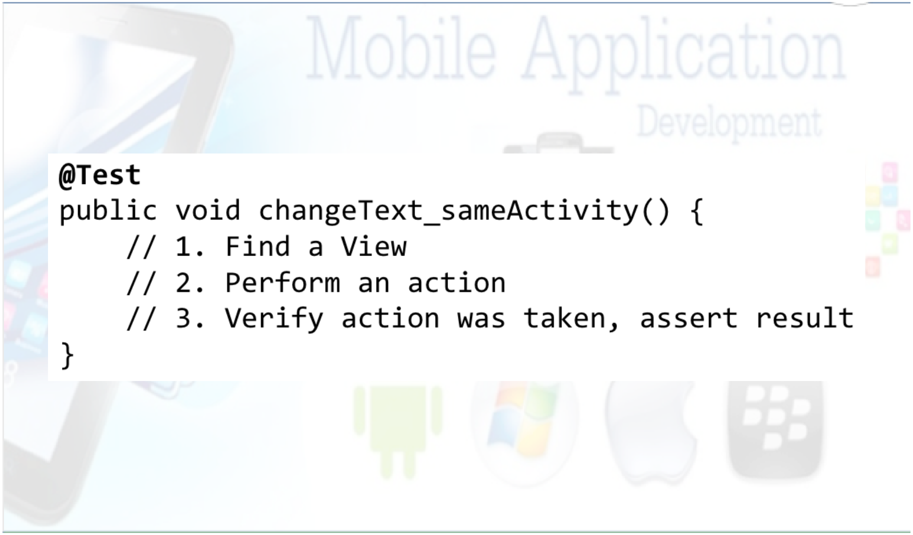
@Rule specifies the context of testing



- The @Rule establishes the context for the testing code.

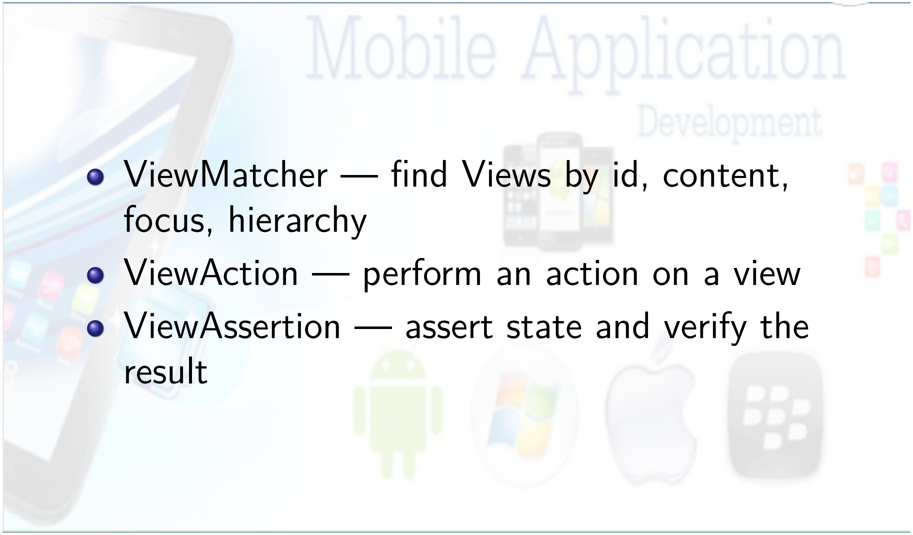
```
@Rule
public ActivityTestRule<MainActivity> mActivityRule =
    new ActivityTestRule<>(MainActivity.class);
```

@Test method structure



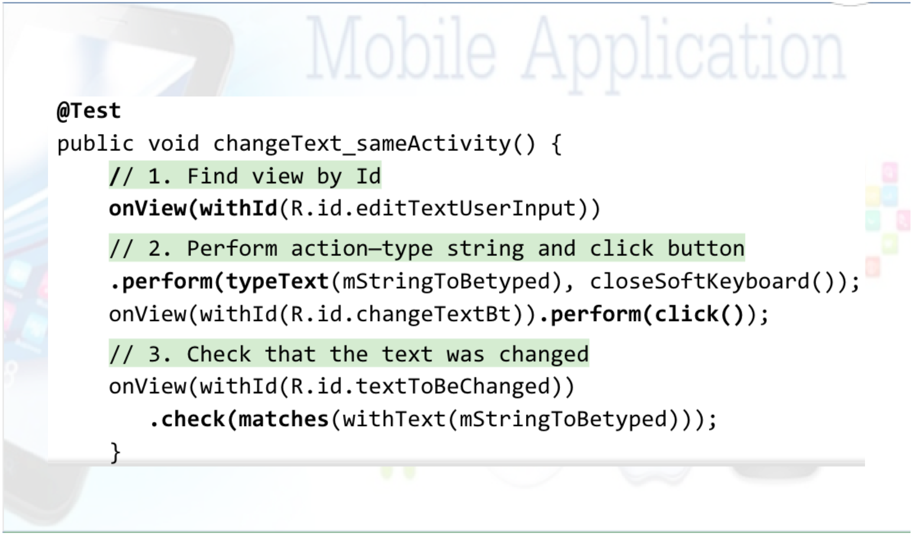
```
@Test
public void changeText_sameActivity() {
    // 1. Find a View
    // 2. Perform an action
    // 3. Verify action was taken, assert result
}
```

Hamcrest Matchers



- ViewMatcher — find Views by id, content, focus, hierarchy
- ViewAction — perform an action on a view
- ViewAssertion — assert state and verify the result

Basic example test


Mobile Application

```
@Test
public void changeText_sameActivity() {
    // 1. Find view by Id
    onView(withId(R.id.editTextUserInput))
    // 2. Perform action—type string and click button
    .perform(typeText(mStringToBetyped), closeSoftKeyboard());
    onView(withId(R.id.changeTextBt)).perform(click());
    // 3. Check that the text was changed
    onView(withId(R.id.textToBeChanged))
        .check(matches(withText(mStringToBetyped)));
    }
```

Recording tests

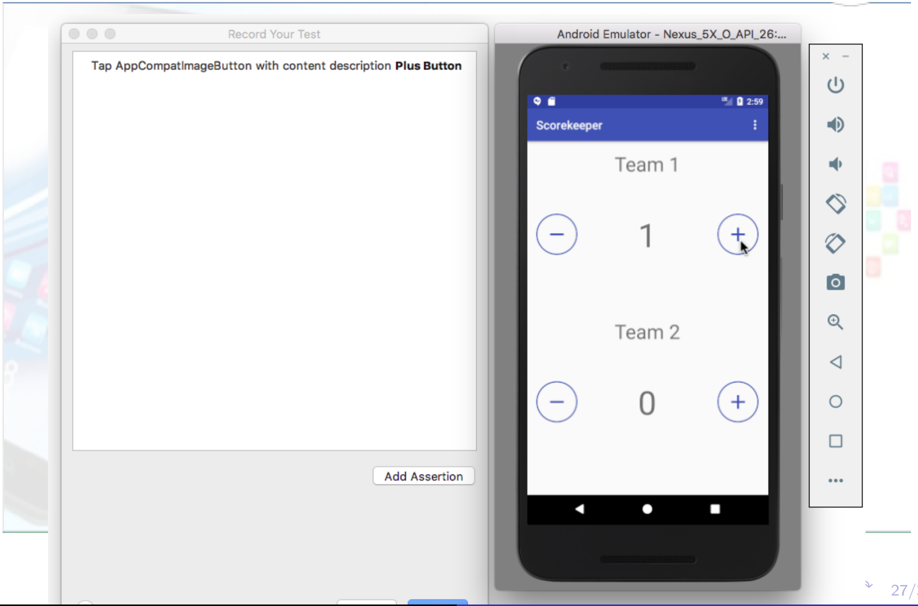
Recording an Espresso test

- Use app normally, clicking through the UI
- Editable test code generated automatically
- Add assertions to check if a view holds a certain value
- Record multiple interactions in one session, or record multiple sessions

Start recording an Espresso test

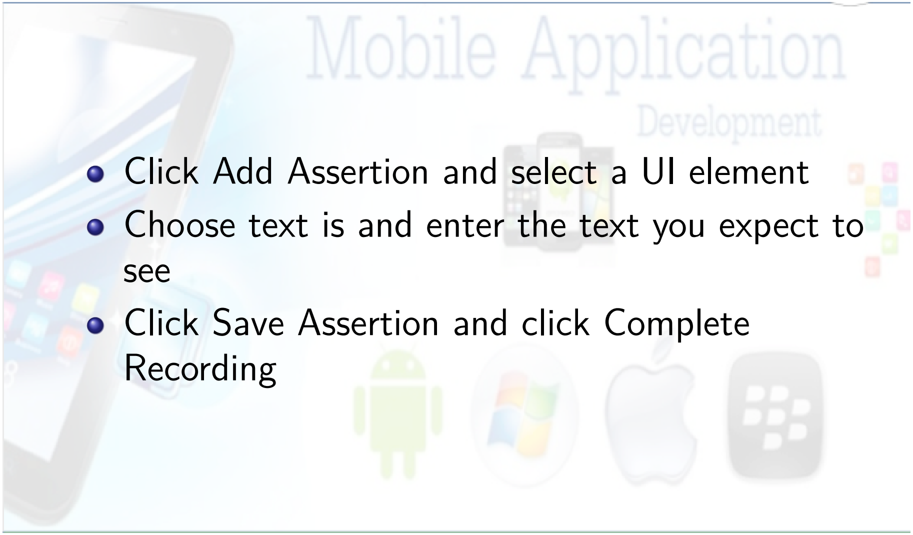
- Run > Record Espresso Test
- Click Restart app, select target, and click OK
- Interact with the app to do what you want to test

Start recording an Espresso test



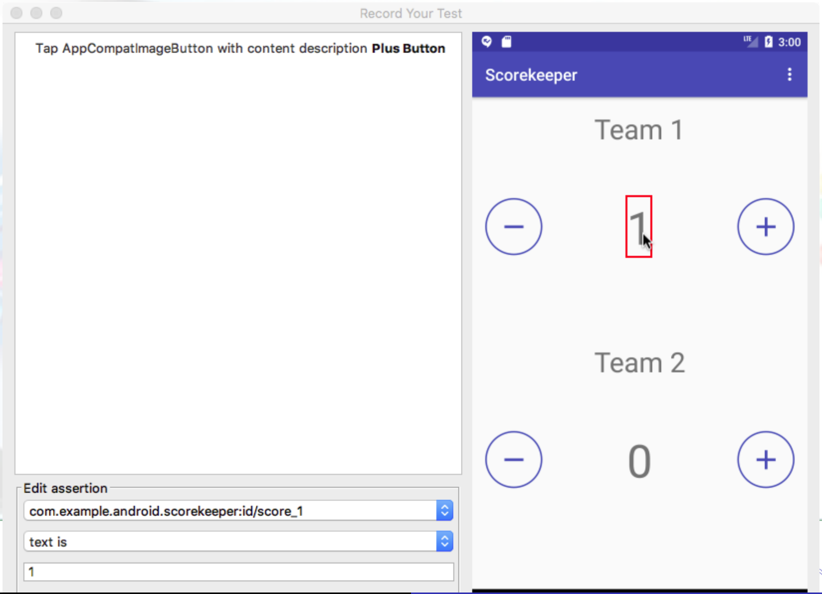
Tap AppCompatImageButton with content description **Plus Button**

Add assertion to Espresso test recording



- Click Add Assertion and select a UI element
- Choose text is and enter the text you expect to see
- Click Save Assertion and click Complete Recording

Add assertion to Espresso test recording


Record Your Test

Tap AppCompatImageButton with content description **Plus Button**

Edit assertion

com.example.android.scorekeeper:id/score_1

text is

1

THANK YOU