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# Appium Essentials

Explore mobile automation with Appium and discover new ways to test native, web, and hybrid applications

**Manoj Hans**

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**Manoj Hans**



BIRMINGHAM - MUMBAI

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First published: April 2015

Production reference: 1060415

Published by Packt Publishing Ltd.  
Livery Place  
35 Livery Street  
Birmingham B3 2PB, UK.

ISBN 978-1-78439-248-2

[www.packtpub.com](http://www.packtpub.com)

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I would like to thank my family for their continued support while I spent evenings and weekends on the computer. I also want to thank Ujjawal Kumar, Nishank Jangra, and the Packt Publishing team for their support during the writing of this book.

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I would like to thank my family for supporting me when I was reviewing this book and making sure that I completed things on time.

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I would like to thank my friend, Abdullah Aydeğer; my mathematician brother, Orçun Yenigün; and my best friend, Cansin Aldanmaz, for their support throughout the reviewing of this book. I also owe thanks to my father, Ünal Yenigün, and mother, Hanife Yenigün, for their unconditional love.

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# Table of Contents

<b>Preface</b>	<b>v</b>
<b>Chapter 1: Appium – Important Conceptual Background</b>	<b>1</b>
<b>Appium architecture</b>	<b>1</b>
Appium on iOS	2
Appium on Android	2
<b>The Selenium JSON wire protocol</b>	<b>3</b>
<b>Appium session</b>	<b>4</b>
<b>Desired capabilities</b>	<b>5</b>
Android capabilities	8
iOS capabilities	12
<b>The Appium server and its client libraries</b>	<b>15</b>
<b>Summary</b>	<b>15</b>
<b>Chapter 2: Getting Started with Appium</b>	<b>17</b>
<b>Appium – pros and cons</b>	<b>17</b>
<b>System requirements for Android/iOS</b>	<b>19</b>
Android requirements on Windows and Mac	19
iOS requirements	19
<b>Installing different software</b>	<b>20</b>
Appium installation for Android	20
Installing JDK on Windows	20
Installing the Android SDK	22
Setting the system variables for Mac	23
Appium for iOS	24
Installing Xcode	24
Installing Homebrew	24
Node and npm	25
Appium for different OSes	25
Appium for Windows	25
Appium for Mac	25

*Table of Contents*

---

Downloading the necessary JAR files	26
<b>Creating emulators and simulators</b>	<b>26</b>
An iOS simulator	26
An Android emulator	26
<b>Setting up an Eclipse Java project</b>	<b>28</b>
<b>Summary</b>	<b>33</b>
<b>Chapter 3: The Appium GUI</b>	<b>35</b>
<b>The Appium server</b>	<b>35</b>
The Appium GUI for Windows	35
Android Settings	36
General Settings	38
Developer Settings	40
About	41
Inspector	42
The Appium GUI for Mac	43
Android Settings	44
iOS Settings	44
Robot Settings	47
Save/Open configuration	47
Appium doctor	48
Inspector	48
The Recording panel	50
Summary	51
<b>Chapter 4: Finding Elements with Different Locators</b>	<b>53</b>
<b>Finding elements for Android web-based apps using the Chrome ADB plugin</b>	<b>53</b>
<b>Finding elements for iOS web-based apps using Safari's Develop option</b>	<b>57</b>
Finding elements by ID	59
Finding elements by name	61
Finding elements by linkText	62
Finding elements by Xpath	63
Finding elements by cssSelector	63
<b>Finding elements for native and hybrid apps</b>	<b>63</b>
Finding elements with UIAutomatorviewer	64
Finding elements by ID	66
Finding elements by name	67
Finding elements by className	67
Finding elements by AccessibilityId	69
Finding elements by AndroidUIAutomator	69

---

*Table of Contents*

Finding elements with Appium Inspector	70
Finding elements by Xpath	72
Finding elements by name	73
Finding elements by IosUIAutomation	74
<b>Summary</b>	<b>75</b>
<b>Chapter 5: Working with Appium</b>	<b>77</b>
<b>Important initial points</b>	<b>77</b>
Necessary desired capabilities for Android and initiating the Android driver	78
Desired capabilities for native and hybrid apps	82
Desired capabilities for web apps	83
Necessary desired capabilities for iOS and initiating the iOS driver	85
Desired capabilities for native and hybrid apps	86
Desired capabilities for web apps	87
<b>Automating native apps</b>	<b>89</b>
Native Android apps	89
Native iOS apps	92
<b>Working with web apps</b>	<b>94</b>
Web apps on Android	94
Web apps on iOS	96
<b>Hybrid apps' automation</b>	<b>98</b>
Android hybrid apps	98
iOS hybrid apps	101
<b>Summary</b>	<b>103</b>
<b>Chapter 6: Driving Appium on Real Devices</b>	<b>105</b>
<b>Important initial points</b>	<b>105</b>
Desired capabilities for Android and initiating the Android driver	107
Desired capabilities for native and hybrid apps	110
Desired capabilities for web apps	110
Installing provisional profile, SafariLauncher, and ios-webkit-debug-proxy	111
Provisional profile	111
SafariLauncher app and ios-webkit-debug-proxy	113
Desired capabilities for iOS and initiating the iOS driver	114
Desired capabilities for native and hybrid apps	115
Desired capabilities for web apps	116
<b>Automating native apps</b>	<b>118</b>
Android native apps	118
iOS native apps	120

*Table of Contents*

---

<b>Working with web apps</b>	<b>123</b>
Web apps on Android	123
Web apps on iOS	125
<b>Automating hybrid apps</b>	<b>127</b>
Android hybrid apps	127
iOS hybrid apps	131
<b>Summary</b>	<b>134</b>
<b>Chapter 7: Advanced User Interactions</b>	<b>135</b>
<b>Exploring advanced user interactions</b>	<b>135</b>
Long press	136
Scroll and swipe	138
Drag and drop	144
Pinch and zoom	146
Alerts	149
Spinners	151
The switch button	152
The slide SeekBar	153
Capturing screenshots	155
Capturing screenshots on test failure	156
<b>Summary</b>	<b>159</b>
<b>Index</b>	<b>161</b>

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# Preface

The idea of mobile automation using the Selenium syntax first came about at the Selenium Conference in April 2012 in London by Dan Cuellar. During the presentation, he showed the automation of iOS using the Selenium syntax. People who attended the conference were excited about the tool's possibilities.

A few months after the Selenium conference, Jason Huggins contacted Dan about his project on mobile automation. Jason encouraged Dan to release his code under an open source license. In August that year, Dan released the source code on GitHub. Jason then decided to introduce the project in Mobile Testing Summit in November 2012, but the project needed a new name first. Thus, the name Appium was born.

Appium is the one of the most popular tools for mobile automation and is used for testing applications on iOS, Android, and Firefox platforms. It can automate native, hybrid, and web mobile apps.

In January 2013, Sauce Labs decided to fully back Appium and created a team to support Appium. The team, which included Jonathan Lipps (the current project lead), decided that Appium needed a rebirth and ultimately settled on Node.js as the framework to be used.

Appium, with its new design, debuted in Google Test Automation Conference 2013 and was released with Android and Selendroid support a few months later, to make Appium the first cross-platform automation framework. In May 2014, Appium released version 1.0 with stability improvements, bug fixes, and added features. If you want to read more about Appium's history then you can visit the official website <http://appium.io/history.html>.

This book will help you perform mobile automation testing and use Appium drives on both emulators/simulators and real devices. You will also have a good understanding of mobile automation concepts once you're through with it.

## What this book covers

*Chapter 1, Appium – Important Conceptual Background*, explains the JSON wire protocol and Appium sessions, and you will get to know the "desired capabilities" that are required before you start using Appium. A brief introduction to the Appium server and the client library are also provided in the chapter.

*Chapter 2, Getting Started with Appium*, explains the system requirements for both Android and iOS platforms and the advantages of using Appium over other existing tools. You will also understand the prerequisites to get started with Appium. In this chapter, you will learn how to install and set up the software with system variables and create the development environment.

*Chapter 3, The Appium GUI*, explains all the functionalities of the buttons and general settings using the Appium GUI.

*Chapter 4, Finding Elements with Different Locators*, explains the steps to find elements in order to interact with mobile applications. You will also be acquainted with how to use different locators and techniques to find the elements.

*Chapter 5, Working with Appium*, explains scriptwriting for different mobile applications that are supported by Appium. You also get to know about how to install mobile apps in an emulator.

*Chapter 6, Driving Appium on Real Devices*, introduces users to testing mobile applications on real devices. This chapter also includes the general settings required for real devices to work with Appium.

*Chapter 7, Advanced User Interactions*, explores the Appium client library and mobile gestures, such as scroll, zoom, and swipe. You will also learn how to capture screenshots and the uses of the TestNG Listener for taking screenshots on test failure.

## What you need for this book

You will need the following software to get started with the examples in this book:

- Java (version 7 or later)
- The Android SDK API Version 17 or later
- The Eclipse IDE
- TestNG
- The Appium Server
- The Appium client library (Java)

- The Selenium Server and WebDriver Java library
- The ADB plugin on Chrome browser
- Windows 7 or later
- Mac OS 10.7 or later
- Xcode (4.6.3 or a later version; 5.1 is recommended)

## Who this book is for

*Appium Essentials* is intended for automation testers and developers who want to enhance their skills in web-based automation as well as mobile application automation using Appium. It is assumed that you have basic knowledge of mobile application testing, Selenium WebDriver, and programming.

## Conventions

In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles, and an explanation of their meaning.

Code words in text are shown as follows: "After installation, run the command `appium-doctor` to ensure that we are ready with Appium."

A block of code is set as follows:

```
@BeforeClass  
public void setUp() throws MalformedURLException{  
    //Set up desired capabilities  
    DesiredCapabilities caps = new DesiredCapabilities();  
    File app=new File("path of the apk");  
    caps.setCapability(MobileCapabilityType.APP,app);  
    caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
    "4.4");  
    caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
    "Android");  
    caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Android  
    emulator");  
    caps.setCapability("avd", "Name of the AVD to launch");  
    caps.setCapability(MobileCapabilityType.APP_PACKAGE, "package  
    name of your app (you can get it from apk info app)");  
    caps.setCapability(MobileCapabilityType.APP_ACTIVITY, "Launch  
    activity of your app (you can get it from apk info app)");
```

```
caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
"Browser");  
// In case of web-apps  
driver = new AndroidDriver(new  
URL("http://127.0.0.1:4723/wd/hub"), caps);  
driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);  
}
```

Any command-line input or output is written as follows:

```
android create avd -n <name of the AVD> -t <targetID>
```

New terms and important words are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: "Click on **Advanced system settings**."



Warnings or important notes appear in a box like this.



Tips and tricks appear like this.

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# 1

## Appium – Important Conceptual Background

In this chapter, we will learn about the Appium architecture, **JavaScript Object Notation (JSON)** wire protocol, and Appium sessions as well as gain an understanding of the desired capabilities before starting Appium. This chapter will also touch upon the topics of the Appium server and its client library.

In short, we will cover the following topics:

- Appium's architecture
- The Selenium JSON wire protocol
- Appium sessions
- Desired capabilities
- The Appium server and its client library

### Appium architecture

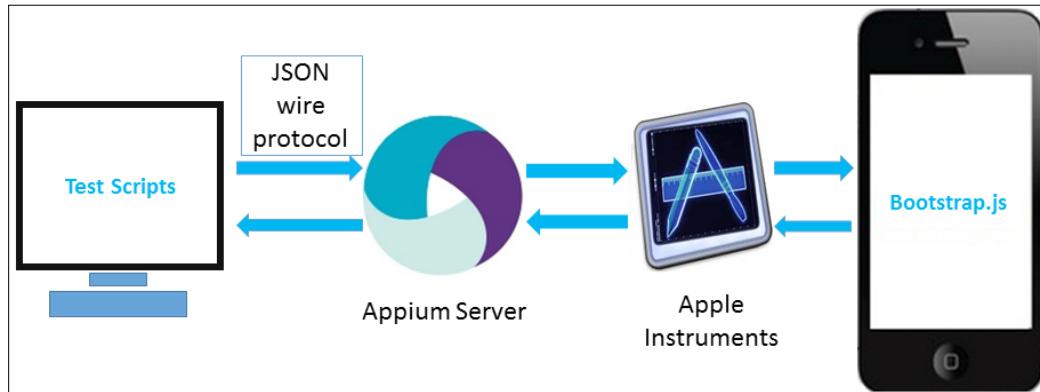
Appium is an HTTP server written in Node.js that creates and handles WebDriver sessions. The Appium web server follows the same approach as the Selenium WebDriver, which receives HTTP requests from client libraries through JSON and then handles those requests in different ways, depending on the platform it is running on.

Let's discuss how Appium works in iOS and Android.

## Appium on iOS

On an iOS device, Appium uses Apple's UIAutomation API to interact with the UI elements. UIAutomation is a JavaScript library provided by Apple to write test scripts; Appium utilizes these same libraries to automate iOS apps.

Let's take a look at the architecture, which is shown in the following diagram:



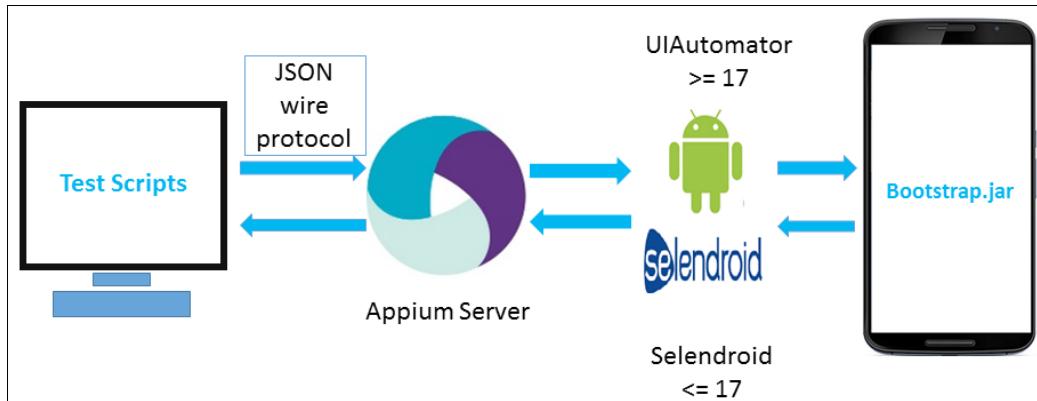
In the preceding diagram, when we execute the test scripts, it goes in the form of JSON through an HTTP request to the Appium server. The Appium server sends the command to the instruments, and the instruments look for the `bootstrap.js` file, which is pushed by the Appium server to the iOS device. Then, these commands execute in the `bootstrap.js` file within the iOS instruments' environment. After the execution of the command, the client sends back the message to the Appium server with the log details of the executed command.

A similar kind of architecture follows in the case of Android app automation.  
Let's discuss the Appium architecture for Android.

## Appium on Android

On an Android device, Appium uses the UIAutomator framework to automate the apps. UIAutomator is a framework that is developed by the Android developers to test the Android user interface.

Let's take a look at the architecture, which is shown in the following diagram:



In the preceding diagram, we have a UIAutomator/Selendroid in place of Apple instruments and `bootstrap.jar` in place of the `bootstrap.js` file.

Appium supports Android versions greater than or equal to 17; for earlier versions, it uses the Selendroid framework. When we execute the test scripts, Appium sends the command to the UIAutomator or Selendroid on the basis of the Android version.

Here, `bootstrap.jar` plays the role of a TCP server, which we can use to send the test command in order to perform the action on the Android device using UIAutomator/Selendroid.

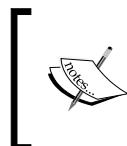
## The Selenium JSON wire protocol

The **JSON wire protocol (JSONWP)** is a transport mechanism created by WebDriver developers. This wire protocol is a specific set of predefined, standardized endpoints exposed via a RESTful API. The purpose of WebDriver and JSONWP is the automated testing of websites via a browser such as Firefox driver, IE driver, and Chrome driver.

Appium implements the Mobile JSONWP, the extension to the Selenium JSONWP, and it controls the different mobile device behaviors, such as installing/uninstalling apps over the session.

Let's have a look at some of the endpoints from the API which are used to interact with mobile applications:

- /session/:sessionId
- /session/:sessionId/element
- /session/:sessionId/elements
- /session/:sessionId/element/:id/click
- /session/:sessionId/source
- /session/:sessionId/url
- /session/:sessionId/timeouts/implicit\_wait



The complete list of endpoints is available at <https://code.google.com/p/selenium/wiki/JsonWireProtocol> and <https://code.google.com/p/selenium/source/browse/spec-draft.md?repo=mobile>.



Appium provides client libraries similar to WebDriver that act as an interface to the REST API. These libraries have functions similar to the following method:

```
AppiumDriver.getPageSource();
```

This method will issue an HTTP request to the JSONWP, and it gets the response from the applicable API endpoint. In this case, the API endpoint that handles the getPageSource method is as follows:

```
/session/:sessionId/source
```

The driver will execute the test script that comes in the JSON format from the AppiumDriver server to get the source. It will return the page source in the string format. In case of non-HTML (native mobile apps) platforms, the Appium library will respond with an XML document representation of the UI hierarchy. The specific structure of the document may vary from platform to platform.

## Appium session

A session is a medium to send commands to the specific test application; a command is always performed in the context of a session. As we saw in the previous section, a client uses the session identifier as the sessionId parameter before performing any command. The client library requests the server to create a session. The server will then respond with a sessionId endpoint, which is used to send more commands to interact with the application(s) being tested.

## Desired capabilities

Desired capabilities is a JSON object (a set of keys and values) sent by the client to the server. It describes the capabilities for the automation session in which we are interested.

Let's discuss the capabilities one by one; first, we will see the Appium server's capabilities:

We need to import "import org.openqa.selenium.remote.DesiredCapabilities" library for Java to work with the desired capabilities.

Capability	Explanation
automationName	<p>This capability is used to define the automation engine. If you want to work with an Android SDK version less than 17, then you need to define the value as Selendroid; otherwise, the capability takes the default value as Appium. Let's see how we can implement it practically:</p> <pre>DesiredCapabilities caps = new DesiredCapabilities(); caps.setCapability("automationName", "Selendroid"); // to set capability value</pre> <p>We can also set the capabilities using Appium's client library. For this, users need to import "import io.appium.java_client.remote.MobileCapabilityType" library:</p> <pre>caps.setCapability(MobileCapabilityType.AUTOMATION_NAME, "Selendroid");</pre> <p>There's no need to use this capability in the case of iOS.</p>
platformName	<p>It is used to set the mobile OS platform. It uses the value as iOS, Android, or FirefoxOS:</p> <pre>caps.setCapability("platformName", "Android");</pre> <p>In case of the Appium client library, you can use this:</p> <pre>caps.setCapability(MobileCapabilityType.PLATFORM_NAME, "Android");</pre>

Capability	Explanation
platformVersion	To set the mobile OS version, for example, 7.1, 4.4.4, use the following command: <pre>caps.setCapability("platformVersion", "4.4.4");</pre> Alternatively, you can use the following command as well: <pre>caps.setCapability(MobileCapabilityType.PLATFORM_VERSION, "4.4.4");</pre>
deviceName	We can define the type of mobile device or emulator to use, using the following command, for example, iPhone Simulator, iPad Simulator, iPhone Retina 4-inch, Android Emulator, Moto x, Nexus 5, and so on: <pre>caps.setCapability("deviceName", "Nexus 5");</pre> You can use the following command as well: <pre>caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Nexus 5");</pre>
app	We can add the absolute local path or remote HTTP URL of the .ipa,.apk, or .zip file. Appium will install the app binary on the appropriate device first. Note that in the case of Android, if you specify the appPackage and appActivity (both the capabilities will be discussed later in this section) capabilities, then this capability shown here is not required: <pre>caps.setCapability("app", "/apps/demo/demo.apk or http://app.com/app.ipa");</pre> Alternatively, you can use the following command: <pre>caps.setCapability(MobileCapabilityType.APP, "/apps/demo/demo.apk or http://app.com/app.ipa");</pre>

Capability	Explanation
browserName	<p>If you want to automate mobile web applications, then you have to use this capability to define the browser.</p> <p>For Safari on iOS, you can use this:</p> <pre>caps.setCapability("browserName", "Safari");</pre> <p>Also, you can use the following command:</p> <pre>caps.setCapability(MobileCapabilityType.BROWSER_NAME, "Safari");</pre> <p>For Chrome on Android, you can use this:</p> <pre>caps.setCapability("browserName", "Chrome");</pre> <p>Alternatively, you can use the following command:</p> <pre>caps.setCapability(MobileCapabilityType.BROWSER_NAME, "Chrome");</pre>
newCommandTimeout	<p>To end the session, Appium will wait for a few seconds for a new command from the client before assuming that the client quit. The default value is 60. To set this time, you can use the following command:</p> <pre>caps.setCapability("newCommandTimeout", "30");</pre> <p>You can also use this command to end the session:</p> <pre>caps.setCapability(MobileCapabilityType.NEW_COMMAND_TIMEOUT, "30");</pre>
autoLaunch	<p>This capability is used to install and launch the app automatically. The default value is set to <code>true</code>. You can set the capability with the following command:</p> <pre>caps.setCapability("autoLaunch", "false");</pre>
language	<p>This is used to set the language on the simulator/emulator, for example, <code>fr</code>, <code>es</code>, and so on. The following command will work only on the simulator/emulator:</p> <pre>caps.setCapability("language", "fr");</pre>

Capability	Explanation
locale	This is used to set the locale for the simulator/emulator, for example, fr_CA, tr_TR, and so on: <pre>caps.setCapability("locale", "fr_CA");</pre>
udid	A unique device identifier (udid) is basically used to identify iOS physical device. It is a 40 character long value (for example, 1be204387fc072g1be204387fc072g4387fc072g). This capability is used when you are automating apps on iOS physical device. We can easily get the device udid from iTunes, by clicking on Serial Number: <pre>caps.setCapability("udid", "1be204387fc072g1be204387fc072g4387fc072g");</pre>
orientation	This is used to start in a certain orientation in simulator/emulator only, for example, LANDSCAPE or PORTRAIT: <pre>caps.setCapability("orientation", "PORTRAIT");</pre>
autoWebview	If you are automating hybrid apps and want to move directly into the Webview context, then you can set it by using this capability; the default value is false: <pre>caps.setCapability("autoWebview", "true");</pre>
noReset	This capability is used to reset the app's state before the session starts; the default value is false: <pre>caps.setCapability("noReset"-, " true");</pre>
fullReset	In iOS, this will delete the entire simulator folder. In Android, you can reset the app's state by uninstalling the app instead of clearing the app data; also, it will remove the app after the session is complete. The default value is false. The following is the command for fullReset: <pre>caps.setCapability("fullReset", "true");</pre>

## Android capabilities

Now, let's discuss the Android capabilities, as shown in the following table:

Capability	Explanation
appPackage	<p>This capability is for the Java package of the Android app that you want to run, for example, com.android.calculator2, com.android.settings, and so on:</p> <pre>caps.setCapability("appPackage", "com.android.calculator2");</pre> <p>Alternatively, you can use this command:</p> <pre>caps.setCapability(MobileCapabilityType.APP_PACKAGE, "com.android.calculator2");</pre>
appActivity	<p>By using this capability, you can specify the Android activity that you want to launch from your package, for example, MainActivity, .Settings, com.android.calculator2.Calculator, and so on:</p> <pre>caps.setCapability("appActivity", "com.android.calculator2.Calculator");</pre> <p>You can also use the following command:</p> <pre>caps.setCapability(MobileCapabilityType.APP_ACTIVITY, "com.android.calculator2.Calculator");</pre>
appWaitActivity	<p>Android activity for which the user wants to wait can be defined using this capability:</p> <pre>caps.setCapability("appWaitActivity", "com.android.calculator2.Calculator");</pre> <p>Alternatively, you can also use this command:</p> <pre>caps.setCapability(MobileCapabilityType.APP_WAIT_ACTIVITY, "com.android.calculator2.Calculator");</pre>
appWaitPackage	<p>The Java package of the Android app you want to wait for can be defined using the following capability, for example, com.example.android.myApp, com.android.settings, and so on:</p> <pre>caps.setCapability("appWaitPackage", "com.example.android.myApp");</pre>

Capability	Explanation
deviceReadyTimeout	<p>You can set the timeout (in seconds) while waiting for the device to be ready, as follows; the default value is 5 seconds:</p> <pre data-bbox="768 466 1176 519">caps.setCapability   ("deviceReadyTimeout", "10");</pre> <p>Alternatively, you can also use this command:</p> <pre data-bbox="768 572 1225 646">caps.setCapability   (MobileCapabilityType.DEVICE_READY_TIMEOUT, "10");</pre>
enablePerformanceLogging	<p>You can enable the Chrome driver's performance logging by the use of this capability. It will enable logging only for Chrome and web view; the default value is false:</p> <pre data-bbox="768 804 1176 878">caps.setCapability   ("enablePerformanceLogging",   "true");</pre>
androidDeviceReadyTimeout	<p>To set the timeout in seconds for a device to become ready after booting, you can use the following capability:</p> <pre data-bbox="768 994 1266 1047">caps.setCapability(   "androidDeviceReadyTimeout", "20");</pre>
androidDeviceSocket	<p>This capability is used to set DevTools socket name. It is only needed when an app is a Chromium-embedding browser. The socket is opened by the browser and the ChromeDriver connects to it as a DevTools client, for example, chrome_DevTools_remote:</p> <pre data-bbox="768 1258 1266 1311">caps.setCapability("androidDeviceSocket", "chrome_DevTools_remote");</pre>
Avd	<p>Using this capability, you can specify the name of avd that you want to launch, for example, AVD_NEXUS_5:</p> <pre data-bbox="768 1427 1095 1459">caps.setCapability   ("avd", "AVD_NEXUS_5");</pre>
avdLaunchTimeout	<p>This capability will help you define how long you need to wait (in milliseconds) for an avd to launch and connect to the Android Debug Bridge (ADB) (the default value is 120000):</p> <pre data-bbox="768 1628 1192 1681">caps.setCapability("avdLaunchTimeout", "230000");</pre>

Capability	Explanation
avdReadyTimeout	You can specify the wait time (in milliseconds) for an avd to finish its boot animations using the following capability; the default wait timeout is 120000: <pre>caps.setCapability("avdReadyTimeout", "240000");</pre>
avdArgs	To pass the additional emulator arguments when launching an avd, use the following capability, for example, netfast: <pre>caps.setCapability("avdArgs", "netfast");</pre>
chromedriverExecutable	You can give the absolute local path to the WebDriver executable (if the Chromium embedder provides its own WebDriver, it should be used instead of the original ChromeDriver bundled with Appium) using the following capability: <pre>caps.setCapability("chromedriverExecutable", "/abs/path/to/webdriver");</pre>
autoWebviewTimeout	The following capability allows you to set the time (in milliseconds) for which you need to wait for the Webview context to become active; the default value is 2000: <pre>caps.setCapability("autoWebviewTimeout", "3000");</pre>
intentAction	Intent action is basically used to start an activity, as shown in the following code. The default value is android.intent.action.MAIN. For example, android.intent.action.MAIN, android.intent.action.VIEW, and so on: <pre>caps.setCapability("intentAction", "android.intent.action.VIEW");</pre>
intentCategory	This provides the intent category that will be used to start the activity (the default is android.intent.category.LAUNCHER), for example, android.intent.category.LAUNCHER, android.intent.category.APP_CONTACTS: <pre>caps.setCapability("intentCategory", "android.intent.category.APP_CONTACTS");</pre>

Capability	Explanation
intentFlags	Flags are used to start an activity (the default is 0x10200000), for example, 0x10200000: <pre>caps.setCapability("intentFlags", "0x10200000");</pre>
unicodeKeyboard	You can enable Unicode input by using the following code; the default value is false: <pre>caps.setCapability("unicodeKeyboard", "true");</pre>
resetKeyboard	You can reset the keyboard to its original state by using this capability. The default value is false: <pre>caps.setCapability("resetKeyboard", "true");</pre>

## iOS capabilities

Let's discuss the iOS capabilities, as shown in the following table:

Capability	Explanation
calendarFormat	This is used to set the calendar format for the iOS simulator. It applies only to a simulator, for example, Gregorian: <pre>caps.setCapability("calendarFormat", "Gregorian");</pre>
bundleId	BundleId is basically used to start an app on a real device or to use other apps that require the bundleId during the test startup, for example, io.appium.TestApp: <pre>caps.setCapability("bundleId", "io.appium.TestApp");</pre>
launchTimeout	This is used to specify the amount of time (in millisecond) you need to wait for Instruments before assuming that it hung and the session failed. This can be done using the following command: <pre>caps.setCapability("launchTimeout", "30000");</pre>

Capability	Explanation
locationServicesEnabled	This capability is used to enable location services. You can apply it only on a simulator; you can give the Boolean value, as follows:  <code>caps.setCapability("locationServicesEnabled", "false");</code>
locationServicesAuthorized	If you want to use this capability, you must provide the bundleId by using the bundleId capability. You can use this capability on a simulator. After setting this, the location services alert doesn't pop up. The default is the current simulator setting and its value is false:  <code>caps.setCapability("locationServicesAuthorized", "true");</code>
autoAcceptAlerts	Using this capability, you can accept privacy permission alerts automatically, such as location, contacts, photos, and so on, if they arise; the default value is false:  <code>caps.setCapability("autoAcceptAlerts", "true");</code>
nativeInstrumentsLib	You can use the native instruments library by setting up this capability:  <code>caps.setCapability("nativeInstrumentsLib", "true");</code>
nativeWebTap	This can be used to enable real web taps in Safari, which are non-JavaScript based. The default value is false. Let me warn you that this might not perfectly deal with an element; it depends on the viewport's size/ratio:  <code>caps.setCapability("nativeWebTap", "false");</code>
safariAllowPopups	You can use this capability on a simulator only. It allows JavaScript to open new windows in Safari. The default is the current simulator setting. To do this, you can use the following command:  <code>caps.setCapability("safariAllowPopups", "false");</code>

Capability	Explanation
safariIgnoreFraudWarning	This capability can be used only on a simulator. It prohibits Safari from displaying a fraudulent website warning. The default value is the current simulator setting, as follows: <pre>caps.setCapability   ("safariIgnoreFraudWarning",    "false");</pre>
safariOpenLinksInBackground	This capability enables Safari to open links in new windows; the default keeps the current simulator settings: <pre>caps.setCapability   ("safariOpenLinksInBackground",    "true");</pre>
keepKeyChains	Whether you need to keep keychains (Library/ Keychains) when an Appium session is started/ finished can be defined using this capability. You can apply it on a simulator, as follows: <pre>caps.setCapability   ("keepKeyChains", "true");</pre>
processArguments	This capability allows you to pass arguments while AUT using instruments, for example, myflag: <pre>caps.setCapability   ("processArguments", "myflag");</pre>
interKeyDelay	You can delay the keystrokes sent to an element when typing uses this capability. It takes the value in milliseconds: <pre>caps.setCapability   ("interKeyDelay", "100");</pre>

We have seen all the desired capabilities that are used in Appium. Now, we will talk in brief about the Appium server and its client library.

## The Appium server and its client libraries

The Appium server is used to interact with different platforms such as iOS and Android. It creates a session to interact with mobile apps, which are not supported on any platform. It is an HTTP server written in Node.js and uses the same concept as the Selenium Server, which identifies the HTTP requests from the client libraries and sends these requests to the appropriate platform. To start the Appium server, users need to download the source or install it directly from npm. Appium also provides the GUI version of the server. You can download it from the official Appium site, <http://appium.io>. In the next chapter, we will discuss the GUI version in more detail.

One of the biggest advantages of Appium is because it is simply a REST API at its core, the code you use to interact with it is written in a number of languages such as Java, C#, Ruby, Python, and others. Appium extends the WebDriver client libraries and adds the extra commands in it to work with mobile devices. It provides client libraries that support Appium extensions to the WebDriver protocol. Because of these extensions to the protocol, it is important to use Appium-specific client libraries to write automation tests or procedures, instead of generic WebDriver client libraries.

Appium added some interesting functionality for working closely with mobile devices, such as multitouch gestures and screen orientation. We will see the practical implementation of these functionalities later.

## Summary

We should now have an understanding of the Appium architecture, JSON wire protocol, desired capabilities, and its uses. We also learned about the Appium server and its language-specific client library in this chapter.

Specifically, we dove into JSONWP and Appium session, which are used to send further commands in order to interact with the application. We also set up automation sessions using the desired capabilities. In the last section, we grasped some information about the Appium server and its language-specific client libraries.

In the next chapter, we will take a look at what we require to get started with Appium.



# 2

## Getting Started with Appium

Today, a lot is going on in the field of mobile development, and we need to test these developments to meet the expectations of the end users. It is this progress that has contributed to the growth of mobile automation. Dan Cuellar came up with a brilliant idea that involved integrating the tool with Selenium, post which he created Appium. Appium is a good tool and is widely used to automate mobile apps. The best part is that it is open source.

In this chapter, we will learn the following:

- The advantages of Appium
- System requirements for Android/iOS
- Installing different software
- Creating emulators and simulators
- Setting up an Eclipse Java project

### Appium – pros and cons

Appium is an open source tool for automating mobile apps, such as native, web-based, and hybrid applications designed for the Android, iOS, and Firefox OS platforms.

Before diving into Appium's advantages, let's discuss its shortcomings, as follows:

- **No direct support for Android Alert Handling:** Alert handling is not implemented yet for native apps via Alert API but, we have an alternative to handle it which we will see in *Chapter 7, Advanced User Interactions*. Hopefully, alert handling will be implemented soon.
- **Limited support for Android versions:** Appium directly supports Android Version 17 or later, but if we want to work with versions older than version 17, then we can use the integrated tool Selendroid.

- **Lack of image recognition:** We can't locate images; to work with images, we have to work with screen coordinates, which is not the best way but again it's in their road map to apply the locator strategy to find images.
- **Mobile gestures support:** Some of the gesture supports are not implemented yet, such as double-clicking in the Java client library, but they are implemented in other client libraries. Hopefully the gesture support will be implemented soon in the Java client library as well.

Now, let's discuss Appium's advantages on the basis of its philosophy.

The Appium philosophy has a different appeal from other competitors. The official philosophy (<http://appium.io/slate/en/master/?java#appium-philosophy>) is as follows:

- You shouldn't recompile your app or modify it in any way in order to automate it
- You shouldn't be locked into a specific language or framework to write and run your tests
- A mobile automation framework shouldn't reinvent the wheel when it comes to automation APIs
- A mobile automation framework should be open source in spirit and practice as well as in name

Appium uses vendor-provided frameworks under the hood, which meets the first requirement, so we don't need third-party code to compile the app. We can test the same build of the app that we are going to submit in the marketplace. For our second requirement, Appium extends the WebDriver client libraries, which are already written in most popular programming languages. So, we are free to use any programming language in order to write the automation test scripts.

Appium extends the existing WebDriver JSONWP with additional API methods that are convenient for mobile automation. So, Appium has the same standard as WebDriver and no reinvention for the mobile automation framework, which meets the third requirement. Last but not least, it is open source.

It provides cross-platform solutions for native and hybrid mobile apps, which means that the same test cases will work on multiple platforms. If you are familiar with Selenium WebDriver, you will feel at home with Appium, otherwise you will first need to learn WebDriver for a better understanding. Appium uses the same scripting as WebDriver. Appium allows you to talk to other Android apps that are integrated with **App Under Test (AUT)**. For example, you can hit another app from the AUT such as a camera app. It also supports cloud-based testing; you can run your test scripts in the cloud using services such as Sauce Labs and Testdroid. They provide services to run tests on real devices or simulators.

These advantages make it superior over other mobile automation tools. The following table shows Appium's advantages over other tools based on its philosophy:

Tools	R1	R2	R3	R4
Calabash	No	No	No	Yes
iOS driver	Yes	Yes	Yes	No
Robotium	No	No	Yes	No
Selendroid	No	Yes	Yes	No
Appium	Yes	Yes	Yes	Yes



R1, R2, R3, and R4 are the Appium philosophy, which we discussed earlier in this section.



## System requirements for Android/iOS

We have read about Appium; now, it's time to know about the system requirements for Android/iOS.

### Android requirements on Windows and Mac

The following are the system requirements for Appium on Android:

- Java (version 7 or later)
- Android SDK API (version 17 or later)
- Android Virtual Device (AVD) or real device

### iOS requirements

These are the system requirements for iOS devices to start with Appium:

- Mac OS X 10.7 or later
- Xcode (greater than or equal to 4.6.3; 5.1 is recommended) with the command-line build tool
- Java version 7 or later

- Homebrew
- Node and npm

In the following section, we will look at how to install different software.

## Installing different software

To get started with Appium, we need to install some software on our machines. Let's start the installation process on different machines.

### Appium installation for Android

The prerequisites for the installation of Appium on Android are as follows:

- JDK (Java development kit)
- Android SDK (Software development kit)
- Appium for different OSes

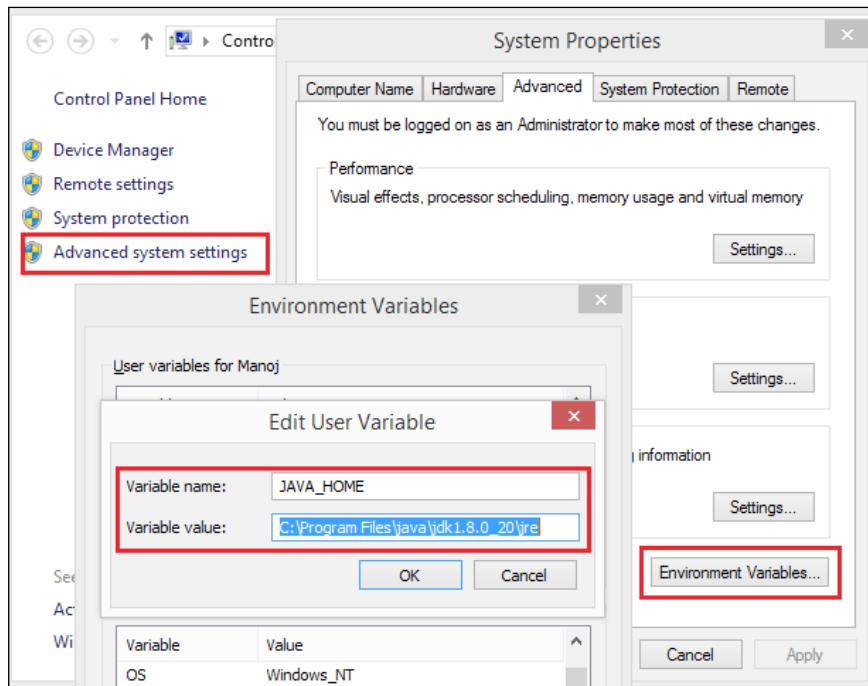
### Installing JDK on Windows

In order to install the JDK, you can visit <http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html>.

After installing the JDK, you need to set the environment variables. To do this, perform the following steps:

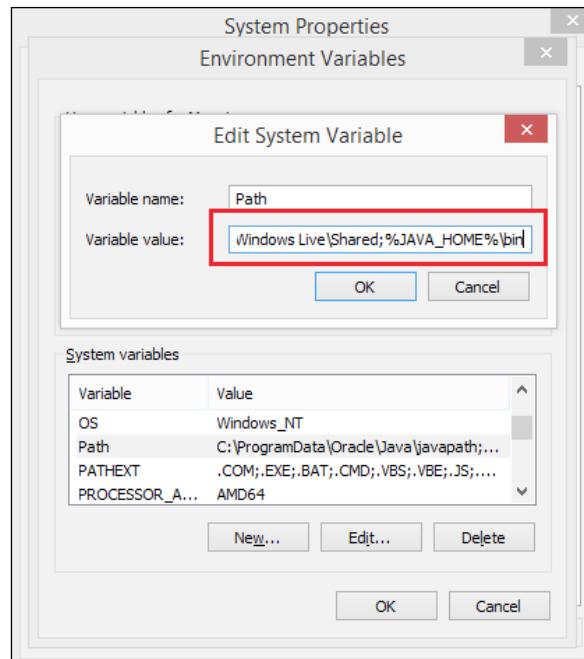
1. Open **System Properties** by pressing the Windows logo + *Pause* key or right-click on **My Computer** and then click on **Properties**.
2. Click on **Advanced system settings**.
3. Click on **Environment Variables**.

4. Under **User variables**, click on **New**. Then, you will get the following screenshot:



5. Enter the **Variable name** as **JAVA\_HOME**.
6. Enter the **Variable value** as the installation path for the JDK, for example, **C:\Program Files\Java\jdk1.8.0\_20\jre**.

7. In the **System variables** section, double-click on **Path**; then, in **Variable value**, add the new path `%JAVA_HOME%\bin`. Just ensure that there is a semicolon separating this entry from the preexisting value, as shown in the following screenshot:



8. Finally, click on the **OK** button to apply the changes.

Now, open the command prompt and enter the command `java -version` to check the Java path setting. This will return the Java version available on the system.

## Installing the Android SDK

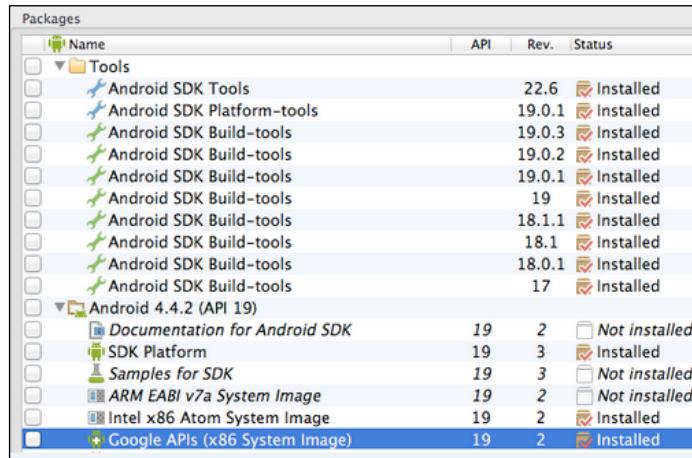
We need to install the Android SDK to drive the test scripts on devices. You can download the Android SDK from <http://developer.android.com/sdk/index.html> for your operating system.

We will set the system variables for Windows using the following steps:

1. Follow steps 1 to 4 from the preceding section, in which we set the path for Java.
2. Type **Variable name** as `ANDROID_HOME` and enter the **Variable value** of where you have your Android SDK installed. For example, `C:\android-sdk`.

3. Now, we need to add the paths %ANDROID\_HOME%\platform-tools and %ANDROID\_HOME%\tools to the **Path** variable under **System Variables**.
4. Click on the **OK** button to apply the changes.

To verify the Android path, type android on the command prompt and press *Enter*. The following window will appear:



The screenshot shows the 'Packages' tab of the Android SDK Manager. It lists various packages under the 'Tools' category, including multiple versions of the Android SDK Tools, Platform-tools, and Build-tools. Below them is the 'Android 4.4.2 (API 19)' category, which includes Documentation for Android SDK, SDK Platform, Samples for SDK, ARM EABI v7a System Image, Intel x86 Atom System Image, and Google APIs (x86 System Image). The 'Google APIs (x86 System Image)' package is currently selected.

Name	API	Rev.	Status
Android SDK Tools	22.6	✓ Installed	
Android SDK Platform-tools	19.0.1	✓ Installed	
Android SDK Build-tools	19.0.3	✓ Installed	
Android SDK Build-tools	19.0.2	✓ Installed	
Android SDK Build-tools	19.0.1	✓ Installed	
Android SDK Build-tools	19	✓ Installed	
Android SDK Build-tools	18.1.1	✓ Installed	
Android SDK Build-tools	18.1	✓ Installed	
Android SDK Build-tools	18.0.1	✓ Installed	
Android SDK Build-tools	17	✓ Installed	
<b>Android 4.4.2 (API 19)</b>			
Documentation for Android SDK	19	2	☐ Not installed
SDK Platform	19	3	✓ Installed
Samples for SDK	19	3	☐ Not installed
ARM EABI v7a System Image	19	2	☐ Not installed
Intel x86 Atom System Image	19	2	✓ Installed
Google APIs (x86 System Image)	19	2	✓ Installed

Install the packages, as shown in the preceding screenshot. If you are testing API 19, then you just need to install **SDK tools (22.6)**, **Platform-tools (19.0.1)**, **Build-tools (19.0.3)**, and **Android 4.4.2**.

## Setting the system variables for Mac

If you are setting the system variables for the first time, then you need to create the .bash\_profile file with the help of following steps:

1. Open the terminal.
2. Type touch ~/.bash\_profile and press *enter/return*.
3. Type open ~/.bash\_profile. The system will open the bash\_profile file.

Now, we have a bash\_profile file. In order to set the Java and Android SDK paths, we need to configure the JAVA\_HOME and ANDROID\_HOME variables in bash\_profile. Add the following paths into the file:

- export JAVA\_HOME=path/to/the/java/home
- export ANDROID\_HOME=path/to/the/android/sdk
- export  
PATH=\$PATH:\$ANDROID\_HOME/tools:\$ANDROID\_HOME/platform-tools

Once you have completed all the steps, type `java -version` in the terminal to check the Java path setting. This will return the Java version available on the system; type `android` on the terminal and install the desired Android packages.

## Appium for iOS

The following are the prerequisites for installing Appium on iOS:

- Xcode
- Homebrew
- Node and npm

### Installing Xcode

We need to perform the following steps to install Xcode:

1. Visit <https://itunes.apple.com/us/app/xcode/id497799835> to install Xcode. Then, click on **View in Mac App Store**.
2. The system will launch the App Store automatically on your Mac and open the Xcode page.
3. Now, click on the **Free** button and then click on **Install App**.

To launch Xcode, you can go to the Applications folder and then double-click on Xcode. Now you are done with the installation.

### Installing Homebrew

Homebrew is a software package management system for Mac, which is used to install the stuff you need that Apple didn't provide. With Homebrew, you can install many open source tools. Perform the following steps to install Homebrew:

1. Open the terminal and enter the following command:  

```
ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install)".
```
2. Follow the instructions prompted by the terminal.
3. After installing the Homebrew, run the command `brew doctor`. You will get the message `Your system is ready to brew`; if you don't, then try to fix the warnings and errors using the `brew doctor`.

## **Node and npm**

npm is a Node.js package manager; it is an online repository of open source Node.js projects. It is command-line utility to package installation.

The Appium server is written in Node.js; that's why we need it to download Appium. There are other ways to download the Appium server as well, which will be discussed later.

Let's install Node using brew commands. You need to run the following command to install Node:

```
brew install node
```

## **Appium for different OSes**

There are different methods to install the Appium server on Windows/iOS. Let's discuss them one by one.

### **Appium for Windows**

You can download Appium for Windows directly from Appium's official website (<http://appium.io/>), or you can clone Appium from <https://github.com/appium/appium.git>.

Just to ensure that we are ready to start with the Appium server, enter the following command on the Command Prompt:

```
node Appium-doctor
```

You don't need to download Node; you can get it from the Appium bundle. To run the Node commands, you need to set the path for Node (for example, C:\AppiumForWindows). Before running the command, set the directory as C:\AppiumForWindows\node\_modules\appium\bin.

### **Appium for Mac**

Appium for Mac can be downloaded from the Appium website, alternatively you can download it using npm commands.

Run the following command to install Appium:

```
npm install -g appium
```

After installation, run the `appium-doctor` command to ensure that we are ready to use Appium.



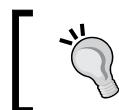
Make sure you have not installed Appium with sudo, otherwise you will face authorization problems while running Appium.



## Downloading the necessary JAR files

We need to download some executable binaries to work with Appium. They are listed as follows:

- Selenium Server and WebDriver Java client (<https://selenium-release.storage.googleapis.com/index.html>)
- Appium Java client (<http://search.maven.org/#search|ga|1|appium%20java%20client>)
- Gson (<http://mvnrepository.com/artifact/com.google.code.gson>)



The download links can be changed; I suggest you visit the official websites in the case of an address change.



## Creating emulators and simulators

We'll now look at how we can create emulators and simulators, starting with an iOS simulator and then move on to an Android simulator.

### An iOS simulator

We don't need to create a simulator for Mac; it already comes with Xcode under developer tools. When you start the Appium server for the first time, it will prompt you to authorize the use of Instruments, or if you are running it from npm, run `sudo authorize_ios` to work with the simulator.

### An Android emulator

There are two ways to create an AVD for testing android apps:

- Create the AVD from the command line
- Create the AVD using the AVD Manager

Let's create AVD using the command line, as follows:

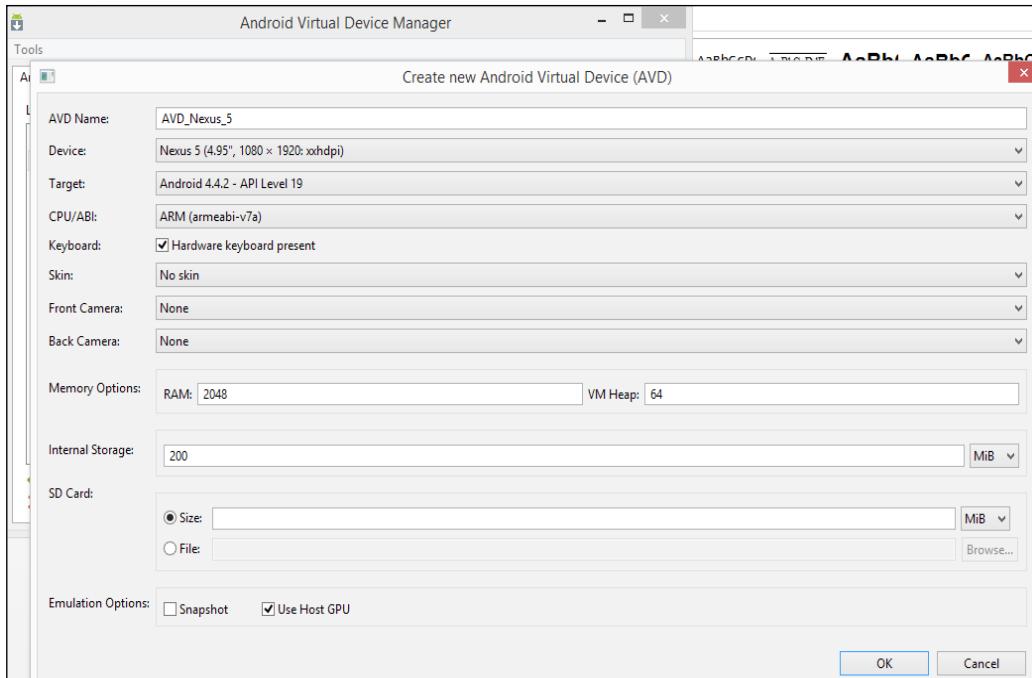
1. Open the Command Prompt and type `android list targets`; this will generate a list of available targets.
2. Run `android create avd -n <name of the AVD> -t <targetID which you can get from the first step> --abi <again you can get it from first step>`.

 You can also customize the AVD with options; visit <http://developer.android.com/tools/devices/managing-avds-cmdline.html> for more details.

The preceding link can change; if it has changed, then you can search on Google with the keywords "avds command line".

Second, we can create the AVD from the AVD Manager (you can find this under the `Android SDK` folder). We need to perform the following steps to create the AVD:

1. Double-click on **AVD Manager** and click on the **New** button. The following screen will be displayed:



2. Enter the name of the device and the necessary details.
3. Click on the **OK** button.

After you complete these steps, the emulator will be displayed under the **Android Virtual Devices** tab.

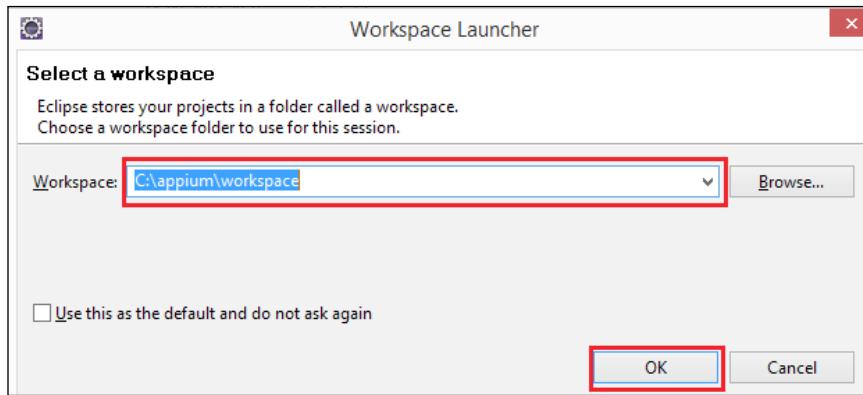
## Setting up an Eclipse Java project

We need an integrated development environment (IDE) to write test scripts; in the market, there are a lot of open source IDE's such as Eclipse, NetBeans, IntelliJ IDEA, and others. Here we are going to use an Eclipse IDE. If you have downloaded the Android ADT bundle, then you will get Eclipse along with it. Otherwise, you can download it from <http://www.eclipse.org/downloads/packages/eclipse-ide-java-ee-developers/lunasr1a>.

Once you have downloaded the IDE, launch it by double-clicking on the `eclipse.exe` icon.

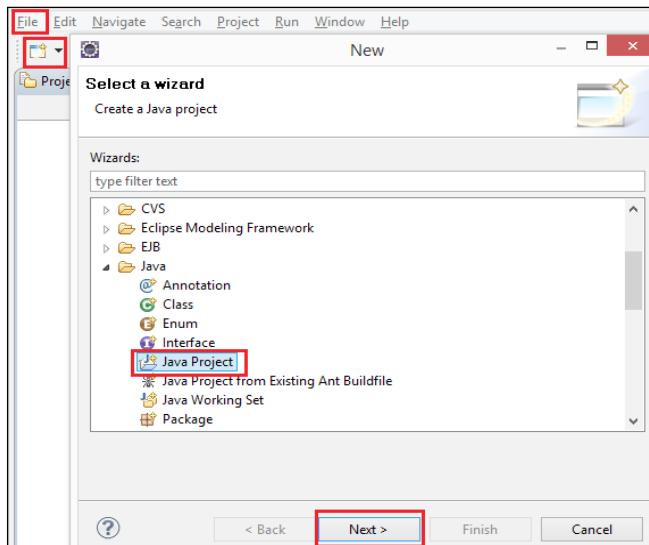
After this, you need to perform the following steps to set up the Java project:

1. After clicking on the icon, it will ask you for a **Workspace** location. Enter the location and click on the **OK** button, as shown here:

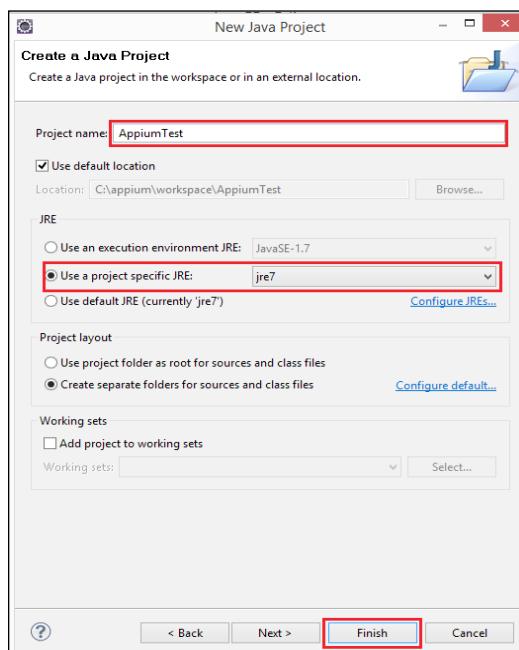


2. Click on the Workbench icon on the welcome screen, which is at the top-right corner of the screen.
3. Create a new project by clicking on the shortcut icon; you can also do this by navigating to **File | New | Project**. A dialog box will appear.

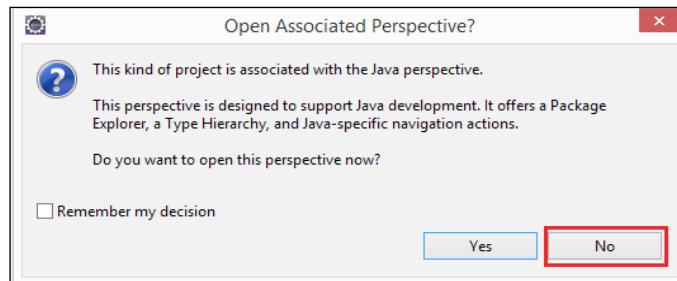
4. Select **Java Project** under the **Java** folder and click on the **Next** Button, as shown in the following screenshot:



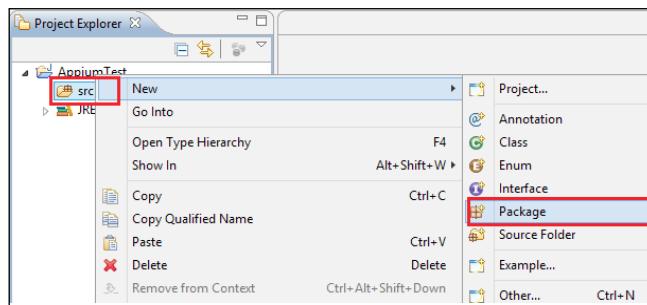
5. Enter the **Project name**, for example, AppiumTest, and click on **Use a project specific JRE** or **Use default JRE**. Then click on the **Finish** button, as shown here:



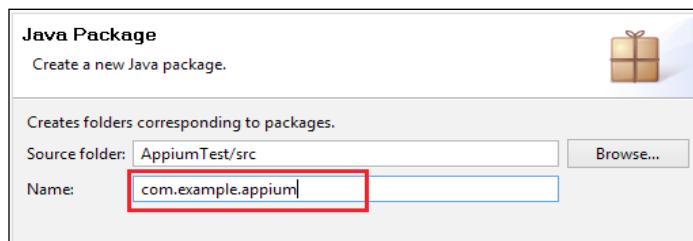
- Eclipse will prompt you to open the project in perspective view; you need to click on the **No** button:



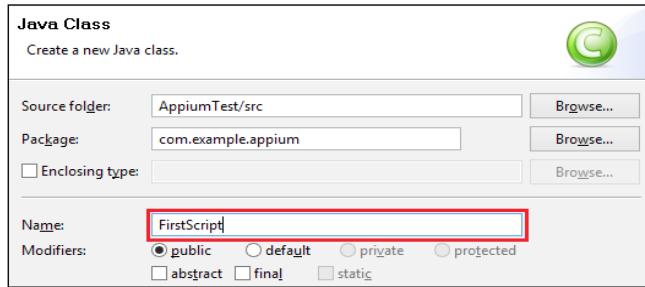
- You have successfully created the Java project. Now, create a package by right-clicking on **src**; then, go to **New | Package** and enter the package name, for example, `com.example.appium`. Now, click on the **Finish** button, as shown in the following screenshot:



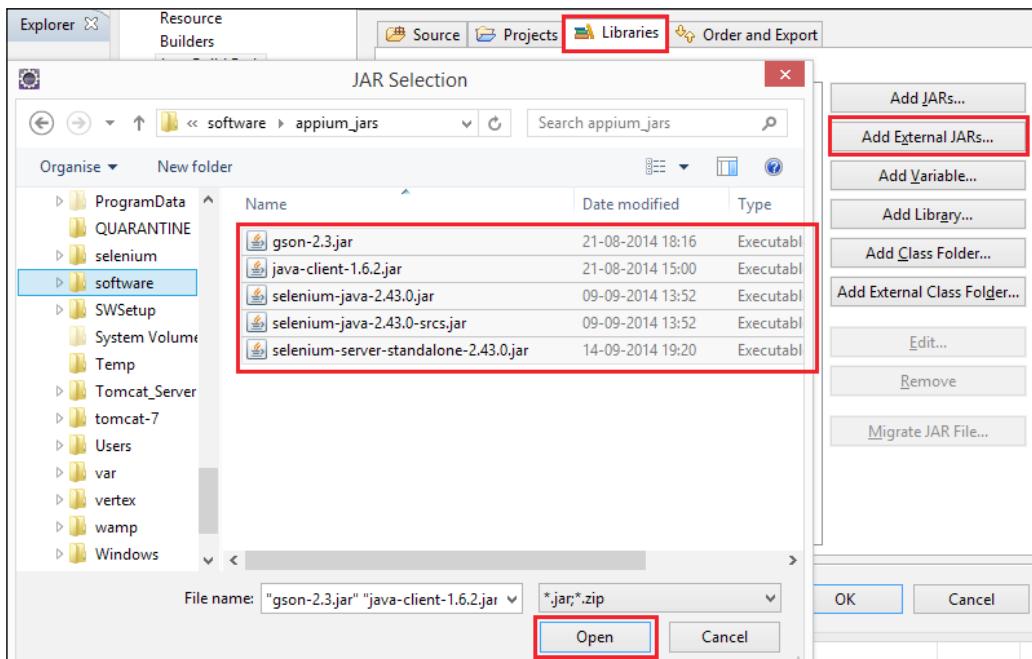
- The following window will open:



9. Now, create the class by right-clicking on **com.example.appium**; go to **New | Class** and type the name of the class, for example, **FirstScript**. Next, click on the **Finish** button, as shown here:



10. Before writing the test scripts, we need to add some external JAR files, which are shown in the following screenshot. In order to add JAR files, right-click on **AppiumTest** and navigate to **Build Path | Configure Build Path**. Eclipse will open a dialog box; select the **Libraries** tab and then click on **Add External JARs...**, as shown in the following screenshot:

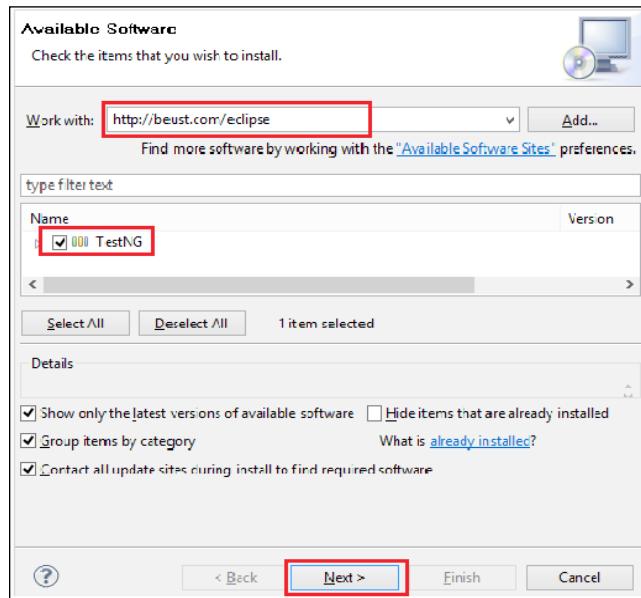


11. You need to add the JAR files shown in the preceding screenshot. After adding the JAR files, click on the **OK** button.

We have created a Java project and successfully configured all the necessary JAR files. As we are going to use TestNG as the unit testing framework, we need to install TestNG as an Eclipse plugin.

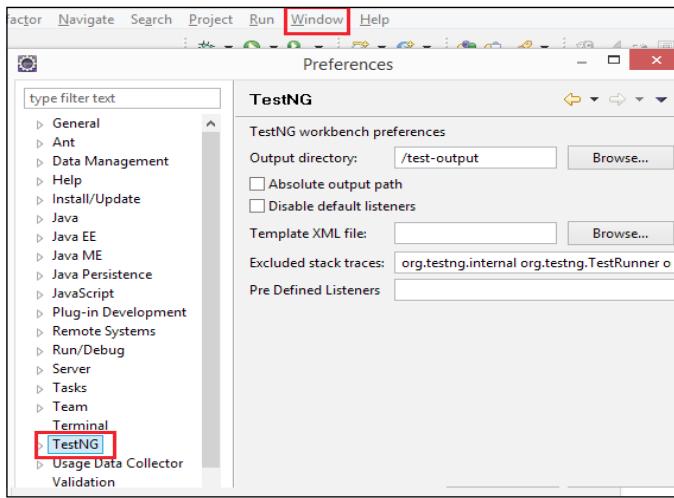
In order to install TestNG, we need to perform the following steps:

1. Click on the **Help** tab and then click on **Install New Software**; you will get the following installation window:



2. Type the address in **Work with** as `http://beust.com/eclipse`. **TestNG** will appear in the frame; just select **TestNG** and click on the **Next** button. Now, you need to follow the instructions to install the TestNG plugin.

3. The **TestNG** plugin will be displayed in **Preferences** under **Window** once you have completed the installation, as shown here:



Now we are ready to write our first Appium test script.

## Summary

We learned a lot in this chapter, starting with the pros and cons of Appium and moving on to the system requirements for Android and iOS. We then looked at the installation of JDK, Android SDK, WebDriver client, Selenium server binaries, Homebrew, Node and npm, as well as Appium and its client library. We also learned about the system's environment variables. Lastly, we created an emulator to test the apps and set up an Eclipse Java project.

In the next chapter, we are going to learn how to use the Appium GUI.



# 3

## The Appium GUI

This chapter focuses on the GUI for the Appium server. By the end of this chapter, we should get an understanding of all the terms that are available in the application.

In this chapter, we will learn about the following topics:

- The Appium GUI for Windows
- The Appium GUI for Mac

### The Appium server

In the previous chapter, we downloaded the Appium server. We have two ways to start the server: either using the Appium GUI or using Command Prompt/Terminal. Now let's discuss the Appium GUI.

### The Appium GUI for Windows

Appium developers have created the well-designed server GUI, using which we can easily start the server along with the desired settings. This GUI gives us a lot of options to set up the environment in order to start with automation testing.

The Appium GUI has the following icons/buttons:

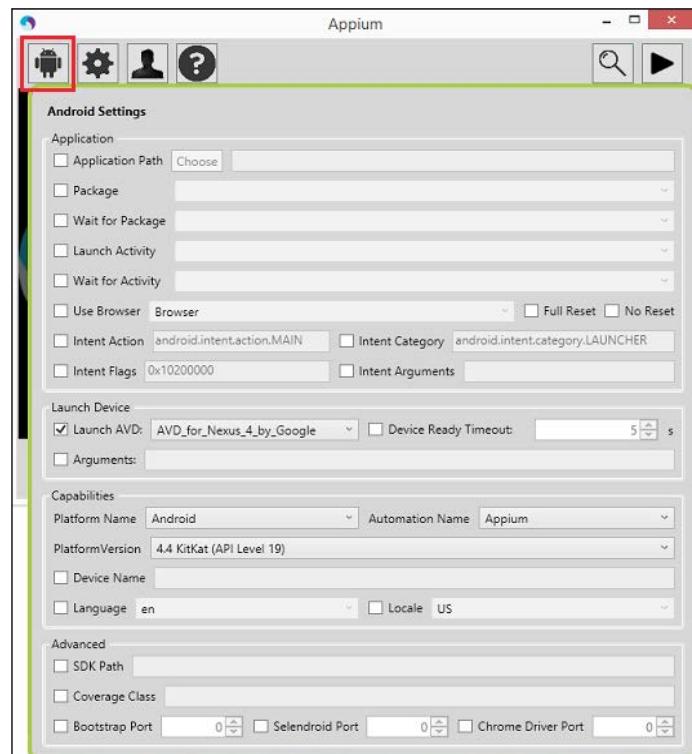
- **Android Settings**
- **General Settings**
- **Developer Settings**
- **About**
- **Inspector**
- **Launch/Stop**
- **Clear**

These buttons/icons can be seen in the following screenshot:



## Android Settings

Under **Android Settings**, we have multiple options which we need before we start with the automation of mobile apps. Just click on the first icon from the Appium GUI; this will open the pop-up window along with a lot of fields. These fields are categorized using headings such as **Application**, **Launch Device**, **Capabilities**, and **Advanced**, as shown in the following screenshot:



## Application

The **Application** pane contains various fields, which are listed in the following table:

Field	Description
<b>Application Path</b>	In this field, you can give the path of the Android APK that you want to test. You have two options to set the app's path: either to click on the <b>Choose</b> button or directly type into the box.
<b>Package</b>	This field is for the Android app package. For example, com.android.calculator2.
<b>Wait for Package</b>	This capability will wait for the application package, which we provide in the <b>Package</b> capability.
<b>Launch Activity</b>	Type the activity that you want to launch in the mobile device, for example, MainActivity.
<b>Wait for Activity</b>	This is the same as the wait for package functionality; it will wait for the app activity.
<b>Use Browser</b>	Select the browser from the dropdown, which you wish to launch.
<b>Full Reset</b>	This will uninstall the app after the session is complete.
<b>No Reset</b>	This will prevent the device from resetting.
<b>Intent Action</b>	This will be used to start the activity.
<b>Intent Category</b>	Here, we can specify the app activity that we want to start.
<b>Intent Flags</b>	This denotes the intent flags used to start the activity.
<b>Intent Arguments</b>	Here, you can pass additional arguments to start the activity.

## Launch Device

The **Launch Device** pane contains a lot of fields, which are listed in the following table:

Field	Description
<b>Launch AVD</b>	Here, you need to type the name of the AVD to be launched.
<b>Device Ready Timeout</b>	Here, mention the timeout (in seconds) to wait for the device to be ready.
<b>Arguments</b>	We can pass additional emulator arguments to launch the AVD in this field.

## Capabilities

The **Capabilities** pane contains the fields listed in the following table:

Field	Description
<b>Platform Name</b>	This denotes the name of the mobile platform.
<b>Automation Name</b>	You can select this from the dropdown.
<b>PlatformVersion</b>	Here, select the android version in which you wish to test the mobile app.
<b>Device Name</b>	This denotes the name of the device to be used.
<b>Language</b>	This is used to set the language for the Android device.
<b>Locale</b>	This is used to set the locale for the Android device.

## Advanced

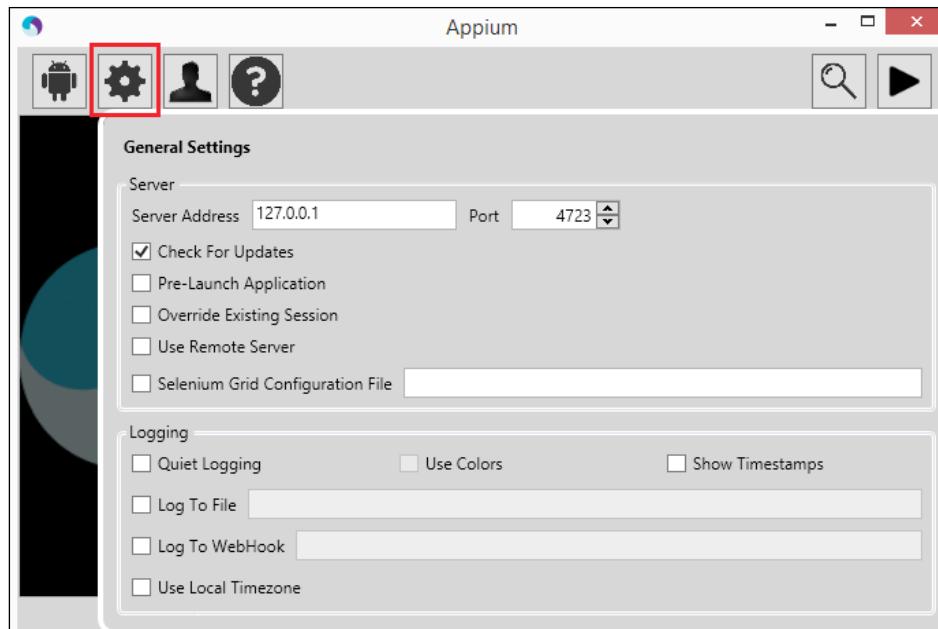
The **Advanced** pane contains the fields listed in the following table, along with their descriptions:

Field	Description
<b>SDK Path</b>	This denotes the Android SDK path.
<b>Coverage Class</b>	Here, we can pass a fully qualified instrumentation class.
<b>Bootstrap Port</b>	Here, set the port number to talk to Appium.
<b>Selendroid Port</b>	Here, we can set the port number for Selendroid.
<b>Chromedriver Port</b>	Here, we set the port in which ChromeDriver will start.

Another type of setting in the GUI is the developer settings.

## General Settings

Click on the second icon in the GUI to open the developer settings. This also categorizes the fields into headings such as **Server** and **Logging**, as shown in the following screenshot:



## Server

The **Server** pane contains the fields listed in the following table, along with their descriptions:

Field	Description
<b>Server Address</b>	The IP address of the system on which the Appium server is running.
<b>Port</b>	The port on which the Appium server will talk to the WebDriver commands. The system takes the default port 4723.
<b>Check for Updates</b>	If you click on this, then Appium will automatically check for version updates.
<b>Pre-Launch Application</b>	This capability will launch the application in the device before it starts listening commands from the WebDriver.
<b>Override Existing Session</b>	Checking this will override the Appium sessions, if they exist.
<b>Use Remote Server</b>	If the Appium server is running on another machine, then you can use this functionality to connect the Appium Inspector.
<b>Selenium Grid Configuration File</b>	You can mention the Selenium Grid configuration file's path.

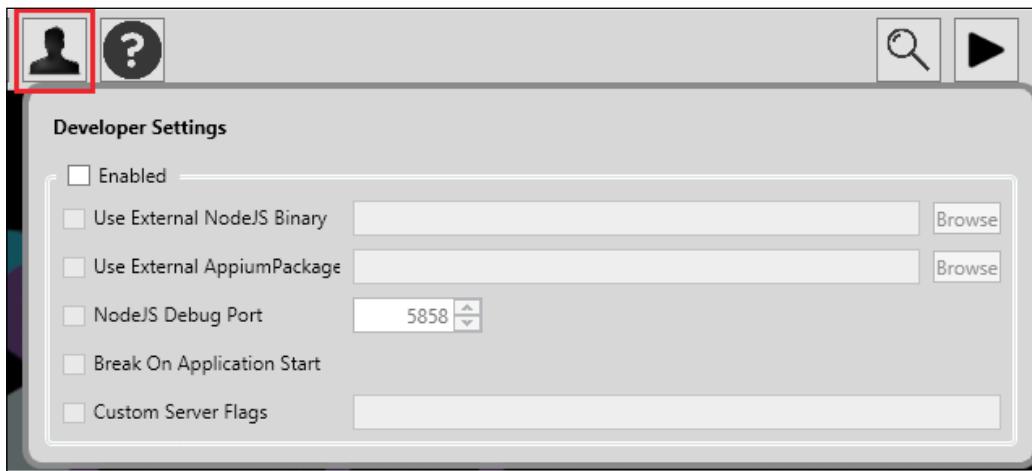
## Logging

The **Logging** pane contains the fields listed in the following table, along with their descriptions:

Field	Description
<b>Quiet Logging</b>	This will prevent a verbose logging output.
<b>Show Timestamps</b>	The console output will be displayed along with timestamps.
<b>Log to File</b>	The log output will be stored in the mentioned file (For example, C:\\appium\\abc.log).
<b>Log to WebHook</b>	The log output will be sent to the HTTP listener.
<b>Use Local Timezone</b>	By clicking on this option, you can use your local time zone, otherwise it will use the node server's time zone.

## Developer settings

If you click on the highlighted icon (shown here) in the GUI, you will get the following screen:

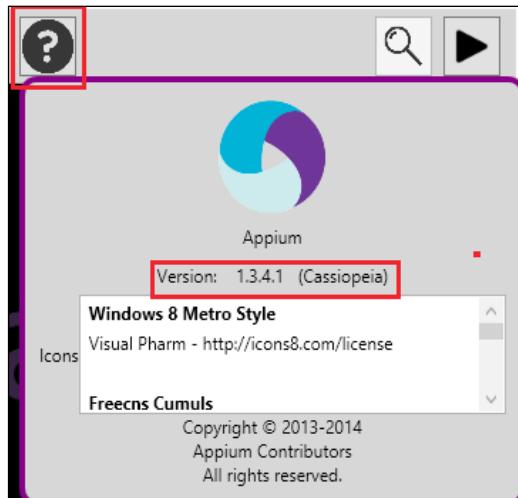


The **Developer Settings** pane will contain the options listed in the following table:

Field	Description
<b>Enabled</b>	Developer settings will be displayed if the box is checked.
<b>Use External NodeJS Binary</b>	If you have another Node.js version instead of the application itself supplied here, Appium will use the same version of Node.js.
<b>Use External Appium Package</b>	You can supply the Appium package here, if you have another one.
<b>NodeJS Debug Port</b>	The Node.js debugging port is where the debugger will run.
<b>Break on Application Start</b>	When the application starts, the Node.js debug server will break.
<b>Custom Server Flags</b>	Here, you can pass the server flags (For example, --device-name Nexus 5).

## About

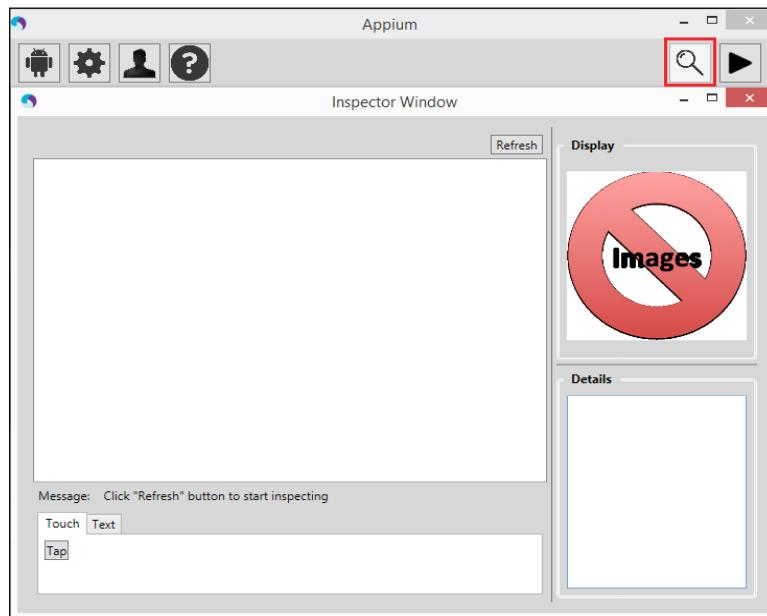
Clicking on this icon will display the Appium version you are using, as shown in the following screenshot:



Now, let's take a look at the Appium Inspector.

## Inspector

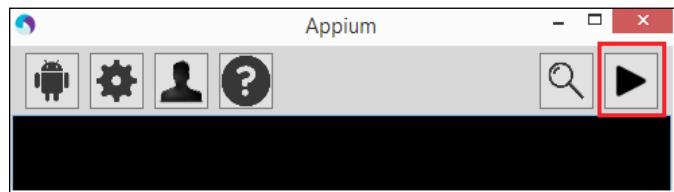
Appium Inspector allows us to find the elements that we are looking for. It also comes with a record and playback functionality similar to that of the Selenium IDE, but currently, it does not work well with Windows. To open the Inspector, we have to click on the highlighted icon, as shown in the following screenshot, but first application should be prelaunched on the device:



By using the Inspector, we can get the source code of a particular application, but it is hard to recognize the app elements. On Windows, UIAutomator is more powerful than Appium Inspector for inspecting the elements. In the next chapter, we will learn more about the UIAutomator.

## The Launch/Stop button

This is used to start and stop the Appium server, which is shown in the following screenshot:

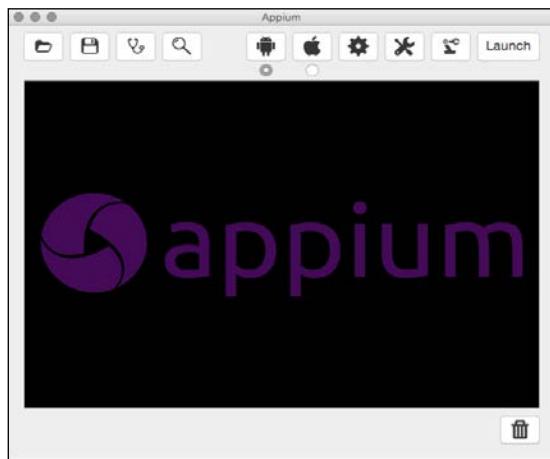


## The Clear button

We can find this button in the bottom-right corner of the server screen; it is used to clear console logs.

## The Appium GUI for Mac

Similarly, Mac also has an Appium GUI for Android automation; a lot of options are common with Windows. Let's discuss all the settings that are present in the GUI. The following is the screenshot of the Appium GUI on Mac

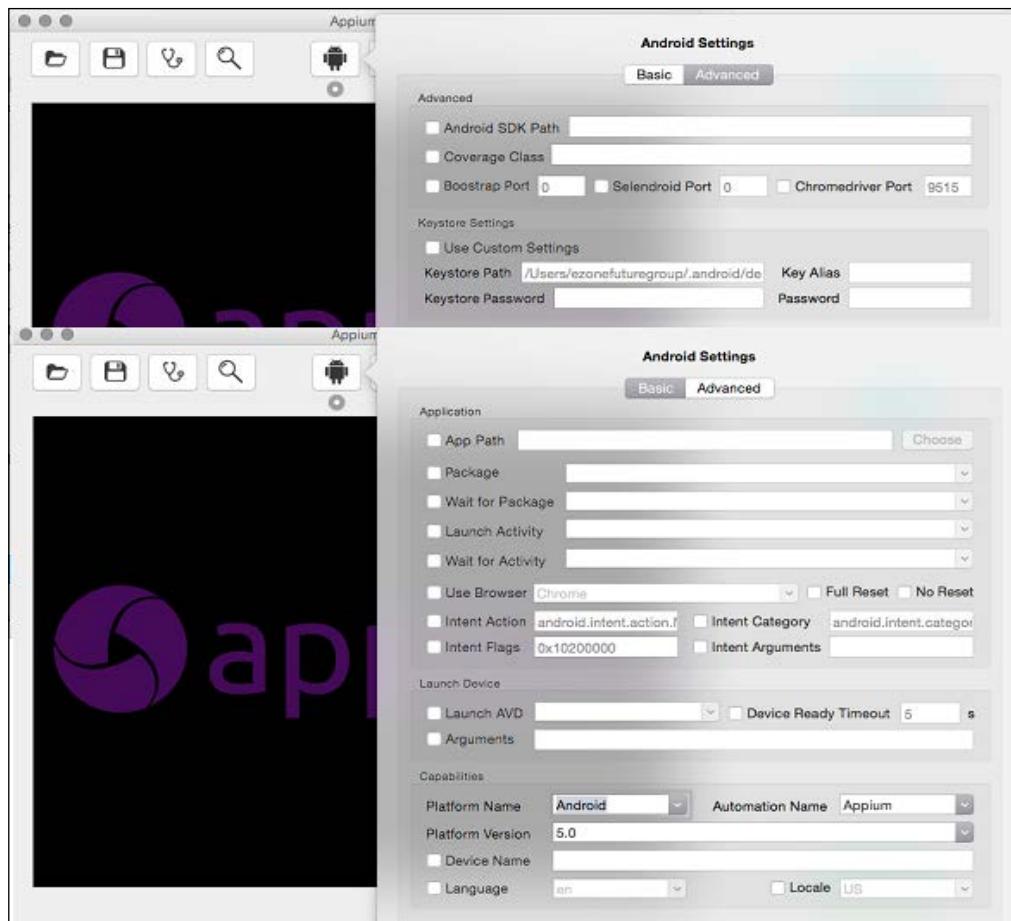


It contains the following icons:

- **Android Settings**
- **iOS Settings**
- **General Settings**
- **Developer Settings**
- **Robot Settings**
- **Save configuration**
- **Open configuration**
- **Inspector**
- **Appium doctor**
- **Launch/Stop**
- **Delete**

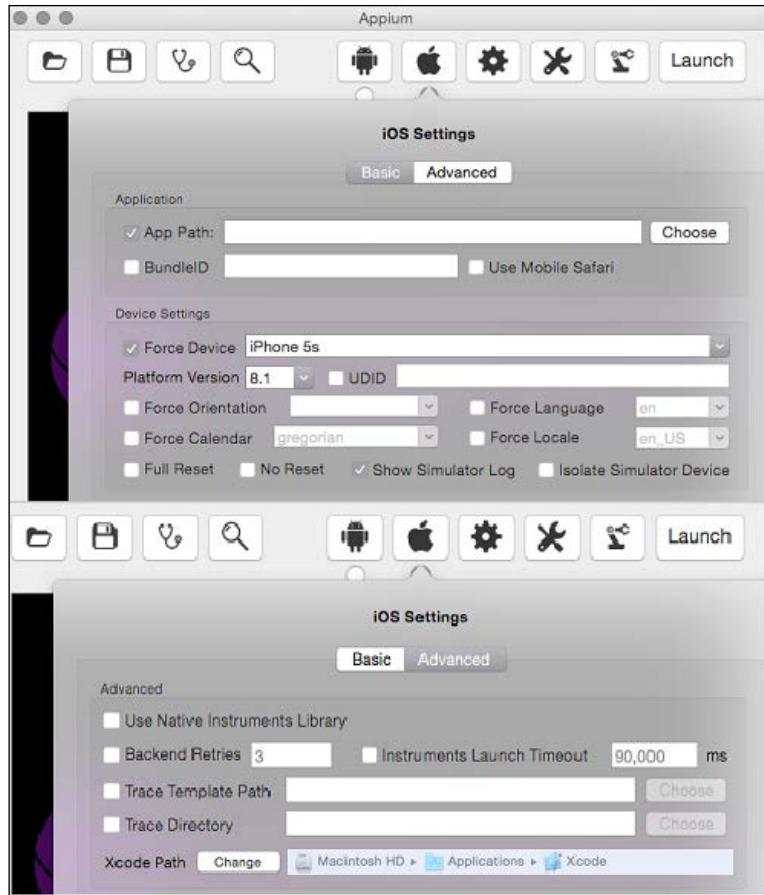
## Android Settings

We have already seen Android Settings on the Windows platform; these settings are the same on Mac OS as well, but there are some UI changes in the Appium server, as shown in the following screenshot. The **Android Settings** are divided into two tabs, **Basic** and **Advanced**.



## iOS Settings

To set up the iOS, we need to click on the **iOS Settings** icon. It contains two options, **Basic** and **Advanced**. Under **Basic**, we will have the subheadings **Application** and **Device Settings**, and under **Advanced**, we will get the advanced iOS settings.



## Application

The options present under the **Application** tab are listed in the following table, along with their descriptions:

Field	Description
<b>App Path</b>	In this field, we can specify the path of the iOS application (.app, .zip, or .ipa) that we want to test.
<b>Choose</b>	This is used to browse the path of the application.
<b>BundleID</b>	This denotes the bundle ID of the application.
<b>Use Mobile Safari</b>	In the case of mobile web apps, we can select this option to start the Safari browser. Make sure <b>BundleID</b> and <b>App Path</b> is unchecked.

## Device Settings

The options present under the **Device Settings** tab are listed in the following table, along with their descriptions:

Field	Description
<b>Force Device</b>	You can select the simulator iPhone or iPad mode from the dropdown.
<b>Platform Version</b>	This is used to select the mobile platform version.
<b>Force Orientation</b>	This is used to set the orientation of the simulator.
<b>Force Language</b>	This is used to set the language for the simulator.
<b>Force Calendar</b>	Here, we can choose the calendar format for the simulator.
<b>Force Locale</b>	This denotes the locale for the simulator.
<b>UDID</b>	If the UDID box is checked, then Appium will run the application on the attached iOS device; you need to make sure that <b>bundleID</b> is supplied and <b>App Path</b> is unchecked.
<b>Full Reset</b>	This will delete the entire simulator folder.
<b>No Reset</b>	This specifies that the simulator should not reset the app between sessions.
<b>Show Simulator Log</b>	This will write the simulator log in the console, if checked.

## Advanced

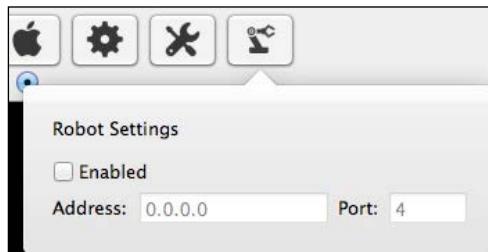
The options present under the **Advanced** tab are listed in the following table, along with their descriptions:

Field	Description
<b>Use Native Instruments Library</b>	If this box is checked, Appium will use the Native Instruments Library rather than the library that comes with Appium.
<b>Backend Retries</b>	We can specify the number to retry the launching of Instruments before the reporting crashes or times out.
<b>Instruments Launch Timeout</b>	This denotes the amount of time to wait for the Instruments to launch (in ms).
<b>Trace Template Path</b>	This traces the template file to use with Instruments.
<b>Choose</b>	This is used to browse the trace's template path.
<b>Xcode Path</b>	This denotes the path of the Xcode application.

We have already discussed **General Settings**, **Developer Settings**, **Launch**, and **Delete** in Appium for Windows. Now, let's take a look at **Robot Settings**.

## Robot Settings

If you want automation using a robot, then you need to enable **Robot Settings**. In **Robot Settings**, Appium will ask for the host and port numbers where the robot is connected, as shown here:



## Save/Open configuration

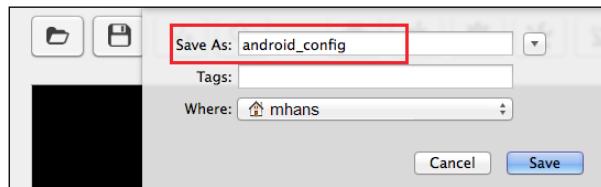
Appium has a feature to save the settings; we don't need to specify the settings again and again while testing the apps. It allows you to tag the configuration file, after which you can easily find out the saved file on the basis of the tag color.

To save the configuration file, we need to perform the following steps:

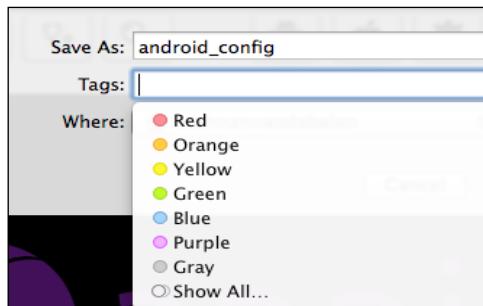
1. Click on the Save configuration icon; this will open the popup, as shown here:



2. Specify the filename:



3. Click on the **Tags** textbox; it will display the list of tags, as shown in the following screenshot. We can select more than one tag.



4. Select the location where you want to save the file.

We just saw how easy it is to save the configuration file. Using the saved file, we can quickly set the configuration by clicking on the Open configuration icon (which is visible in the left-hand side of the Save configuration icon) and selecting the saved file.

## Appium doctor

It will tell you about the Appium setup; you can verify the setup using the Appium doctor. Click on the Doctor button in between the Inspector and Save buttons; this will display the information in the Appium GUI console, as shown here:



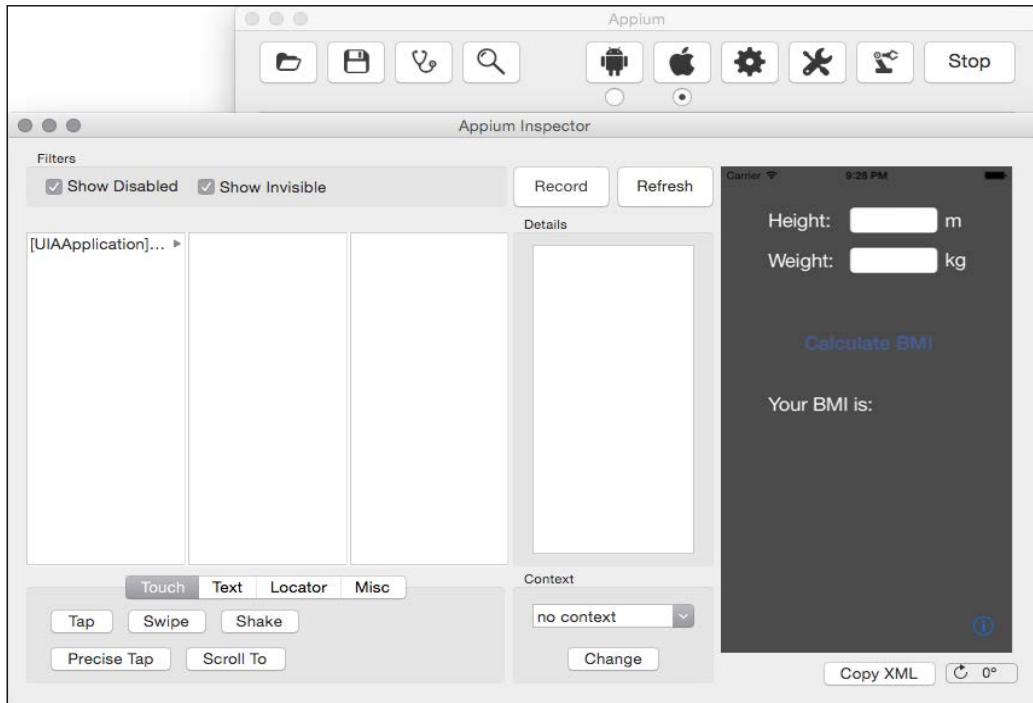
If you get any configuration error that something is not being set up, then try to resolve it before you start with Appium.

## Inspector

Appium comes with a great piece of functionality such as the Inspector; it is a record and playback tool like Selenium IDE. We can easily generate the test script without hurdles.

It shows all the elements of the mobile app, like UIAutomator does in Android. Now, let's take a look at the Inspector. Here, we are going to take an example of the BMI calculator app in iOS, which is shown in the following screenshot. First, we need to click on the Save button before clicking on the Inspector button, and we also need to specify the app path.

In the **Appium Inspector** window, we can see the following fields:



- **Show Disabled:** This will display the elements that are not enabled
- **Record:** This will open the recording panel in the bottom of the window, as shown in the following screenshot, and you can perform actions using controls in the Appium Inspector:

The screenshot shows the recording panel of the Appium Inspector. It has tabs for "Touch", "Text", "Locator", and "Misc", with "Misc" selected. Below these are buttons for "Tap", "Swipe", "Shake", "Precise Tap", "Scroll To", "Context" (set to "no context"), and "Change". At the bottom are "Copy XML", "Undo", "Redo", and "Clear" buttons. The main area is a code editor with Java syntax highlighting. The code is as follows:

```

Java
DesiredCapabilities capabilities = new DesiredCapabilities();
capabilities.setCapability("appium-version", "1.0");
capabilities.setCapability("platformName", "iOS");
capabilities.setCapability("platformVersion", "8.1");
capabilities.setCapability("deviceName", "iPhone 5s");
capabilities.setCapability("app", "/Users/mhans/Library/Developer/Xcode/DerivedData/BMICalc/Build/
Products/Debug-iphonesimulator/BMICalc.app");
wd = new AppiumDriver(new URL("http://0.0.0:4723/wd/hub"), capabilities);
wd.manage().timeouts().implicitlyWait(60, TimeUnit.SECONDS);
wd.close();
}
    
```

- **Refresh:** This will refresh the DOM 3-column as well as the screenshot
- **Screenshot:** This area will display the screenshot taken for the app, and you can also click in the area to select elements in the DOM
- **Details:** This will contain details about the selected element

You will find some more options such as the **Touch** section, **Text** section, **Alerts** section, **Locator**, and **Misc**, which will further categorize into some buttons that can take an action on the application under test.

Let's take a look at the following options:

- **Touch:** This contains buttons to execute touch events such as tap, swipe, shake, and scroll
- **Text:** This contains buttons to execute text events, such as typing and firing the JavaScript
- **Locator:** This is a useful option provided by Appium; by using this, we can check whether the elements exist or not on the basis of locators.
- **Misc:** This contains the buttons that can handle the alerts

## The Recording panel

This panel contains the test scripts generated by the recorded actions that are performed on the application. It also contains some options that we can take on the recorded test scripts. Let's take a look at the panel's options:

- A dropdown for language selection: You can change the recorded test scripts' language from the dropdown (in the screenshot, we selected **Java**)
- **Add Boilerplate:** This will display the code with the Selenium instance along with the recorded scripts; otherwise, this will only show the code from the actions you have recorded
- **XPath Only:** This will generate the scripts using the XPath identifier only
- **Replay:** By clicking on the **Replay** button, we can execute the recorded scripts
- **Undo:** This will delete the last recorded action
- **Redo:** This will add the last undone action back
- **Clear:** This will clear the recorded actions

## **Summary**

In this chapter, we learned about the Appium GUI's features on both the Windows and iOS platforms. We also looked at how we can set the Android and iOS settings using the Appium GUI.

In the next chapter, we will take look at different strategies for identifying elements.



# 4

## Finding Elements with Different Locators

Appium has different locators to find elements on the mobile apps that can be used while testing. In this chapter, we will discuss some techniques to find an element for native and hybrid apps using the uiautomator and Appium inspector. To find an element for web-based applications, we will see a Chrome add-on to remotely inspect the web elements.

In this chapter, we will learn the following topics:

- Finding elements using the Chrome ADB plugin
- Finding elements using the Safari Develop option
- Finding elements using UIAutomatorviewer and Appium Inspector
- Finding elements on mobile apps by `id`, `Name`, `LinkText`, `Xpath`, `cssSelector`, `ClassName`, `AccessibilityId`, `AndroidUIAutomator`, and `IosUIAutomation`

### Finding elements for Android web-based apps using the Chrome ADB plugin

To find an element for web apps, we need to install an add-on in order to remotely inspect the web elements. The Chrome browser gives us an ADB (add-on) to access the source code of the mobile apps remotely. You can download it from <https://chrome.google.com/webstore/detail/adb/dpngiggdglpdnjdoaefidgiigpemgag?hl=en-GB> (Make sure you've installed Chrome Version 32 or later on your desktop.).

Once the add-on is installed, perform the following steps to set up the device for remote debugging:

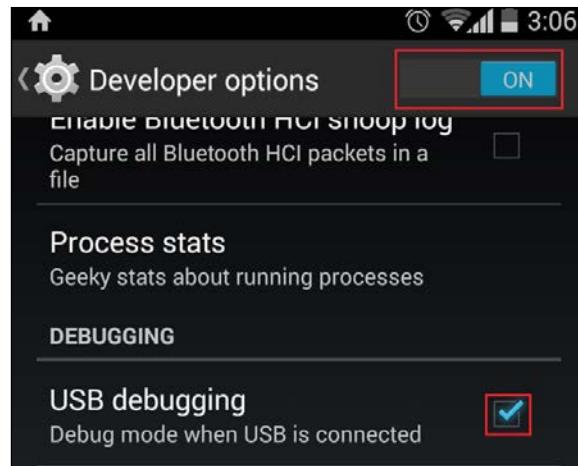
1. Go to **Settings | About Phone** and tap on **Build number** seven times (assuming that you have Android Version 4.2 or newer). Then, return to the previous screen and find **Developer options**, as shown in the following screenshot:



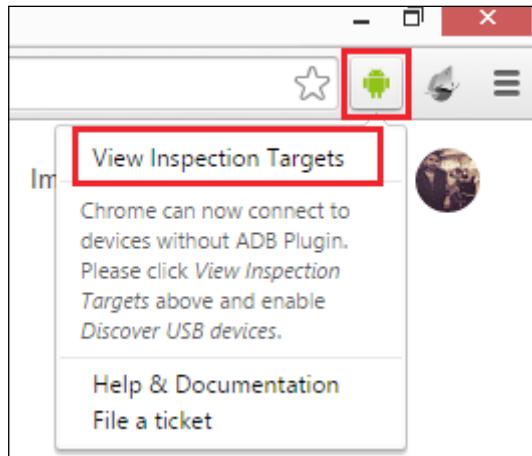
The preceding step is not the same for all smart phones; if you can't find this option, then search How to enable developer options on Google with your device model.



2. Tap on **Developer options** and click on **ON** in the developer settings (you will get an alert to allow developer settings; just click on the **OK** button); make sure that the **USB debugging** option is checked:



3. Now, go to your desktop Chrome browser (assuming that you've already installed the ADB plugin), click on the ADB plugin icon—which is in the top-right corner of the screen—and click on **View Inspection Targets**:



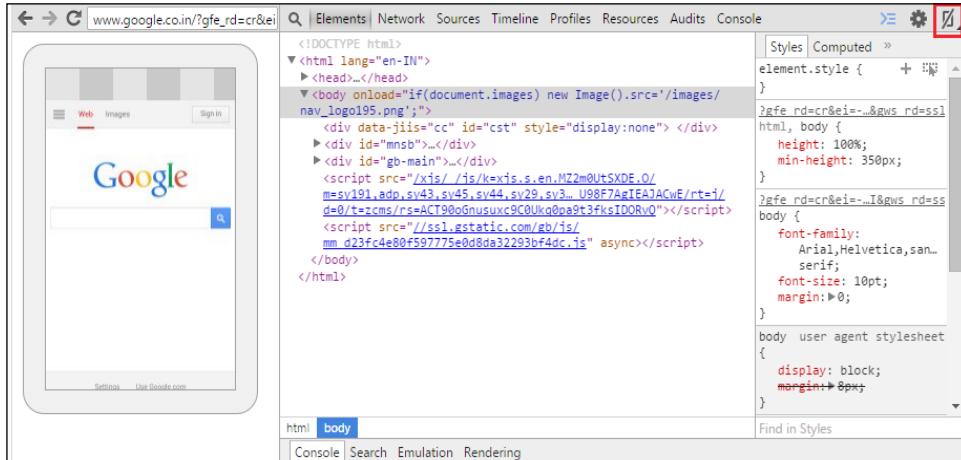
4. Use a USB cable to connect your Android device to the desktop (make sure you've installed the appropriate USB driver for your device). After you connect, you will get an alert on your device to allow USB debugging; just tap on **OK**.

### Finding Elements with Different Locators

5. Open the Chrome browser on your device and navigate to the desired URL (we will open [www.google.com](http://www.google.com)).
6. Once you set up your device for debugging, then the `chrome://inspect/#devices` page will display all the connected devices along with the open tabs and web views. Make sure **Discover USB devices** is checked, as shown here:



7. Now, click on the **inspect** link to open the developer tools; you will get the following screen. Now, click on the screencast icon, in the top-right corner, to display your device's screen:

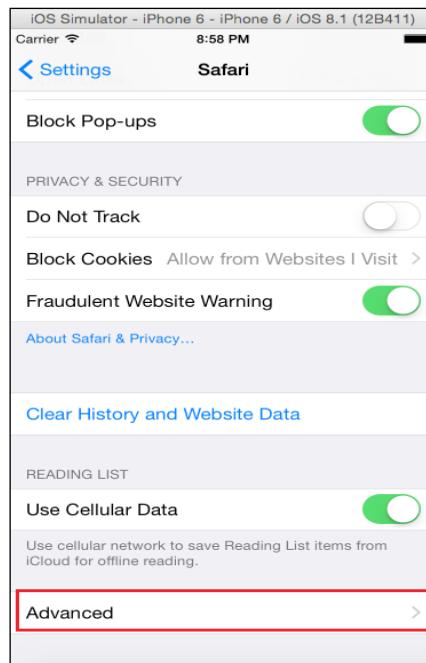


Now we can easily inspect elements with Chrome DevTools.

## Finding elements for iOS web-based apps using Safari's Develop option

Safari comes with a built-in solution for finding the elements for web apps, but we need to perform the following steps in order to set up the device for remote debugging:

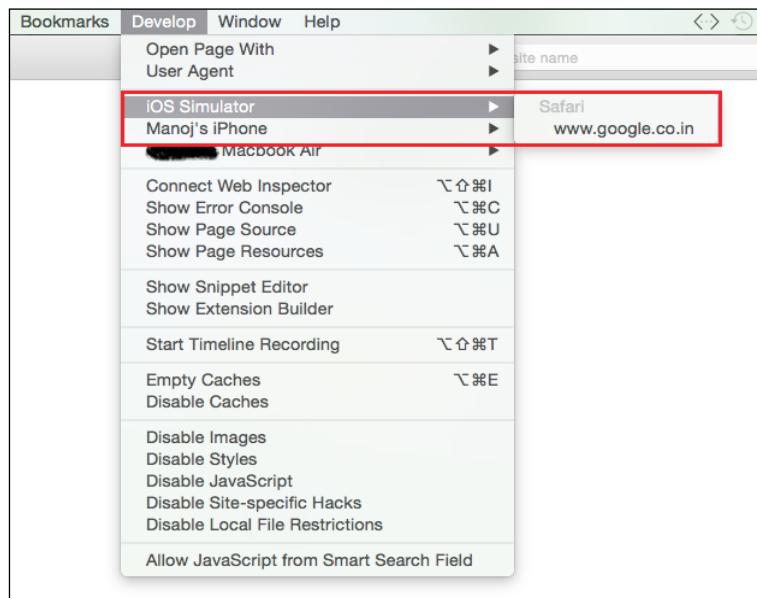
1. Navigate to **Settings | Safari | Advanced**:



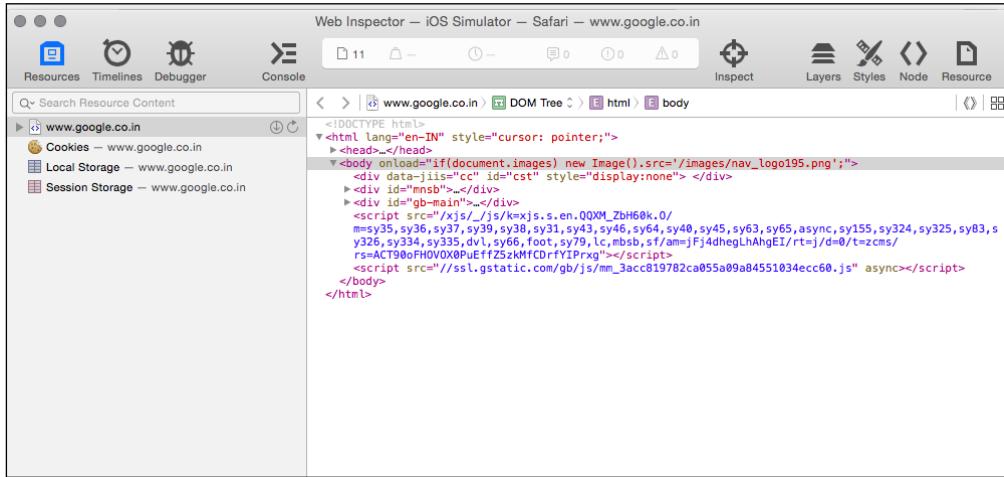
2. Then, turn on **Web Inspector**:



3. Open the Safari browser on your device/simulator and navigate to the desired URL (we are navigating to [www.google.com](http://www.google.com)).
4. Now, go to your Mac Safari browser, click on the **Develop** option from the menu, select the device/simulator (assuming that the device is connected to your Mac), and click on the URL:



- Now you will get the following screen with the HTML source code:



Now, we can easily inspect elements with Safari DevTools.

## Finding elements by ID

To interact with the web page, first we need to find an element on the page. All the functions of the Appium client library need an element to perform the actions on the web page.

Finding an element by ID is used to locate only one element in the mobile app. This is how the method signature to find an element looks:

```
findElement(By.id(String id));
```

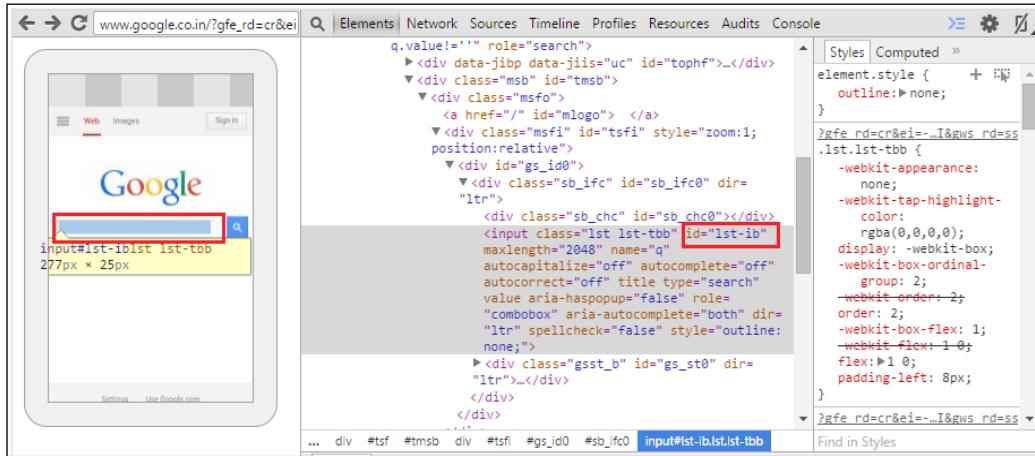
We need to pass an ID of the element we want to interact with. Now, we are going to find the ID of an element using the Chrome ADB plugin remotely. Here, we have taken an example of the Google search page. Perform the following steps:

1. Navigate to <https://www.google.com> on your mobile's Chrome browser.
2. Click on the **inspect** link from the ADB plugin of your desktop's Chrome browser.

## Finding Elements with Different Locators

---

3. Click on the inspect element icon  and mouseover the search box, as shown in the following screenshot:



We can use the highlighted `id` to interact with the web element. This is how the command will look:

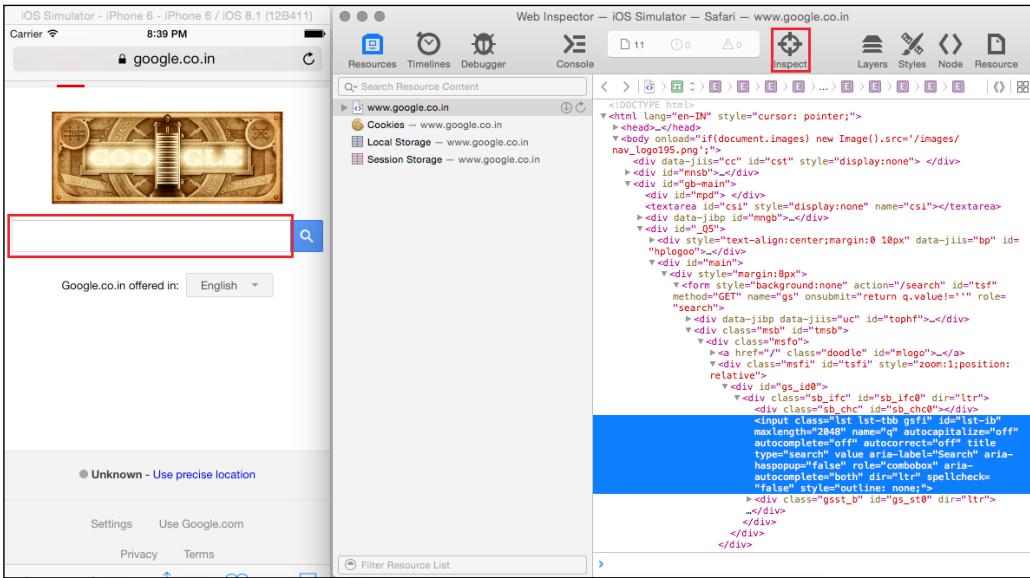
```
WebElement searchBar=driver.findElement(By.id("lst-ib"));
```

If you want to type in the search box, then you can use a web element reference; for instance, you can use a reference such as `searchBar.sendKeys ("Manoj Hans") ;`.

Let's take the same example to find an element by ID on the Safari browser in an iOS device. We need to perform the following steps:

1. Navigate to <https://www.google.com> on your mobile Safari browser.
2. Click on the URL under **iOS simulator** under the **Develop** tab of the Mac Safari browser.

3. Click on the **Inspect** icon and then click on the search box in the iOS simulator, as shown here:



We can use the highlighted `id` to interact with the web element. This is how the command will look:

```
WebElement searchBar=driver.findElement(By.id("lst-ib"));
```

If you want to type in the search box, then you can use a web element reference, such as `searchBox.sendKeys("Manoj Hans");`.

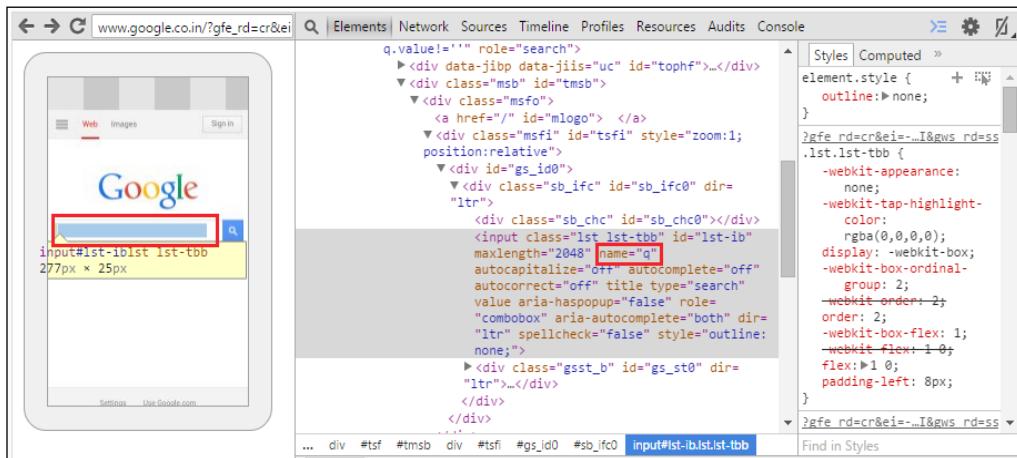
## Finding elements by name

Another way to find an element is by their name; elements can have names to locate them. This is how the method signature will look:

```
findElement(By.name(String Name));
```

## Finding Elements with Different Locators

Same as in the case of `id`, we need to pass the `name` attribute of the element we want to look for. It will return a `WebElement` object that we can perform actions on. We can again take an example of the Google search page, as the search box also has a name. All the steps will be the same as the ones we've taken to find an element by ID, as shown in the following screenshot:



This is how the command will look:

```
WebElement searchBar=driver.findElement(By.name("q"));
```

## **Finding elements by linkText**

This method is useful when you want to locate the element that has a hyperlink. This is how the method signature looks:

```
findElement(By.linkText(String text));
```

We need to pass the text that has a hyperlink. It will return a `WebElement` object that we can perform actions on. All the steps to locate the element will be the same as the steps performed to find an element by ID.

We are going to find the `Images` text on the Google search page that have a link; this is how the command will look:

```
WebElement imagesLink=driver.findElement(By.linkText("Images"));
```

## Finding elements by Xpath

Xpath works on both XML and well-formed HTML structures to find elements. It is a bit slower (in the cases where you generated it in a complex manner) than the ID and name methods, but it is a very useful approach to find an element on the web page where the element ID is generated dynamically. Here, we are not going to teach you about Xpath, but if you want to learn about the Xpath strategy, then you can search Google for a tutorial. This is how the method signature will look:

```
findElement(By.xpath(String XPath));
```

We need to pass the Xpath of the element we want to look for. It will return a `WebElement` object that we can perform actions on. Here, we will construct the Xpath on the basis of attributes.

We are going to construct an Xpath of the Google search box; this is how the command will look:

```
WebElement  
searchBox=driver.findElement(By.xpath("//input[@id='lst-ib']"));
```

## Finding elements by cssSelector

`cssSelector` strictly operates on HTML, and it is faster than Xpath in finding an element on the web page. This is how the method signature will look:

```
findElement(By.cssSelector(String cssSelector));
```

We need to pass the `cssSelector` of the element we want to look for. It will return a `WebElement` object that we can perform actions on. Here, we will construct the `cssSelector` on the basis of attributes.

We are going to construct `cssSelector` of the Google search box; this is how the command will look:

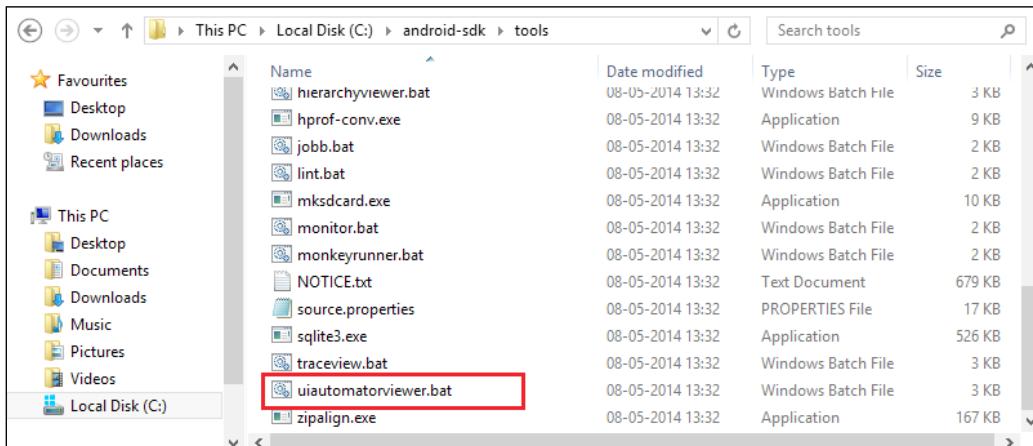
```
WebElement searchBox=driver.findElement(By.cssSelector("#lst-  
ib"));
```

## Finding elements for native and hybrid apps

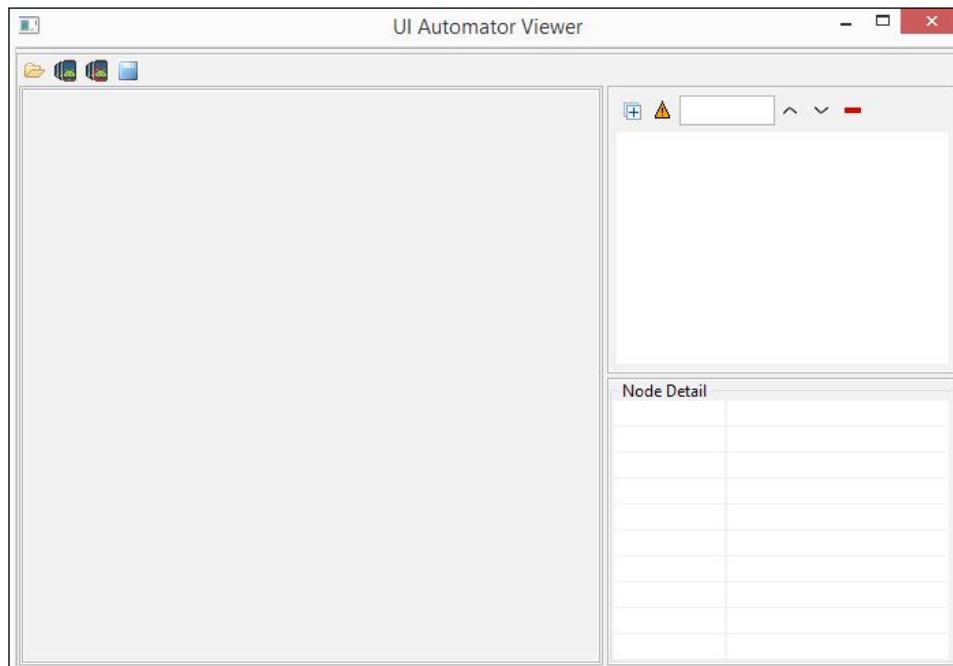
There are multiple ways to find an element for native and hybrid apps, such as `UIAutomatorviewer` (for Android only) and `Appium Inspector` (for both Android and iOS). Let's start with the `uiautomator`.

## Finding elements with UIAutomatorviewer

We can find the UIAutomatorviewer in the Android SDK folder C:\android-sdk\tools (assuming that the SDK located in the C drive); you can find the same in Mac as well under the tools folder, as shown in the following screenshot:

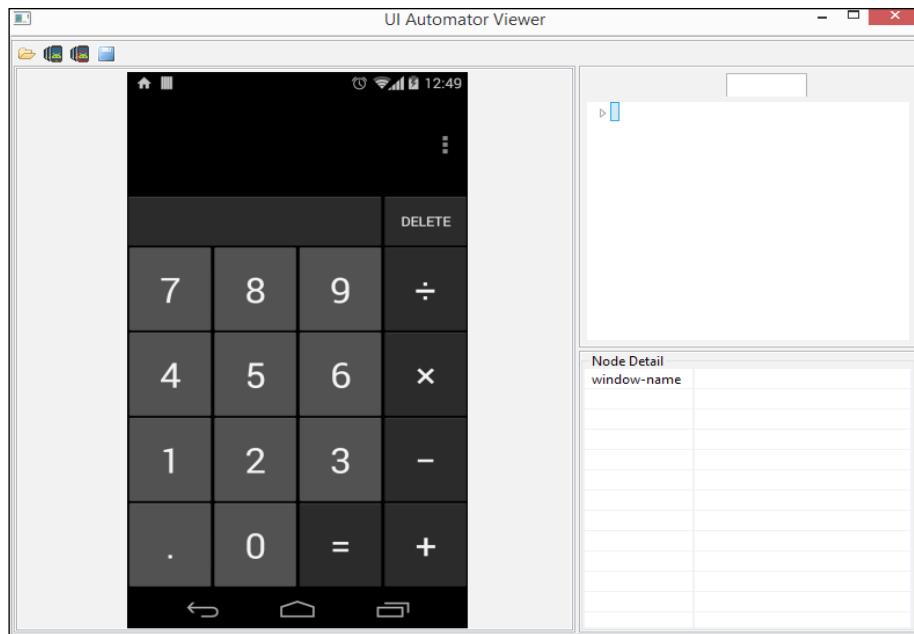


To open `uiautomatorviewer`, you need to double-click on it. You will get the following screen:



Now, we are going to take an example of finding an element of the Android app calculator. We need to perform the following steps:

1. Open the Android emulator or real device (For a real device, we need to enable USB debugging).
2. Open the calculator app.
3. Now, click on the device's screenshot icon  from the **UI Automator Viewer** window (The progress information box will be visible.). If more than one device is running, then UIAutomatorviewer will ask you to select the device to capture the screenshot. The following is the screenshot of the calculator.



You will get the screenshot of the calculator successfully.

Now, it's time to find an element with different locators supported by the Appium driver.

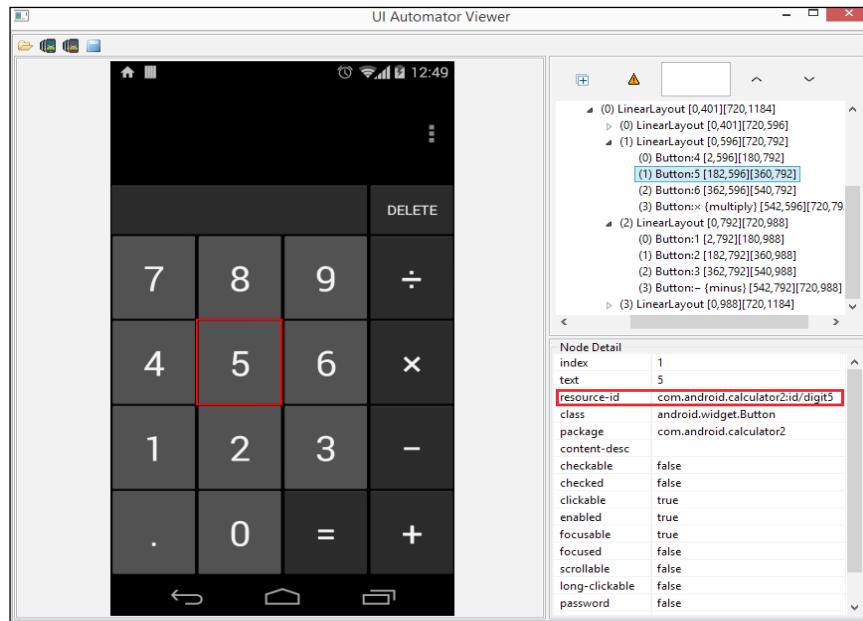
## Finding elements by ID

The method signature will be the same as the one we saw earlier to find an element by ID for web apps:

```
findElement(By.id(String id));
```

We need to pass the ID of the element we want to interact with. Here, we are going to find the digit **5** from the calculator app using **UI Automator Viewer**. We need to perform the following steps:

1. Click on the digit **5** from **UI Automator Viewer**.
2. Under **Node Details**, you will get **resource-id** as **com.android.calculator2:id/digit5**:



3. We can use **resource-id** as an ID to perform an action on the digit **5**. This is how the command will look:

```
WebElement  
digit_5=driver.findElement(By.id  
("com.android.calculator2:id/digit5"));
```

4. To click on the digit **5**, we can use the following command:

```
digit_5.click();
```

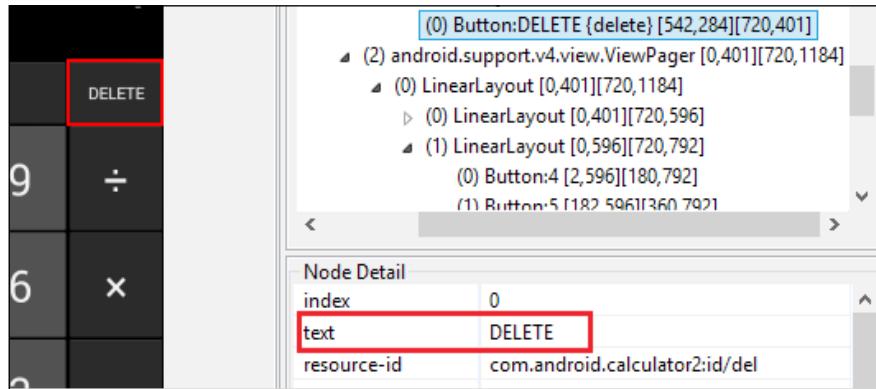
## Finding elements by name

The method signature will be the same as the one we saw earlier to find an element by name for web apps:

```
findElement(By.name(String Name));
```

We need to pass the name of the element we want to interact with. Here, we are going to find the **DELETE** button from the calculator app using **UI Automator Viewer**. We need to perform the following steps:

1. Click on **DELETE** from **UI Automator Viewer**.
2. Under **Node Details**, you will get the **text** as **DELETE**, as shown here:



We can use the **DELETE text** to locate the **DELETE** button as Name. This is how the command will look:

```
WebElement delete=driver.findElement(By.name("DELETE"));
```

3. To click on the **DELETE** button, we can use the following command:

```
delete.click();
```

## Finding elements by className

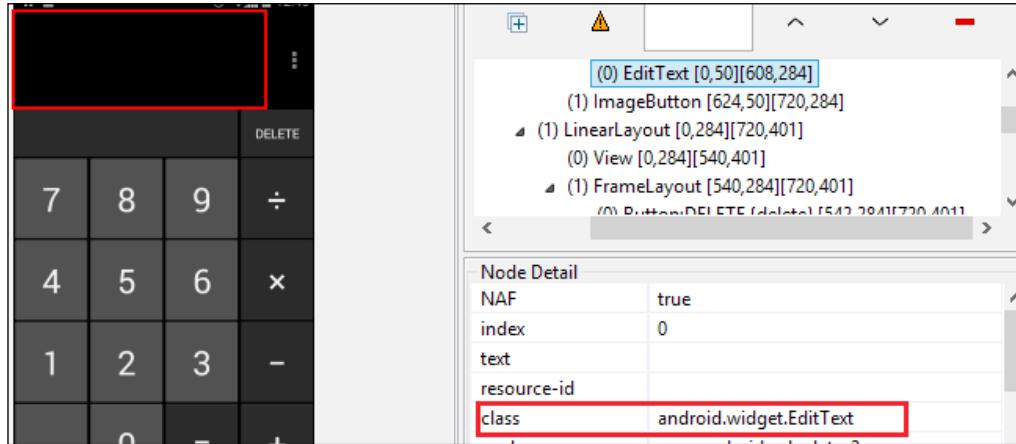
We can find an element using the **className** locator as well. This is how the method signature looks:

```
findElement(By.className(String ClassName));
```

### Finding Elements with Different Locators

We need to pass the `className` of the element we want to interact with. Here, we are going to find the **EditBox** from the calculator app using **UI Automator Viewer**. We need to perform the following steps:

1. Click on **EditBox** from **UI Automator Viewer**.
2. Under **Node Detail**, you will get the **class** as `android.widget.EditText`:



3. We can use `class` as `className` to perform an action on **EditBox**. This is how the command will look:

```
WebElement  
editBox=driver.findElement(By.className  
("android.widget.EditText"));
```

4. To get the value from the **EditBox**, we can use the following command:  
`editBox.getText();`

If the same class is used for multiple elements, then we need to select an element on the basis of indexing. For example, if we want to select the digit 7 on the basis of `className`, then this is how the code will look:

```
List<WebElement>  
editBox=driver.findElements(By.className  
("android.widget.Button"));  
editBox.get(1).click();
```

We are using `findElements` in place of `findElement` in the preceding code; the preceding code will return more than one value. Here, the digit 7 has an index value 1, so we have to pass an index value of 1 to take an action.

## Finding elements by AccessibilityId

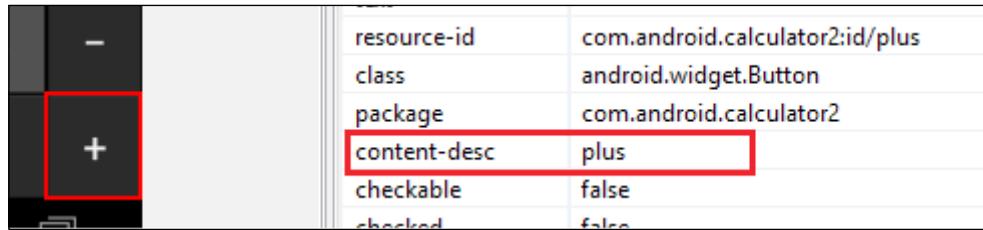
The Appium developers wanted to give us more options to locate an element, so they created `AccessibilityId`. It locates the element, same as `ID` and `name`. This is how the method signature for `AccessibilityId` looks:

```
findElement(By.AccessibilityId(String AccId));
```

We need to pass an `AccId` of the element we want to interact with. Here, we are going to find the `+` sign from the calculator app using **UI Automator Viewer**.

We need to perform the following steps:

1. Click on the `+` sign from **UI Automator Viewer**.
2. Under **Node Details**, you will get the **content-desc** as `plus`:



<code>-</code>	<code>resource-id</code>	<code>com.android.calculator2:id/plus</code>
	<code>class</code>	<code>android.widget.Button</code>
	<code>package</code>	<code>com.android.calculator2</code>
	<code>content-desc</code>	<code>plus</code>
	<code>checkable</code>	<code>false</code>
	<code>checked</code>	<code>false</code>

3. We can use **content-desc** as `AccId` to perform an action on the `+` sign. This is how the command will look:

```
WebElement plusSign=driver.  
findElementByAccessibilityId("plus");
```

4. To click on the `+` sign, we can use the following command:

```
plusSign.click();
```

## Finding elements by AndroidUIAutomator

`AndroidUIAutomator` is a very powerful locator to find an element. It uses the `Android UIAutomator` library to find an element. The method signature looks like this:

```
findElement(By.AndroidUIAutomator(String UIAuto));
```

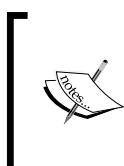
We need to pass the `UIAuto` of an element that we want to interact with. Here, we are going to find the `=` sign from the calculator app using **UI Automator Viewer**. We need to perform the following steps:

1. Click on the `=` sign from **UI Automator Viewer**.
2. Under the **Node details**, we can pick any of the values. For example, `resource-id` as `com.android.calculator2:id/equal`. We can use `resource-id` as `UIAuto` to perform an action on the `=` sign. This is how the command will look:

```
WebElement equal=driver.  
findElementByAndroidUIAutomator("new UiSelector().  
resourceId(\"com.android.calculator2:id/equal\")");
```

3. To click on the `=` sign, we can use the following command:  
`equal.click();`
4. Another example is to pick `content-desc` as `equals`, so the command will look like this:

```
WebElement equal=driver.  
findElementBy.AndroidUIAutomator("new  
UiSelector().description(\"equals\")");
```



If you want to find out more about the UIAutomator library, then it might be helpful to check out [http://developer.android.com/tools/testing/testing\\_ui.html](http://developer.android.com/tools/testing/testing_ui.html) and <http://developer.android.com/tools/help/uiautomator/UiSelector.html>.



## Finding elements with Appium Inspector

We learned in an earlier chapter that Appium Inspector works well on the Mac platform. So, we will now use it on Mac to find elements.

To start the **Appium Inspector for Android**, we need to perform the following steps:

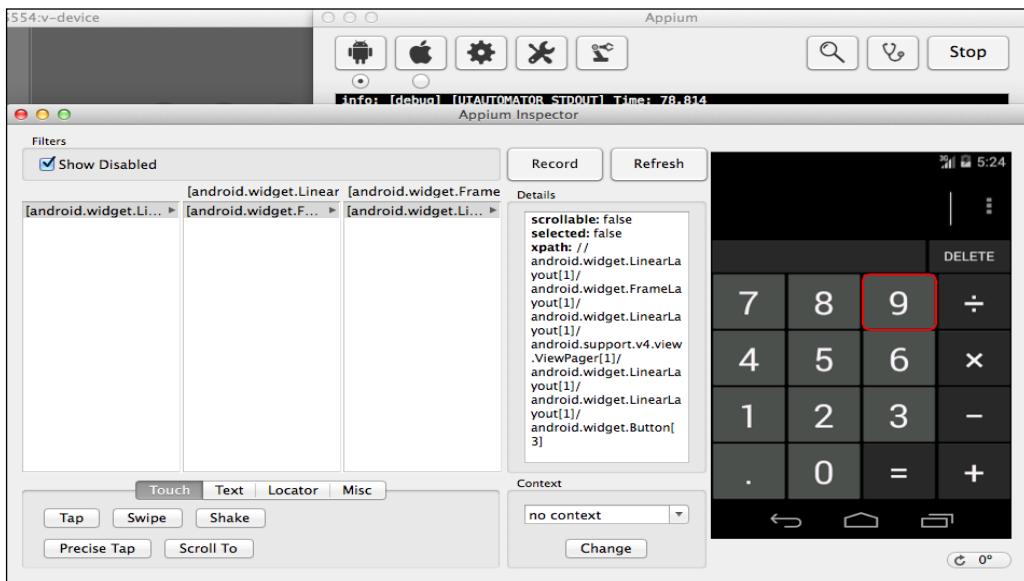
1. We need to specify the path of the application, package, and activity name in the Appium GUI in case of an emulator. In the case of a real device, the package and activity name is sufficient.

From where can you find out about the package and activity name of the app if the app is running on a physical device?



You can install the APK Info app from the Play Store (<https://play.google.com/store/apps/details?id=de.migali.soft.apkinfo&hl=en>) to know about the package and activity name of the app. If you have an app on your desktop, then the Appium server will automatically retrieve the package and activity name once the app's path is specified.

2. The **Prelaunch Application** option should be checked under **General Settings**.
3. If you are working with an emulator, then it should be open or the **Launch AVD** option should be checked under **Android Settings** (assuming that you have created the emulator). On the other hand, if you are working with a real device, then the device should be connected and the **USB debugging** option should be checked.
4. Click on the **Launch** button.
5. Click on the **Inspector** icon. Now, Appium Inspector will be launched, as shown in the following screenshot. Again, let's take the example of the calculator app.



We have already seen a lot of ways to find an element in **UI Automator Viewer**; now we are going to find an element with Xpath.

## Finding elements by Xpath

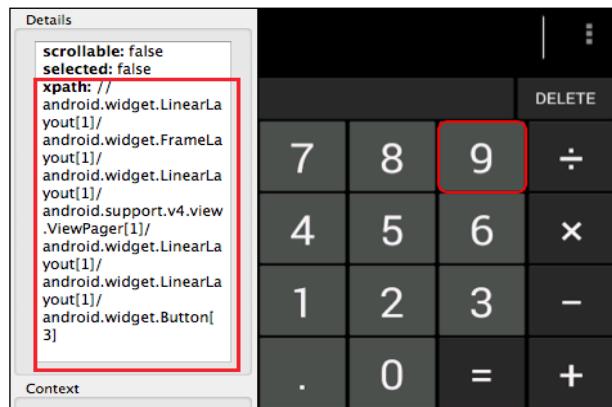
Xpath is bit slower than the `ID` and `name` methods, but it is a very useful approach to find an element. The method signature will look like this:

```
findElement (By.xpath(String XPath)) ;
```

We need to pass the `xpath` of the element we want to look for. It will return a `WebElement` object that we can perform actions on.

We are going to use the `xpath` of the digit **9**; this is how the command will look:

```
WebElement  
digit_9=driver.findElement(By.xpath("//android.widget.LinearLayout[1]/ android.widget.FrameLayout[1] / android.widget.LinearLayout[1] / android.support.v4.view.ViewPager[1] / android.widget.LinearLayout[1] / android.widget.LinearLayout[1] / android.widget.Button[3] "));
```



You can use the `WebElement` reference, `digit_9`, to perform an action on the digit **9**, which has been shown in the preceding screenshot.

We learned how to find an element on Android devices. Now, it is the turn to iOS. To start the **Appium Inspector for iOS**, we need to perform the following steps:

1. We need to specify the path of the application in the Appium GUI.
2. The **Prelaunch Application** option should be checked under **General Settings**.
3. If you are working with a simulator, then it should be open or the **Force Device** option should be checked under **iOS Settings** and then you have to choose the desired iOS simulator. On the other hand, if you are working with a real device, then the device should be connected and the device UDID should be specified.
4. Click on the **Launch** button.
5. Click on the **Inspector** icon.

Here, we are going to take an example of TestApp, which you can download from the Appium GitHub repository (<https://github.com/appium/appium/blob/master/assets/TestApp7.1.app.zip?raw=true>). Thanks to Appium developers for creating TestApp.

## Finding elements by name

The method signature will be the same as we the one we saw earlier to find an element by name for web apps:

```
findElement (By.name (String Name)) ;
```

We need to pass the name of the element we want to interact with. Here, we are going to find the second **EditBox** from the TestApp using the Appium Inspector. We need to perform the following steps:

1. Click on the second **EditBox** from the Appium Inspector.
2. Under the **Details** tab you will get the **name** as **IntegerB**. We can use **name** as Name to identify the 2nd **EditBox**. The command will look like this:

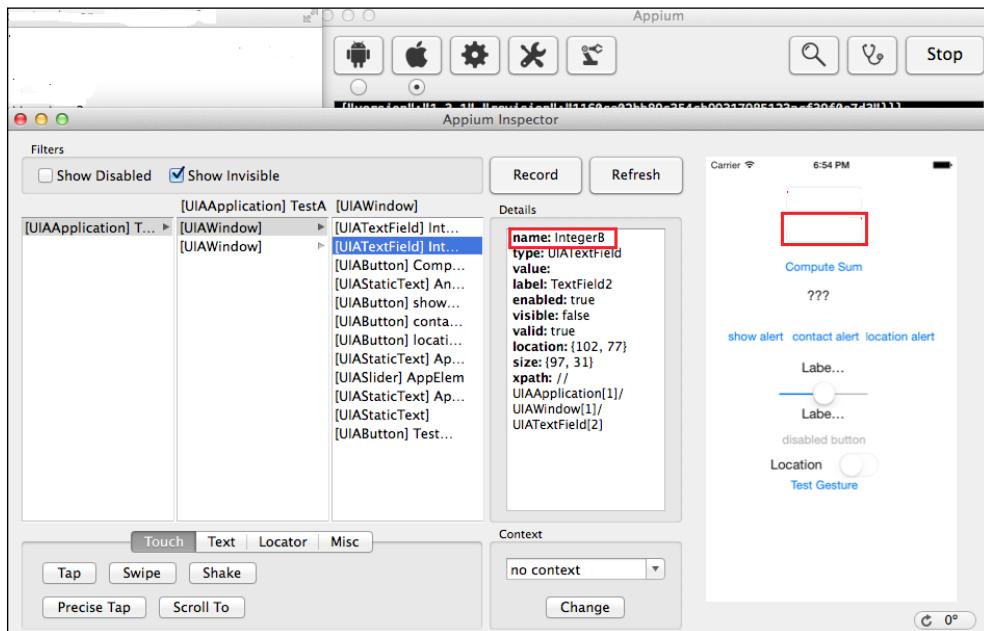
```
WebElement  
editBox=driver.findElement (By.name ("IntegerB")) ;
```

## Finding Elements with Different Locators

---

3. To type in the **EditBox**, we can use the following command:

```
editBox.sendKeys("12");
```



## Finding elements by IosUIAutomation

UIAutomation is a JavaScript library that is used to find an element in Apple's Automation Instruments. Appium developers have given us a similar way to find an element in Appium using `IosUIAutomation`. This is how the method signature looks:

```
findElements(By.IosUIAutomation(String IosUIAuto));
```

We need to perform the following steps if we want to use the `IosUIAutomation`:

1. We need to pass the `IosUIAuto` value of an element we want to interact with. Here, we are going to find the first **EditBox** from the `TestApp` using Apple's UIAutomation library.

For example, to find an element on the basis of the UIAutomation library using `elements` function, it will return an `elements` array. We can find the element using an index.

The command will look like this:

```
WebElement editBox=driver.  
findElements(By.IosUIAutomation(".elements()[0]")); //Here '0' is  
an element index
```

2. To type in the first **EditBox**, we can use the following command:

```
editBox.sendKeys("10");
```

3. Another example is to find the element on the basis of the `textFields` object, where the command will look like this:

```
WebElement editBox=driver.findElements(By.IosUIAutomation(".".  
textFields()[0]));
```

If you want to explore the UIAutomation library more, then it might be helpful to visit [https://developer.apple.com/library/ios/documentation/ToolsLanguages/Reference/UIAElementClassReference/index.html#/apple\\_ref/doc/uid/TP40009903-CH1-SW6](https://developer.apple.com/library/ios/documentation/ToolsLanguages/Reference/UIAElementClassReference/index.html#/apple_ref/doc/uid/TP40009903-CH1-SW6).

## Summary

We learned a lot about how to find an element using different locators and techniques. Specifically, we learned how to remotely open the Firebug for mobile web apps to locate the web elements with different type of locators and also how UIAutomator Viewer can be used to find elements. We then moved on to searching for elements using Appium Inspector, ID, name, Xpath, cssSelector, className, AccessibilityId, AndroidUIAutomator, and, last but not least, IosUIAutomation.

We learned a lot about finding an element; now it's time to start automating mobile apps. In the next chapter we will work with the Appium driver.



# 5

## Working with Appium

Now, we are going to start working with Appium on different mobile apps. We will be acquainted with emulators/simulators to automate mobile apps by Appium. We will take a look at how to install apps from a computer to an emulator, moving on to calling the Chrome browser in an Android emulator to set up the desired capabilities and test web applications. Then, we will learn how to start the Safari browser in a simulator and set up the desired capabilities to test web applications. We will also take a look at how to write automation scripts for native mobile apps. Lastly, we will automate the hybrid apps and switch from native to web view.

In this chapter, we will learn the following topics:

- The automation of native apps
- The automation of hybrid apps
- Working with web apps and a native browser
- Working with web apps and Safari

### Important initial points

Before starting with Appium, let's make sure that we have all the necessary software installed.

The prerequisites for Android are as follows:

- Java (version 7 or later)
- The Android SDK API (version 17 or later)
- An emulator
- Eclipse
- TestNG

- The Appium server
- The Appium client library (Java)
- The Selenium Server and WebDriver Java library
- The APK Info app

The prerequisites for iOS are as follows:

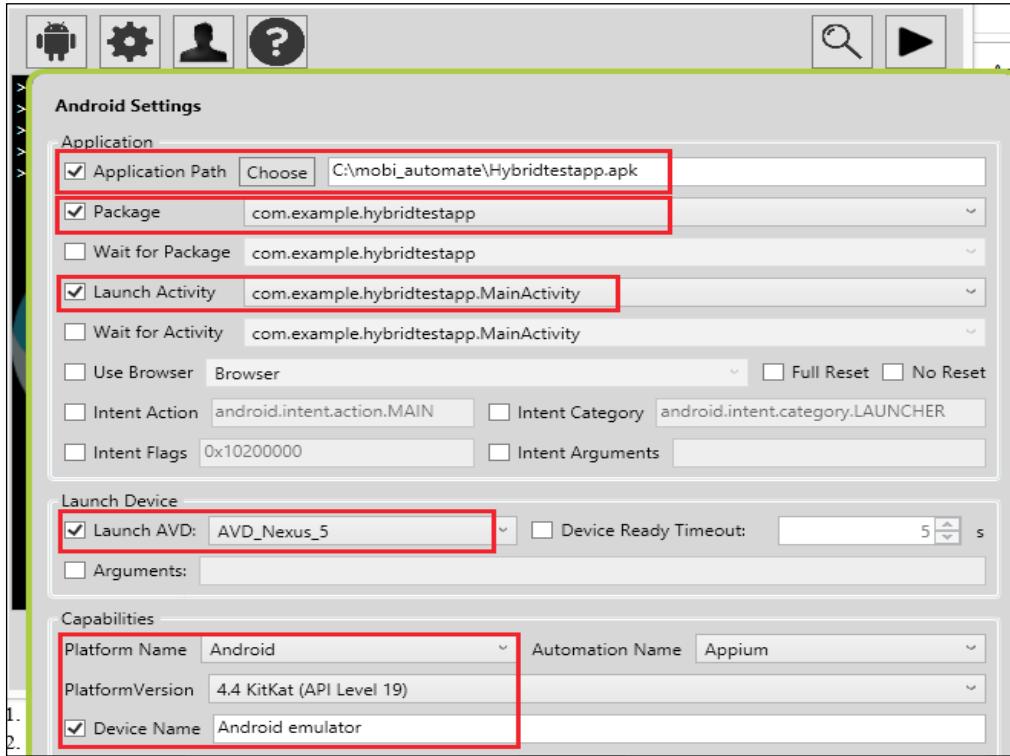
- Mac OS 10.7 or later
- Xcode (version 4.6.3 or later; 5.1 is recommended)
- Simulator
- Safari on simulator
- Java Version 7
- Eclipse
- TestNG
- The Appium Server
- The Appium client library (Java)
- The Selenium Server and WebDriver Java library

When working with Appium, we need to set the desired capabilities and initiate an Android/iOS driver. First, we need to understand them one by one.

## **Necessary desired capabilities for Android and initiating the Android driver**

There are two ways to set the desired capabilities, one with the Appium GUI and another by initiating the desired capabilities object. Desired capabilities object will be more preferable, otherwise we have to change the desired capabilities in the GUI again and again whenever we are testing another mobile app. Let's discuss both these ways.

Let's see the **Android Settings** in the Appium GUI settings for native and hybrid apps:



Here are the steps you need to perform for native and hybrid apps:

1. Click on the **Android Settings** icon.
2. Select **Application path** and provide the path of the application.
3. Select **Package** and choose it from the drop-down.

4. Select **Launch Activity** and choose an activity from the drop-down.

If an application is already installed on the AVD, then we don't need to follow steps 2–4. In this case, we have to install the APK info app on the AVD to know about the package and the activities of the app and then set them using the desired capabilities object (which we will see in the next topic).

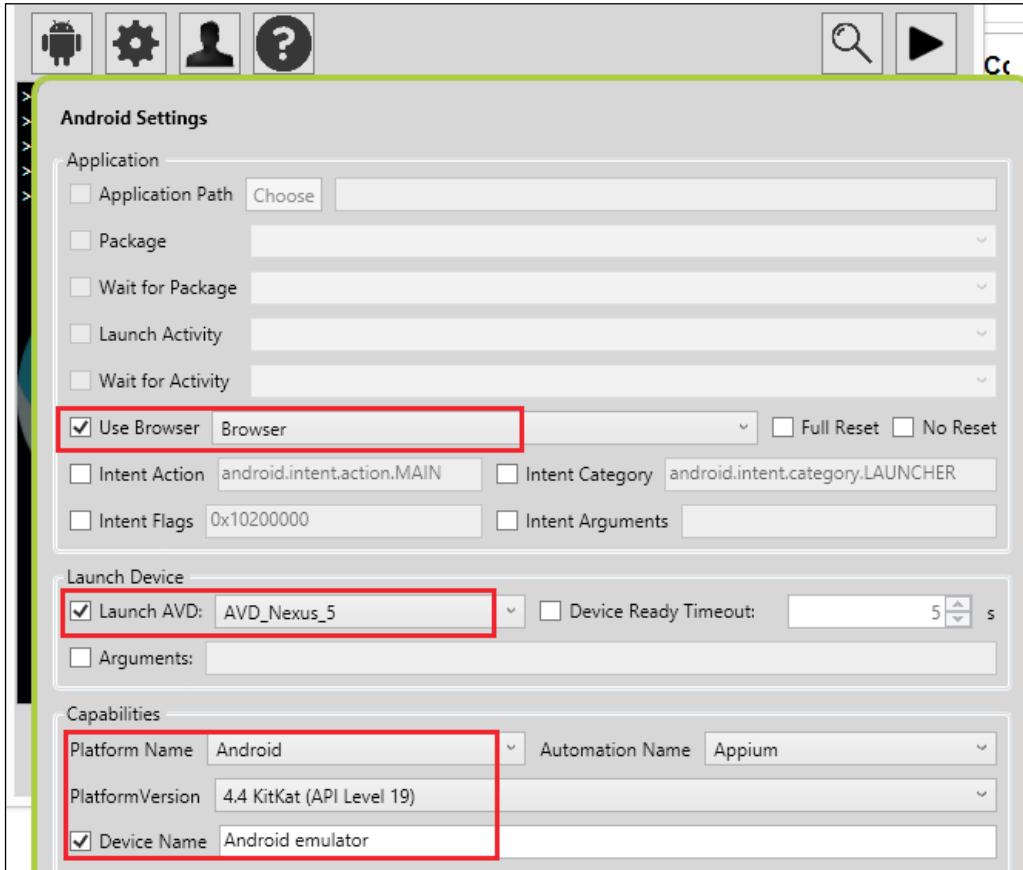
Here, the question is how to install APK in the emulator? Simply perform the following steps:

1. Start the emulator.
2. Open Command Prompt.
3. Type adb -e install [path of the apk]. For example, adb -e install c:\app\apkinfo.apk.
4. Click on the *Enter* button; post this, you will get a success message.

You are done with the APK installation!

5. Select **Launch AVD** and choose a created emulator from the list.
6. Select **PlatformVersion** from the drop-down menu.
7. Select **Device Name** and type `Android emulator`.
8. Now, start the Appium Server.

Let's see the **Android Settings** in the Appium GUI settings for web apps:



Here are the steps that you need to perform for web apps:

1. Click on the Android Settings icon.
2. Select **Launch AVD** and choose a created emulator from the list.
3. Select **PlatformVersion** from the drop-down.
4. Select **Use Browser** and choose **Browser** from the drop-down.
5. Select **Device Name** and type `Android emulator`.
6. Now, start the Appium server.

Let's discuss how to initiate the desired capabilities object and set the capabilities.

## Desired capabilities for native and hybrid apps

We already discussed the desired capabilities in *Chapter 1, Appium – Important Conceptual Background*, so here we will directly dive into the code with comments. First, we need to import the following packages:

```
import java.io.File;
import org.openqa.selenium.remote.DesiredCapabilities;
import io.appium.java_client.remote.MobileCapabilityType;
```

Now, let's set the desired capabilities for the native and hybrid apps, as shown here:

```
DesiredCapabilities caps = new DesiredCapabilities() //To create
an object
File app=new File("path of the apk") //To create file object to
specify the app path
caps.setCapability(MobileCapabilityType.APP,app) //If app is
already installed on the AVD then no need to set this capability.
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
"4.4") //To set the Android version
caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
"Android") //To set the OS name
caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Android
emulator") //To set the Device name
caps.setCapability("avd", "Name of the AVD to launch") //To
specify the AVD which we want to launch
caps.setCapability(MobileCapabilityType.APP_PACKAGE, "package
name of your app (you can get it from apk info app)") //To
specify the android app package
caps.setCapability(MobileCapabilityType.APP_ACTIVITY, "Launch
activity of your app (you can get it from apk info app)") //To
specify the activity which we want to launch
```

## Desired capabilities for web apps

In Android mobile web apps, some of the capabilities that we used in native and hybrid apps such as APP, APP PACKAGE, and APP ACTIVITY are not required because we are launching a browser here. We need to import the following packages:

```
import org.openqa.selenium.remote.DesiredCapabilities;
import io.appium.java_client.remote.MobileCapabilityType;
```

Now, let's set the desired capabilities for the web apps, as follows:

```
DesiredCapabilities caps = new DesiredCapabilities() //To create
an object
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
"4.4"); //To set the android version
caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
"Android"); //To set the OS name
caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Android
emulator"); //To set the device name
caps.setCapability("avd", "Name of the AVD to launch"); //To
specify the AVD which we want to launch
caps.setCapability(MobileCapabilityType.BROWSER_NAME, "Browser");
//To launch the Native browser
```

We are done with the desired capabilities part; now, we have to initiate the Android Driver to connect with the Appium server, but first we need to import the following packages:

```
import io.appium.java_client.android.AndroidDriver;
import java.net.URL;
```

Then, initiate the Android Driver:

```
AndroidDriver driver = new AndroidDriver (new
URL("http://127.0.0.1:4723/wd/hub"), caps);
```

This will launch the app in the Android emulator using the configurations specified in the desired capabilities.

Now, you can use the following class to write the test scripts with TestNG:

```
import io.appium.java_client.android.AndroidDriver;
import io.appium.java_client.remote.MobileCapabilityType;
import java.io.File;
import java.net.MalformedURLException;
import java.net.URL;
```

```
import java.util.concurrent.TimeUnit;
import org.openqa.selenium.remote.DesiredCapabilities;
import org.testng.annotations.AfterClass;
import org.testng.annotations.BeforeClass;
import org.testng.annotations.Test;

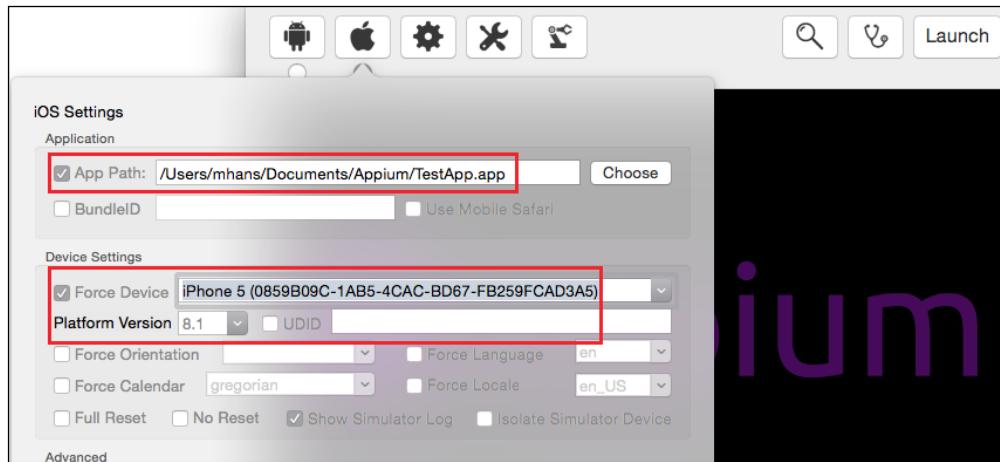
public class TestAppIlication {
    AndroidDriver driver;

    @BeforeClass
    public void setUp() throws MalformedURLException{
        //Set up desired capabilities
        DesiredCapabilities caps = new DesiredCapabilities();
        File app=new File("path of the apk");
        caps.setCapability(MobileCapabilityType.APP,app);
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
        "4.4");
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
        "Android");
        caps.setCapability(MobileCapabilityType.DEVICE_NAME,"Android
        emulator");
        caps.setCapability("avd","Name of the AVD to launch");
        caps.setCapability(MobileCapabilityType.APP_PACKAGE, "package
        name of your app (you can get it from apk info app)");
        caps.setCapability(MobileCapabilityType.APP_ACTIVITY, "Launch
        activity of your app (you can get it from apk info app)");
        caps.setCapability(MobileCapabilityType.BROWSER_NAME,
        "Browser");// In case of web apps
        driver = new AndroidDriver (new
        URL("http://127.0.0.1:4723/wd/hub"), caps);
        driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
    }
    @Test
    public void testExample(){
        //We will put test scripts here
    }
    @AfterClass
    public void tearDown(){
        driver.closeApp(); //CloseApp() function is used to close the
        mobile native and hybrid apps while quit() and close() is used for
        web apps
    }
}
```

## Necessary desired capabilities for iOS and initiating the iOS driver

Same as Android, we can set the desired capabilities using the Appium GUI and by initiating the desired capabilities object. Let's discuss both.

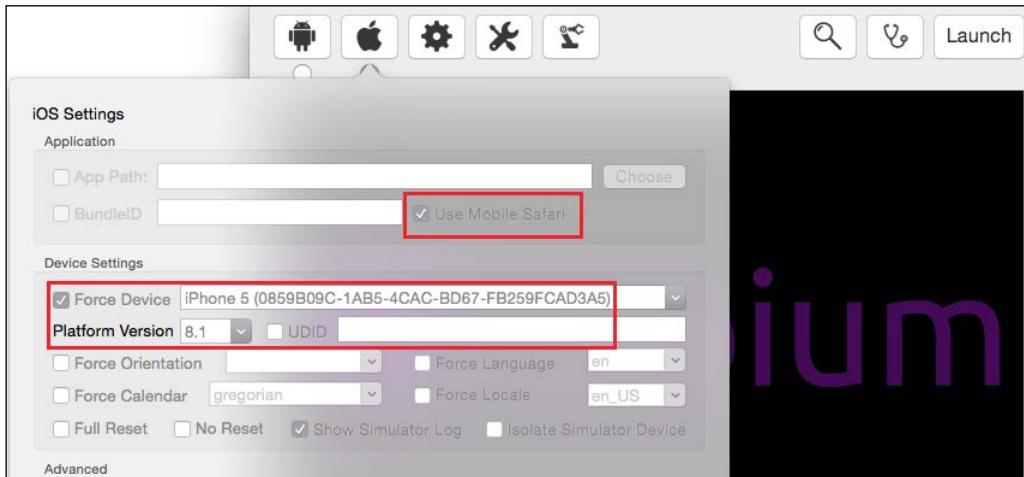
**iOS Settings** in the Appium GUI settings for native and hybrid apps:



Here are the steps you need to perform for native and hybrid apps:

1. Click on the iOS Settings icon.
2. Select **App Path** and provide the path of the application.
3. Select **Force Device** and choose a simulator from the list.
4. Select **Platform Version** from the dropdown or you can also type in a version (for example, **8.1**).
5. Now, start the Appium Server.

Let's see the **iOS Settings** in Appium GUI settings for web apps:



Here are the steps you need to perform for web apps:

1. Click on the iOS Settings icon.
2. Select **Use Mobile Safari**.
3. Select **Force Device** and choose a simulator from the list.
4. Select **Platform Version** from the dropdown or you can also type in a value (for example, **8.1**).
5. Now, start the Appium server.

Let's discuss how to initiate the desired capabilities object and set the capabilities.

## Desired capabilities for native and hybrid apps

We already discussed the desired capabilities for iOS in *Chapter 1, Appium – Important Conceptual Background*, so here we will directly dive into the code with comments. First, we need to import the following packages:

```
import java.io.File;
import org.openqa.selenium.remote.DesiredCapabilities;
import io.appium.java_client.remote.MobileCapabilityType;
```

Now, let's set the desired capabilities for native and hybrid apps:

```
DesiredCapabilities caps = new DesiredCapabilities() ;//To create  
an object of desired capabilities  
File app=new File("path of the .app") ;//To create a file object  
to specify the app path  
caps.setCapability(MobileCapabilityType.APP,app) ;//To set the app  
path  
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
"8.1") ;//To set the iOS version  
caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
"iOS") ;//To set the OS name  
caps.setCapability(MobileCapabilityType.DEVICE_NAME,"iPhone  
5") ;// Type valid simulator name otherwise appium will throw an  
exception
```

## Desired capabilities for web apps

In iOS mobile web apps, some of the capabilities that we used in native and hybrid apps such as APP, APP PACKAGE, and APP ACTIVITY are not required because we are launching a browser here. First, we need to import the following packages:

```
import java.io.File;  
import org.openqa.selenium.remote.DesiredCapabilities;  
import io.appium.java_client.remote.MobileCapabilityType;
```

Now, let's set the desired capacities for the web apps, as shown here:

```
DesiredCapabilities caps = new DesiredCapabilities() ;//To create  
an object of desired capabilities  
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
"8.1") ;//To set the iOS version  
caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
"iOS") ;//To set the OS name  
caps.setCapability(MobileCapabilityType.DEVICE_NAME,"iPhone  
5") ;// Type valid simulator name otherwise Appium will throw an  
exception  
caps.setCapability(MobileCapabilityType.BROWSER_NAME,"Safari") ;  
//To launch the Safari browser
```

We are done with the desired capabilities part; now, we have to initiate the iOS Driver to connect with the Appium server, but first we need to import the following packages:

```
import io.appium.java_client.ios.IOSDriver;  
import java.net.URL;
```

Then, initiate the iOS Driver:

```
IOSDriver driver = new IOSDriver (new  
URL("http://127.0.0.1:4723/wd/hub") ,caps) ;
```

This will launch the app in the simulator using the configurations specified in the desired capabilities.

Now, you can use the following class for test scripts with TestNG:

```
import io.appium.java_client.ios.IOSDriver;  
import io.appium.java_client.remote.MobileCapabilityType;  
import java.io.File;  
import java.net.MalformedURLException;  
import java.net.URL;  
import java.util.concurrent.TimeUnit;  
import org.openqa.selenium.DesiredCapabilities;  
import org.testng.annotations.AfterClass;  
import org.testng.annotations.BeforeClass;  
import org.testng.annotations.Test;  
  
public class TestAppIlication {  
    IOSDriver driver;  
  
    @BeforeClass  
    public void setUp() throws MalformedURLException{  
        //Set up desired capabilities  
        DesiredCapabilities caps = new DesiredCapabilities();  
        File app=new File("path of the .app");  
        caps.setCapability(MobileCapabilityType.APP,app);  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
        "8.1");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME, "iOS");  
        caps.setCapability(MobileCapabilityType.DEVICE_NAME,"iPhone 5");  
        caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
        "Safari");// In case of web apps  
        driver = new IOSDriver (new URL("http://127.0.0.1:4723/wd/hub") ,  
        caps);  
        driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);  
    }  
    @Test  
    public void testExample(){  
        //We will put test scripts here  
    }
```

```

@AfterClass
public void tearDown() {
    driver.closeApp(); //In case of native and hybrid app
    //driver.quit(); //In case of web apps
}
}

```

## Automating native apps

Native apps are basically developed for a particular platform, and they can take an advantage of the device's features. They can work offline. You can install a native app directly on to the device or through an application store, such as Google Play or Apple App Store.

## Native Android apps

Here, we are going to take an example of the Android calculator app, and in this section, we will take a look at the addition of two numbers.



Perform the following steps to automate the calculator app:

1. Update the desired capabilities in the `setup()` method to launch the calculator app:

```
caps.setCapability("avd", "AVD_Nexus_4"); // Mention the  
created AVD name  
caps.setCapability(MobileCapabilityType.APP_PACKAGE,  
"com.android.calculator2");  
caps.setCapability(MobileCapabilityType.APP_ACTIVITY,  
"com.android.calculator2.Calculator");
```

2. Now, we need to find the numbers; we are going to find them by name:

```
WebElement five=driver.findElement(By.name("5"));  
WebElement four=driver.findElement(By.name("4"));
```

3. We need to find the + sign and the = sign; we are going to find them by name and AccessibilityID, respectively:

```
WebElement plus=driver.findElement(By.name("+"));  
WebElement  
equalTo=driver.findElementByAccessibilityId("equals"));
```

4. Now, we need to perform click on the element:

```
five.click();  
plus.click();  
four.click();  
equalTo.click();
```

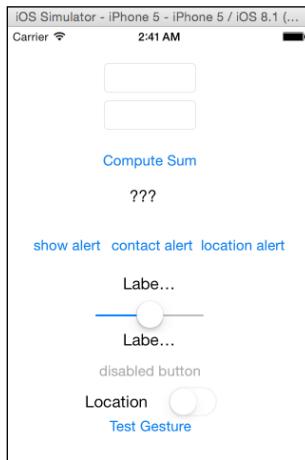
5. Run your script using TestNG; it should look like the following block of code:

```
public class TestApplication {  
AndroidDriver driver;  
@BeforeClass  
public void setUp() throws MalformedURLException{  
DesiredCapabilities caps = new DesiredCapabilities();  
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
"4.4");
```

```
caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
"Android");
caps.setCapability(MobileCapabilityType.DEVICE_NAME,
"Android emulator");
caps.setCapability("avd","AVD_Nexus_4");// Mention the
created AVD name
caps.setCapability(MobileCapabilityType.APP_PACKAGE,
"com.android.calculator2");
caps.setCapability(MobileCapabilityType.APP_ACTIVITY,
"com.android.calculator2.Calculator");
driver = new AndroidDriver (new
URL("http://127.0.0.1:4723/wd/hub"), caps);
driver.manage().timeouts().implicitlyWait
(30, TimeUnit.SECONDS);
}
@Test
public void testExample(){
    WebElement five=driver.findElement(By.name("5"));
    five.click();
    WebElement plus=driver.findElement(By.name("+"));
    plus.click();
    WebElement four=driver.findElement(By.name("4"));
    four.click();
    WebElement
equalTo=driver.findElementByAccessibilityId("equals");
    equalTo.click();
}
@AfterClass
public void tearDown(){
    driver.closeApp();
}
}
```

## Native iOS apps

Here, we are going to take an example of an iOS TestApp; you can get it from <https://github.com/manojhans/Appium/blob/master/Application/iOS/Native/TestApp7.1.app.zip?raw=true>. After downloading it, extract it to a local folder (for example, /Users/mhans/appium/ios/TestApp.app). The downloaded app will look like the following screenshot:



In this section, we will take a look at the addition of two numbers. To do this, perform the following steps:

1. Update the desired capabilities in the `setup()` method to launch the TestApp:

```
File app=new  
File("/Users/mhans/appium/ios/TestApp.app"); //You can  
change it with your app address  
caps.setCapability(MobileCapabilityType.APP, app);
```

2. Now, we have to find elements to be typed in; we are going to find them by name:

```
WebElement  
editBox1=driver.findElement(By.name("TextField1"));  
WebElement  
editBox2=driver.findElement(By.name("TextField2"));
```

3. Now, we need to find the compute button; we are going to find it by AccessibilityID:

```
WebElement  
computeSumBtn=driver.findElementByAccessibilityId("Compute  
Sum");
```

4. Now, type a value in the first box:

```
editBox1.sendKeys("10");
```

5. Type a value in the second box:

```
editBox2.sendKeys("20");
```

6. Now, click on the Compute Sum button:

```
computeSumBtn.click();
```

7. Run your script using TestNG; it should look like the following code:

```
public class TestApplication {  
    IOSDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException{  
        File app=new  
        File("/Users/mhans/appium/ios/TestApp.app");//You can  
        change it with your app address  
        DesiredCapabilities caps = new DesiredCapabilities();  
        caps.setCapability(MobileCapabilityType.APP,app);  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
        "8.1");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
        "iOS");  
        caps.setCapability(MobileCapabilityType.DEVICE_NAME,  
        "iPhone 5");  
        driver = new IOSDriver (new  
        URL("http://127.0.0.1:4723/wd/hub"), caps);  
        driver.manage().timeouts().implicitlyWait  
        (30, TimeUnit.SECONDS);  
    }  
    @Test  
    public void testExample(){  
        WebElement  
        editText1=driver.findElement(By.name("TextField1"));  
        editText1.sendKeys("10");  
        WebElement  
        editText2=driver.findElement(By.name("TextField2"));  
        editText2.sendKeys("20");  
        WebElement  
        computeSumBtn=driver.findElementByAccessibilityId  
        ("Compute Sum");  
        computeSumBtn.click();  
    }  
}
```

```
@AfterClass  
public void tearDown() {  
    driver.closeApp();  
}  
}
```

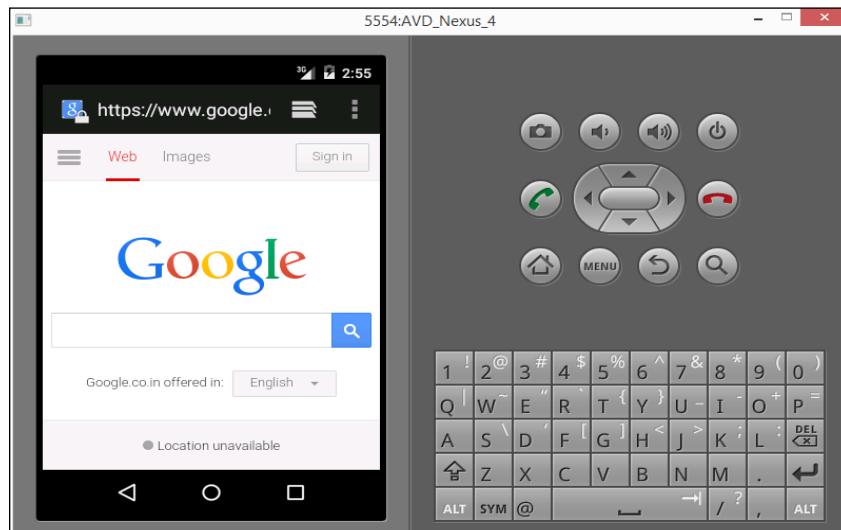
## Working with web-apps

Web apps can be run on any device or platform; the only requirement is a web browser and an Internet connection. The best part is that you don't need to install web-apps on the device. They are generally designed with cross-browser compatibility in mind.

### Web apps on Android

We are going to take an example of the Google search page.

In this section, we are going to take a look at how to load the native browser on an emulator and then type data in the Google search box. Initially, we will get the native browser as shown in following screenshot:



Perform the following steps to load the native browser on an emulator and then type data in the Google search box:

1. Update the desired capabilities in the `setup()` method to launch the native browser:

```
caps.setCapability("avd", "AVD_Nexus_4"); // Mention the  
created AVD name  
caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
"Browser");
```

2. Now, we need to navigate to `https://www.google.com` using the following command:

```
driver.get("https://www.google.com"); //On web apps we need  
to navigate the url to test the desired website
```

3. We need to find the `searchBox` element; in this section, we are going to find an element by name:

```
WebElement searchBox=driver.findElement(By.name("q"));
```

4. Now, we need type in the search box:

```
searchBox.sendKeys("Appium for mobile automation");
```

5. Run your script using TestNG; it should look like the following block of code:

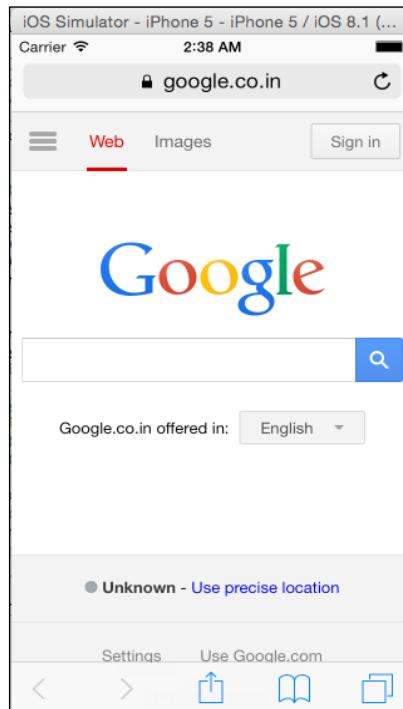
```
public class TestApplication {  
    AndroidDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException{  
        DesiredCapabilities caps = new DesiredCapabilities();  
        caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
        "Browser");  
        caps.setCapability(MobileCapabilityType.PLATFORM  
        _VERSION, "4.4");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
        "Android");  
        caps.setCapability(MobileCapabilityType.DEVICE_NAME,  
        "Android emulator");  
        caps.setCapability("avd", "AVD_Nexus_4"); // Mention the  
        created AVD name  
        driver = new AndroidDriver (new  
        URL("http://127.0.0.1:4723/wd/hub"), caps);  
        driver.manage().timeouts().implicitlyWait  
        (30, TimeUnit.SECONDS);  
    }  
    @Test
```

```
public void testExample() {  
    driver.get("https://www.google.com");  
    WebElement searchBox=driver.findElement(By.name("q"));  
    searchBox.sendKeys("Appium for mobile automation");  
}  
@AfterClass  
public void tearDown(){  
    driver.quit();  
}
```

In the next section, we will see how the same test scripts run on different platforms; we only need to change the desired capabilities, which fulfill the purpose (cross-platform testing) of using Appium.

## Web apps on iOS

We are going to take the example of the Google search page. In this section, we are going to take a look at how to load the browser on the simulator and then type data in the Google search box. Initially, we will get the Safari browser in simulator as shown in the following screenshot:



1. Perform the following steps to load the browser on the simulator and then type data in the Google search boxUpdate the desired capabilities in the `setup()` method to launch the Chrome browser:

```
caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
"Safari");
```

2. Now, we need to navigate to `https://www.google.com` using the following command:

```
driver.get("https://www.google.com");
```

3. We need to find a `searchBox` element; in this section, we are going to find an element by name:

```
WebElement searchBox=driver.findElement(By.name("q"));
```

4. Type the following in the search box:

```
searchBox.sendKeys("Appium for mobile automation");
```

5. Run your script using TestNG; it should look like the following block of code:

```
public class TestApplication {  
    IOSDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException{  
        DesiredCapabilities caps = new DesiredCapabilities();  
        caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
        "Safari");  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
        "8.1");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
        "iOS");  
        caps.setCapability(MobileCapabilityType.DEVICE_NAME,  
        "iPhone 5");  
        driver = new IOSDriver (new  
        URL("http://127.0.0.1:4723/wd/hub"), caps);  
        driver.manage().timeouts().implicitlyWait  
        (30, TimeUnit.SECONDS);  
    }  
    @Test  
    public void testExample(){  
        driver.get("https://www.google.com");  
        WebElement searchBox=driver.findElement(By.name("q"));  
        searchBox.sendKeys("Appium for mobile automation");  
    }  
}
```

```
@AfterClass  
public void tearDown() {  
    driver.quit();  
}  
}
```

## Hybrid apps' automation

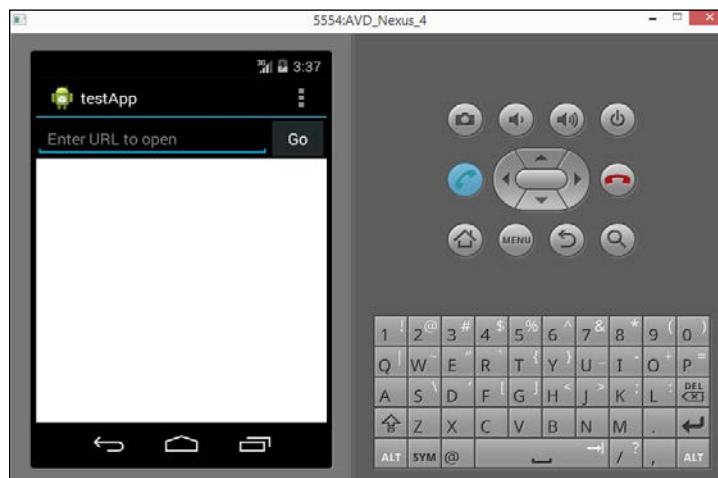
Hybrid apps are a combination of native and web apps; similar to native apps, you can get hybrid apps through an application store. Nowadays, hybrid apps are very popular because they give us a cross-platform solution and display the content they get from the Web.

## Android hybrid apps

Here, we are going to take an example of `testApp`; you can get it from <https://github.com/manojhans/Appium/blob/master/Application/Android/testApp.zip?raw=true>.

If you are working with an Android version less than 4.4, then you have to use Selendroid (in that case, you have to set the capability as `caps.setCapability(MobileCapabilityType.AUTOMATION_NAME, "Selendroid")`), otherwise Appium has a built-in support through ChromeDriver.

While working with hybrid apps, you need to make the changes defined at <https://developer.chrome.com/devtools/docs/remote-debugging#configure-webview>. We have already made the changes in `testApp`. Initially, we will get the `testApp` as shown in following screenshot:



In this section, we are going to take a look at interacting with the web view:

1. Update the desired capabilities in the `setup()` method to launch the hybrid app, as follows:

```
File app=new File("C:\\Appium_test\\testApp.apk");// (On window platform)
caps.setCapability(MobileCapabilityType.APP,app);
caps.setCapability("avd","AVD_Nexus_4");// Mention the created AVD name
caps.setCapability(MobileCapabilityType.APP_PACKAGE, " com.example.testapp");
caps.setCapability(MobileCapabilityType.APP_ACTIVITY, "MainActivity");
```

2. We need to find the Edit box to type in the desired URL (`https://www.google.com`) to open; here, we are going to find an element by ID:

```
WebElement editText=driver.findElement(By.id("com.example.testapp:id/urlField"));
editText.sendKeys("https://www.google.com");
```

3. Now, we need to find the **Go** button; in this section, we are going to find an element by name:

```
WebElement goButton=driver.findElement(By.name("Go"));
```

4. Click on the **Go** button to open the URL in the web view:

```
goButton.click();
```

5. We then need to switch on the web view to take further action. We can get the list of contexts using the following command:

```
Set<String> contexts = driver.getContextHandles();
for (String context : contexts) {
    System.out.println(context); //it will print the list of contexts like NATIVE_APP \n WEBVIEW_com.example.testapp
}
```

6. Now, switch on the web view using this command:

```
driver.context("WEBVIEW_com.example.testapp");
```

You can also use this:

```
driver.context((String) contextNames.toArray()[1]);
```

7. Now, you can interact with the Google page; here, we are going to click on the **Images** tab and find an element by `linkText`:

```
WebElement
images=driver.findElement(By.linkText("Images"));
images.click();
```

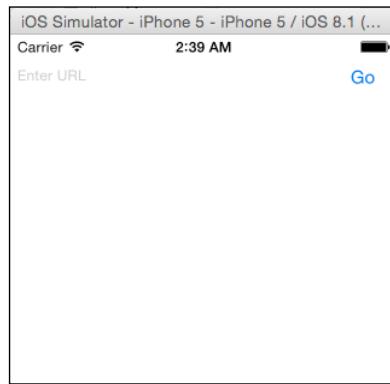
8. Run your script using TestNG; it should look like the following block of code:

```
public class TestApplication {  
    AndroidDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException{  
        DesiredCapabilities caps = new DesiredCapabilities();  
        File app= new File("/Users/mhans/appium/ios/webViewApp.  
        app");  
        caps.setCapability(MobileCapabilityType.APP,app");  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
        "4.4");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
        "Android");  
        caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Androi  
        d emulator");  
        caps.setCapability("avd","AVD_Nexus_4");// Mention  
        the created AVD name  
        caps.setCapability(MobileCapabilityType.AUTOMATION_NAME,  
        "Appium");//Use Selendroid in case of <4.4 android version  
        caps.setCapability(MobileCapabilityType.APP_PACKAGE,  
        "com.example.testapp");  
        caps.setCapability(MobileCapabilityType.APP_ACTIVITY,  
        "com.example.testapp.MainActivity");  
        driver = new AndroidDriver (new  
        URL("http://127.0.0.1:4723/wd/hub"), caps);  
        driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECON  
        DS);  
    }  
    @Test  
    public void testExample(){  
        WebElement editBox=driver.findElement(By.id("com.example.  
        testapp:id/urlField"));  
        editBox.sendKeys("https://www.google.com");  
        WebElement goButton=driver.findElement(By.name("Go"));  
        goButton.click();  
        Set<String> contexts = driver.getContextHandles();  
        for (String context : contexts) {  
            System.out.println(context); //it will print NATIVE_APP \n  
            WEBVIEW_com.example.testapp  
        }  
        driver.context((String) contexts.toArray()[1]);  
        WebElement images=driver.findElement(By.linkText("Images"));  
        images.click();
```

```
        }
    @AfterClass
    public void tearDown() {
        driver.closeApp();
    }
}
```

## iOS hybrid apps

Here, we are going to take an example of `WebViewApp`. You can get it from <https://github.com/manojhans/Appium/blob/master/Application/iOS/Hybrid/WebViewApp7.1.app.zip?raw=true>. After downloading it, extract it to a local folder (for example, `/Users/mhans/appium/ios/WebViewApp.app`). Initially, the `webViewApp` will look like the following screenshot:



In this section, we are going to look at interacting with the web view:

1. Update the desired capabilities in the `setup()` method to launch the hybrid app:

```
File app=new
File ("/Users/mhans/appium/ios/WebViewApp.app");
caps.setCapability(MobileCapabilityType.APP,app);
```

2. We need to find the edit box to type in the desired URL (<https://www.google.com>) to open; here, we are going to find an element by `className`:

```
WebElement editText=driver.findElement(By.
className("UIATextField"));
editText.sendKeys("www.google.com");
```

3. Now, we need to find the **Go** button; we are going to find an element by `name`:

```
WebElement goButton=driver.findElement(By.name("Go"));
```

4. Click on the **Go** button to open the URL in the web view:

```
goButton.click();
```

5. Now, we need to switch on the web view to take further action. We can view the list of contexts using the following command:

```
Set<String> contexts = driver.getContextHandles();
for (String context : contexts) {
    System.out.println(context); //it will print the list of
    contexts like NATIVE_APP \n WEBVIEW_1
}
```

6. Now, switch on the web view using this command:

```
driver.context("WEBVIEW_com.example.testapp");
```

Alternatively, you can also use this command:

```
driver.context((String) contextNames.toArray()[1]);
```

7. Now you can interact with the Google page. Here, we are going to click on the **Images** tab; let's find an element using linkText:

```
WebElement images=driver.findElement(By.linkText("Images"));
images.click();
```

8. Run your script using TestNG; it should look like the following block of code:

```
public class TestApplication {

    IOSDriver driver;
    @BeforeClass
    public void setUp() throws MalformedURLException{
        DesiredCapabilities caps = new DesiredCapabilities();
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
        "8.1");
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
        "iOS");
        caps.setCapability(MobileCapabilityType.DEVICE_NAME,
        "iPhone 5");
        driver = new IOSDriver (new
        URL("http://127.0.0.1:4723/wd/hub"), caps);
        driver.manage().timeouts().implicitlyWait
        (30, TimeUnit.SECONDS);
    }
    @Test
    public void testExample(){
```

```
WebElement
editBox=driver.findElement(By.className("UIATextField"));
editBox.sendKeys("https://www.google.com");
WebElement goButton=driver.findElement(By.name("Go"));
goButton.click();
Set<String> contexts = driver.getContextHandles();
for (String context : contexts) {
    System.out.println(context); //it will print NATIVE_APP
    \n WEBVIEW_com.example.testapp
}
driver.context((String) contexts.toArray() [1]);
WebElement
images=driver.findElement(By.linkText("Images"));
images.click();
}
@AfterClass
public void tearDown(){
    driver.closeApp();
}
}
```

## Summary

In this chapter, we looked at how to execute test scripts of native, hybrid, and mobile web apps on an iOS simulator and Android emulator. We learned how easily we can perform actions on native mobile apps and also learned about the desired capabilities that are required. We learned how to load the native browser in an Android emulator and the necessary capabilities to start with.

We saw how we can start the Safari browser in a simulator and set up the desired capabilities to test web applications. Lastly, we looked at how easily we can automate hybrid apps and switch from native to web view.

In the next chapter, we will take a look at Appium drivers on real devices.



# 6

## Driving Appium on Real Devices

It is really good to know that we can automate mobile apps on real devices. Appium provides the support for automating apps on real devices. We can test the apps in a physical device and experience the look and feel that an end user would.

In this chapter, we will learn the following topics:

- Dialer app automation on an Android real device
- Registration form automation on an Android real device
- Gmail login automation with Chrome browser on an Android real device
- Body Mass Index (BMI) calculator automation on an iOS real device
- Mobile hybrid app automation on an iOS real device
- Web app automation with Safari on an iOS real device

### Important initial points

Before starting with Appium, make sure that you have all the necessary software installed. Let's take a look at the prerequisites for Android and iOS:

Prerequisites for Android	Prerequisites for iOS
Java (Version 7 or later)	Mac OS (Version 10.7 or later)
The Android SDK API, Version 17 or higher	Xcode (Version 4.6.3 or higher; 5.1 is recommended)
A real Android device	An iOS provisional profile
Chrome browser on a real device	An iOS real device

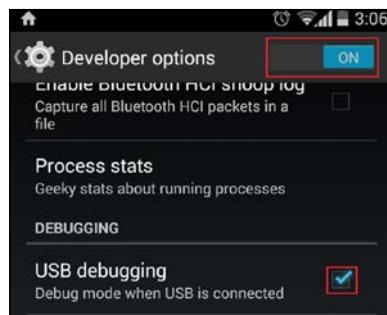
Prerequisites for Android	Prerequisites for iOS
Eclipse	The SafariLauncher app
TestNG	ios-webkit-debug-proxy
The Appium Server	Java Version 7
The Appium client library (Java)	Eclipse
Selenium Server and WebDriver Java library	TestNG
The Apk Info app	The Appium server
	The Appium client library (Java)
	Selenium Server and WebDriver Java library

While working with the Android real device, we need to enable USB debugging under **Developer options**. To enable USB debugging, we have to perform the following steps:

1. Navigate to **Settings | About Phone** and tap on **Build number** seven times (assuming that you have Android Version 4.2 or newer); then, return to the previous screen and find **Developer options**, as shown in the following screenshot:



2. Tap on **Developer options** and then tap on the **ON** switch to switch on the developer settings (You will get an alert to allow developer settings; just click on the **OK** button.). Make sure that the **USB debugging** option is checked, as shown here:



3. After performing the preceding steps, you have to use a USB cable to connect your Android device with the desktop. Make sure you have installed the appropriate USB driver for your device before doing this. After connecting, you will get an alert on your device asking you to allow USB debugging; just tap on **OK**.

To ensure that we are ready to automate apps on the device, perform the following steps:

1. Open Command Prompt or terminal (on Mac).
2. Type `adb devices` and press the *Enter* button.

You will get a list of Android devices; if not, then try to kill and start the adb server with the `adb kill-server` and `adb start-server` commands.

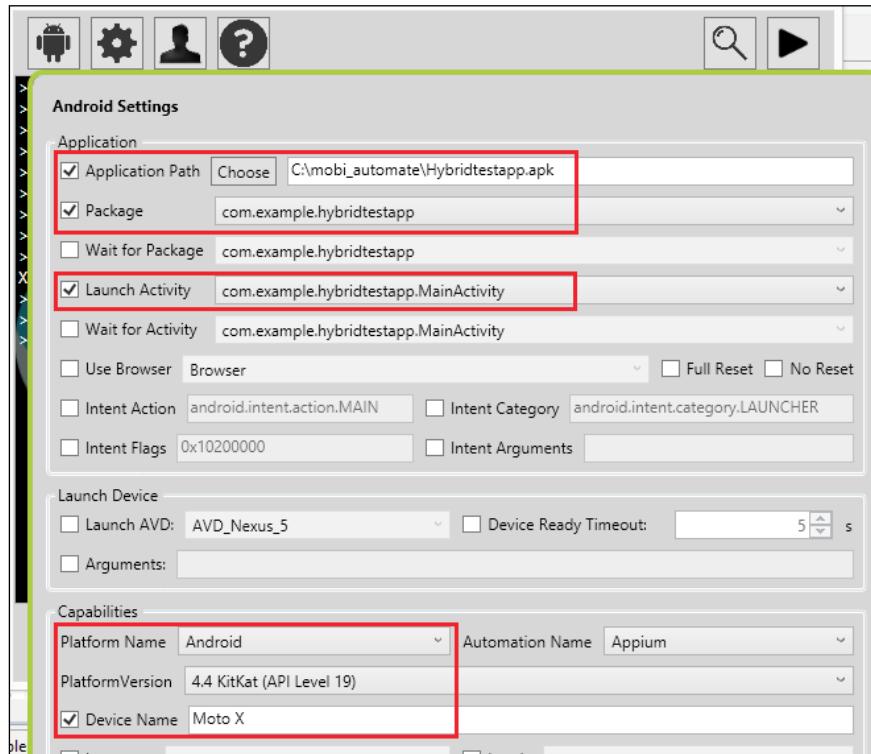
Now, we've come to the coding part. First, we need to set the desired capabilities and initiate an Android/iOS driver to work with Appium on a real device. Let's discuss them one by one.

## Desired capabilities for Android and initiating the Android driver

We have two ways to set the desired capabilities, one with the Appium GUI and the other by initiating the desired capabilities object.

Using the desired capabilities object is preferable; otherwise, we have to change the desired capabilities in the GUI repeatedly whenever we are testing another mobile app.

Let's take a look at the Appium GUI settings for native and hybrid apps:



Perform the following steps to set the **Android Settings**:

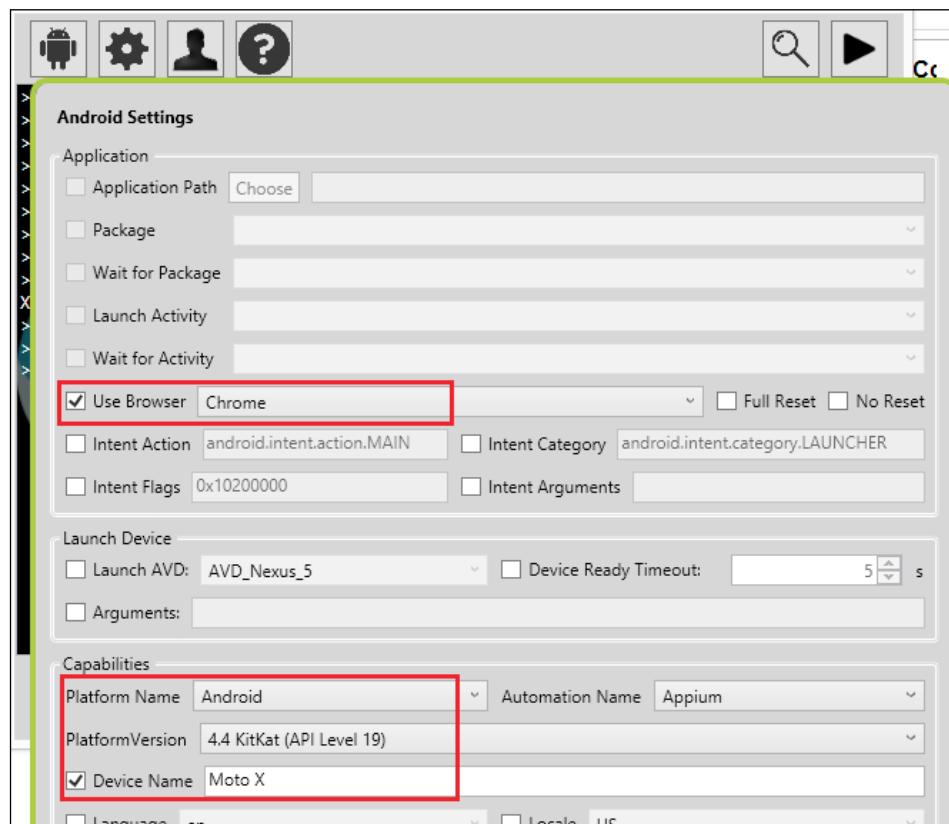
1. Click on the **Android Settings** icon.
2. Select **Application Path** and provide the path of the app.
3. Click on **Package** and choose the appropriate package from the drop-down menu.
4. Click on **Launch Activity** and choose an activity from the drop-down menu.

If the application is already installed on the real device, then we don't need to follow steps 2-4. In this case, we have to install the Apk Info app on the device to know the package and activities of the app and set them using the desired capabilities object, which we will see in the next section. You can easily get the 'Apk info' app from the Android Play Store.

5. Select **PlatformVersion** from the dropdown.
6. Select **Device Name** and type in a device name (For example, Moto X).
7. Now, start the Appium Server.

Perform the following steps to set the Android Settings for web apps:

1. Click on the **Android Settings** icon.
2. Select **PlatformVersion** from the dropdown.
3. Select **Use Browser** and choose **Chrome** from the dropdown.
4. Select **Device Name** and type in a device name (For example, **Moto X**).
5. Now, start the Appium Server.



Let's discuss how to initiate the desired capabilities object and set the capabilities.

## Desired capabilities for native and hybrid apps

We have already discussed desired capabilities in *Chapter 1, Appium – Important Conceptual Background*, so here we will directly dive into the code with comments. First, we need to import the following packages:

```
import java.io.File;
import org.openqa.selenium.remote.DesiredCapabilities;
import io.appium.java_client.remote.MobileCapabilityType;
```

Now, let's set the desired capabilities for the native and hybrid apps:

```
DesiredCapabilities caps = new DesiredCapabilities() //To create
an object
File app=new File("path of the apk") //To create file object to
specify the app path
caps.setCapability(MobileCapabilityType.APP,app) //If app is
already installed on the device then no need to set this
capability.
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
"4.4") //To set the Android version
caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
"Android") //To set the OS name
caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Moto
X") //You can change the device name as yours.
caps.setCapability(MobileCapabilityType.APP_PACKAGE, "package
name of your app (you can get it from apk info app)") //To
specify the android app package
caps.setCapability(MobileCapabilityType.APP_ACTIVITY, "Launch
activity of your app (you can get it from apk info app)") //To
specify the activity which we want to launch
```

## Desired capabilities for web apps

In Android mobile web apps, some of the capabilities that we used in native and hybrid apps such as APP, APP PACKAGE, and APP ACTIVITY are not needed because we launch a browser here. First, we need to import the following packages:

```
import java.io.File;
import org.openqa.selenium.remote.DesiredCapabilities;
import io.appium.java_client.remote.MobileCapabilityType;
```

Now, let's set the desired capabilities for the web apps:

```
DesiredCapabilities caps = new DesiredCapabilities() //To create
an object
```

```
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
"4.4");//To set the android version
caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
"Android");//To set the OS name
caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Moto
X");//You can change the device name as yours
caps.setCapability(MobileCapabilityType.BROWSER_NAME, "Chrome");
//To launch the Chrome browser
```

We are done with the desired capability part; now, we have to initiate the Android driver to connect with the Appium Server by importing the following packages:

```
import io.appium.java_client.android.AndroidDriver;
import java.net.URL;
```

Then, initiate the Android driver as shown here:

```
AndroidDriver driver = new AndroidDriver (new
URL("http://127.0.0.1:4723/wd/hub"), caps);//TO pass the url
where Appium server is running
```

This will launch the app in the Android real device using the configurations specified in the desired capabilities.

## **Installing provisional profile, SafariLauncher, and ios-webkit-debug-proxy**

Before moving on to the desired capabilities for iOS, we have to make sure that we have set up a provisional profile and installed the SafariLauncher app and ios-webkit-debug-proxy to work with the real device.

First, let's discuss the provisional profile.

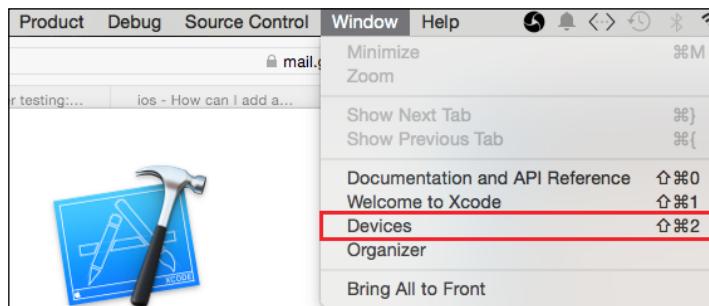
### **Provisional profile**

This profile is used to deploy an app on a real iOS device. To do this, we need to join the iOS Developer Program (<https://developer.apple.com/programs/ios/>).

For this, you will have to pay USD 99. Now, visit [https://developer.apple.com/library/ios/documentation/IDEs/Conceptual/AppDistributionGuide/MaintainingProfiles/MaintainingProfiles.html#/apple\\_ref/doc/uid/TP40012582-CH30-SW24](https://developer.apple.com/library/ios/documentation/IDEs/Conceptual/AppDistributionGuide/MaintainingProfiles/MaintainingProfiles.html#/apple_ref/doc/uid/TP40012582-CH30-SW24) to generate the profile.

After this, you will also need to install provisional profile on your real device; to do this, perform the following steps:

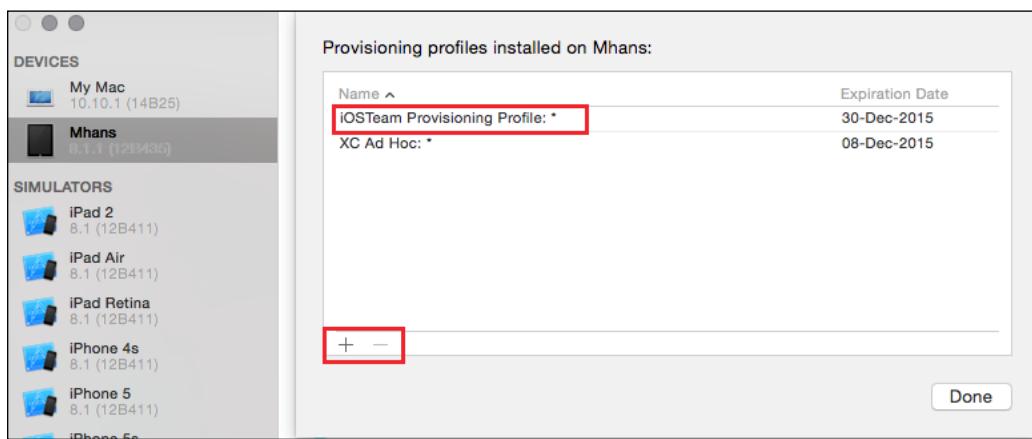
1. Download the generated provisional profile.
2. Connect the iOS device to a Mac using a USB cable.
3. Open Xcode (version 6) and click on **Devices** under the **Window** menu, as shown here:



4. Now, context click on the connected device and click on **Show Provisional Profiles...**:



5. Click on +, select the downloaded profile, and then click on the **Done** button, as shown in the following screenshot:



## SafariLauncher app and ios-webkit-debug-proxy

The SafariLauncher app is used to launch the Safari browser on a real device for web app testing. You will need to build and deploy the SafariLauncher app on a real iOS device to work with the Safari browser. To do this, you need to perform the following steps:

1. Download the source code from <https://github.com/snevesbarros/SafariLauncher/archive/master.zip>.
2. Open Xcode and then open the SafariLauncher project.
3. Select the device to deploy the app on and click on the **build** button.
4. After this, we need to change the SafariLauncher app in Appium.dmg; to do this, perform the following steps:
  1. Right-click on Appium.dmg.
  2. Click on **Show Package Contents** and navigate to Contents/Resources/node\_modules/appium/build/SafariLauncher.
  3. Now, extract SafariLauncher.zip.
  4. Navigate to submodules/SafariLauncher/build/Release-iphoneos and replace the SafariLauncher app with your app.
  5. Zip submodules and rename it as SafariLauncher.zip.

Now, we need to install the ios-webkit-debug-proxy on Mac to establish a connection in order to access the web view. To install the proxy, you can use brew and run the command `brew install ios-webkit-debug-proxy` in the terminal (this will install the latest tagged version), or you can clone it from Git and install it using the following steps:

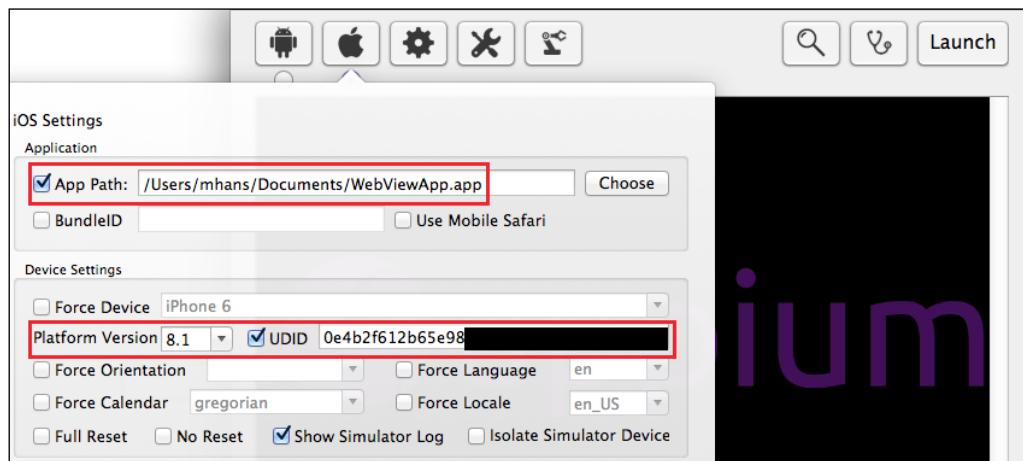
1. Open the terminal, type `git clone https://github.com/google/ios-webkit-debug-proxy.git`, and then click on the *Enter* button.
2. Then, enter the following commands:

```
cd ios-webkit-debug-proxy
./autogen.sh
./configure
make
sudo make install
```

We are now all set to test web and hybrid apps. Next, it's time to move on to the desired capabilities for iOS.

## Desired capabilities for iOS and initiating the iOS driver

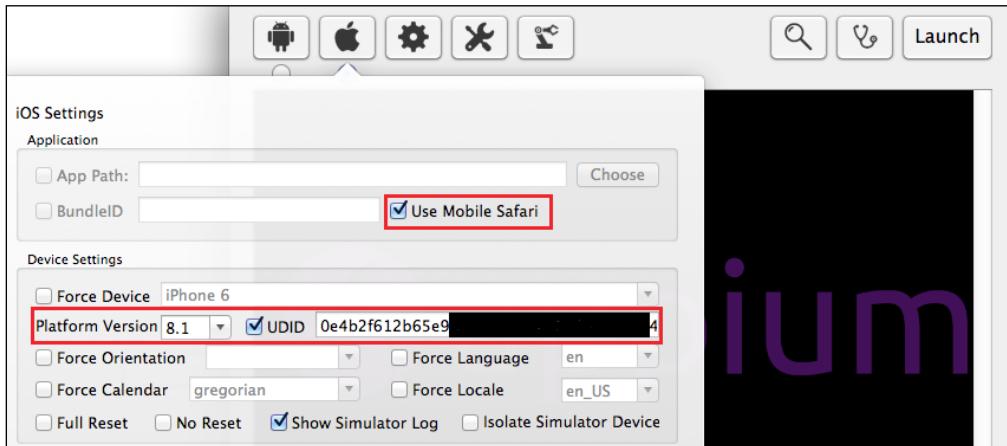
Similar to Android, we can set the desired capabilities using the Appium GUI and by initiating the desired capabilities object. Let's discuss the Appium GUI settings for native and hybrid apps. The following screen will be displayed when the iOS Settings icon is clicked:



Perform the following steps to set the iOS settings for native and hybrid apps:

1. Click on the **iOS Settings** icon.
2. Select **App Path** and provide the path of the application.
3. Select **UDID** and type in the device identifier. For the device identifier, we need to perform the following steps:
  1. Connect iOS device to a Mac using a USB cable.
  2. Open Xcode (Version 6) and click on **Devices** from the **Window** menu.
  3. Select **Connected device**.
  4. Under **Device Information**, you will get an identifier. We can also get the UDID from iTunes by clicking on **Serial Number**.
4. Under **Device Information**, you will get an identifier.
5. Select **Platform Version** from the dropdown; you can also type in the platform version (for example, **8.1**).
6. Now, start the Appium Server.

Let's set the Appium GUI settings for web apps:



Perform the following steps to set the iOS settings for web apps:

1. Click on the **iOS Settings** icon.
2. Select **Use Mobile Safari**.
3. Select **UDID** and type in the device identifier.
4. Select **Platform Version** from the dropdown or you can also type in one (for example, **8.1**).
5. Now, start the Appium Server.

Now, let's take a look at how to initiate the desired capabilities object and set the capabilities.

## Desired capabilities for native and hybrid Apps

We have already discussed the desired capabilities for iOS in *Chapter 1, Appium – Important Conceptual Background*, so here we will directly dive into the code with comments. First, we need to import the following packages:

```
import java.io.File;
import org.openqa.selenium.remote.DesiredCapabilities;
import io.appium.java_client.remote.MobileCapabilityType;
```

Now, let's set the desired capabilities for the native and hybrid apps:

```
DesiredCapabilities caps = new DesiredCapabilities(); //To create  
an object of desired capabilities  
File app=new File("path of the .app"); //To create a file object to  
specify the app path  
caps.setCapability(MobileCapabilityType.APP,app); //To set the app  
path  
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
"8.1"); //To set the iOS version  
caps.setCapability(MobileCapabilityType.PLATFORM_NAME, "iOS"); //To  
set the OS name  
caps.setCapability(MobileCapabilityType.DEVICE_NAME,"iPad"); //  
Type device name  
caps.setCapability("udid","Real Device Id "); // To specify the  
UDID of the device
```

## Desired capabilities for web apps

In iOS mobile web apps, some of the capabilities that we used in native and hybrid apps such as APP, APP PACKAGE, and APP ACTIVITY are not needed because we launch a browser here. First, we need to import the following packages:

```
import java.io.File;  
import org.openqa.selenium.remote.DesiredCapabilities;  
import io.appium.java_client.remote.MobileCapabilityType;
```

Now, let's set the desired capabilities for the web apps:

```
DesiredCapabilities caps = new DesiredCapabilities(); //To create  
an object of desired capabilities  
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
"8.1"); //To set the iOS version  
caps.setCapability(MobileCapabilityType.PLATFORM_NAME, "iOS"); //To  
set the OS name  
caps.setCapability(MobileCapabilityType.DEVICE_NAME,"iPad"); //To  
type the device name  
caps.setCapability("udid","Real Device Id "); //To specify the UDID  
of real device  
caps.setCapability(MobileCapabilityType.BROWSER_NAME,"Safari");  
//To launch the Safari browser
```

We are done with the desired capabilities part; now, we have to initiate the iOS driver to connect to the Appium Server by importing the following packages:

```
import io.appium.java_client.ios.IOSDriver;  
import java.net.URL;
```

Then, initiate the iOS Driver as shown here:

```
IOSDriver driver = new IOSDriver (new  
URL("http://127.0.0.1:4723/wd/hub") ,caps); //To pass the url where  
Appium server is running
```

This will launch the app in the simulator using the configurations specified in the desired capabilities. Now, you can use the following class for scripts with TestNG:

```
import io.appium.java_client.ios.IOSDriver;  
import io.appium.java_client.remote.MobileCapabilityType;  
import java.io.File;  
import java.net.MalformedURLException;  
import java.net.URL;  
import java.util.concurrent.TimeUnit;  
import org.openqa.selenium.remote.DesiredCapabilities;  
import org.testng.annotations.AfterClass;  
import org.testng.annotations.BeforeClass;  
import org.testng.annotations.Test;  
  
public class TestAppIlication {  
    IOSDriver driver;  
    @BeforeClass //It will execute one time before execute all test  
    cases  
    public void setUp() throws MalformedURLException{  
        //Set up desired capabilities  
        DesiredCapabilities caps = new DesiredCapabilities();  
        File app=new File("path of the .app");  
        caps.setCapability(MobileCapabilityType.APP,app);  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
        "8.1");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME, "iOS");  
        caps.setCapability(MobileCapabilityType.DEVICE_NAME,"iPad");  
        caps.setCapability("udid","Real Device Id ");  
        caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
        "Safari");// In case of web-apps  
        driver = new IOSDriver (new URL("http://127.0.0.1:4723/wd/hub") ,  
        caps);  
        driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);  
    }  
    @Test  
    public void testExample(){  
        //We will put test scripts here  
    }  
    @AfterClass
```

```
public void tearDown() {  
    driver.closeApp();  
    //driver.quit(); //in case of web apps  
}  
}
```

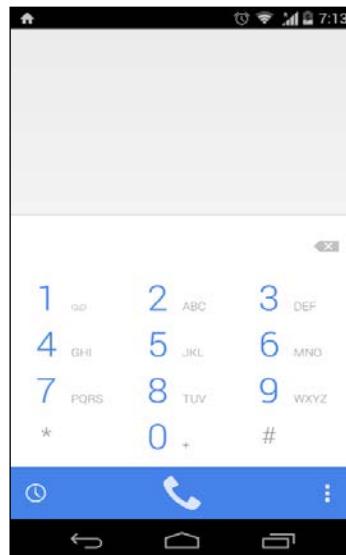
## Automating native apps

Native apps are basically developed for a particular platform and can take advantage of the device's features. One important point to note is that these apps can work even when you are offline. You can install them directly onto the device or through application stores, such as Google Play or the Apple App Store.

### Android native apps

In the case of Android automation, the same code that was used in the previous chapter will work when testing with an emulator, but we need to remove the avd capabilities from the emulator automation code.

Here, we are going to take an example of the Android dialer app. In this section, we will make a call with the Android dialer app, which is shown in the following screenshot:



Let's start with the following steps to automate the dialer app:

1. Set the desired capabilities to launch the dialer app, as follows:

```
caps.setCapability(MobileCapabilityType.APP_PACKAGE,  
"com.android.dialer");  
caps.setCapability(MobileCapabilityType.APP_ACTIVITY,  
"com.android.dialer.DialtactsActivity");
```

2. Now, we need to find the dial pad icon; we are going to find it by AccessibilityId, as follows:

```
WebElement dialPad=  
driver.findElementByAccessibilityId("dial pad"));
```

3. Now, we need to click on the icon using:

```
dialPad.click();
```

4. We need to find the numbers key in order to dial. Here, we are going to put some logic to find the numbers (0 to 9) by name and click on them one by one:

```
for(int n=0;n<10;n++){  
driver.findElement(By.name("'" +n+ "'")).click();  
}
```

This loop will execute 10 times and will pass the value inside the locator from the numbers 0 to 9.

5. Here, we are using a wrong phone number so that the device doesn't make a call to anyone; it will end with an invalid number.

6. Now, we need to find the dial icon to make the call; we are going to find it by AccessibilityId:

```
WebElement dial=  
driver.findElementByAccessibilityId("dial"));
```

7. Now, click on the icon to make the call:

```
dial.click();
```

8. Run your script using TestNG; this is how it should look:

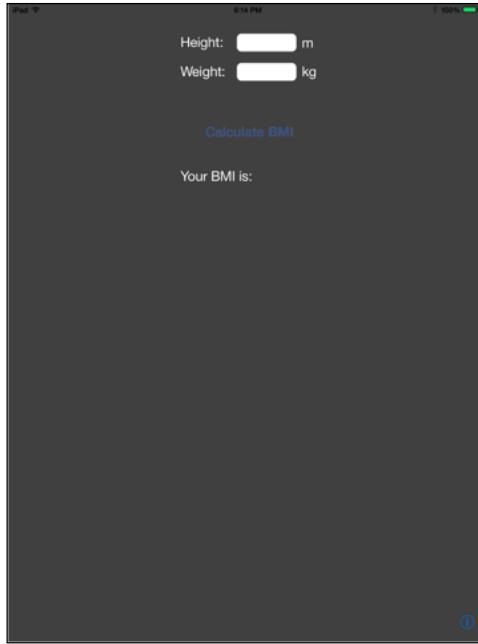
```
public class TestApplication {  
    AndroidDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException{  
        DesiredCapabilities caps = new DesiredCapabilities();  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
"4.4");
```

```
caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
    "Android");
caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Moto
X");//I am using Moto X as Real Device
caps.setCapability(MobileCapabilityType.APP_PACKAGE,
    "com.android.dialer");
caps.setCapability(MobileCapabilityType.APP_ACTIVITY,
    "com.android.dialer.DialtactsActivity");
driver = new AndroidDriver (new
URL("http://127.0.0.1:4723/wd/hub"), caps);
driver.manage().timeouts().implicitlyWait
(30, TimeUnit.SECONDS);
}
@Test
public void testExample(){
    WebElement
dialPad=driver.findElementByAccessibilityId("dial pad");
    dialPad.click();
    for(int n=0;n<10;n++){
        driver.findElement(By.name("'" +n+ "'")).click();
    }
    WebElement
dial=driver.findElementByAccessibilityId("dial");
    dial.click();
}
@AfterClass
public void tearDown(){
    driver.closeApp();
}
}
```

## iOS native apps

Here, we are going to take an example of the BMI calculator; you can get it from [https://github.com/manojjhans/Appium/blob/master/Application/iOS/Real\\_Device/Native/BMICalc.zip?raw=true](https://github.com/manojjhans/Appium/blob/master/Application/iOS/Real_Device/Native/BMICalc.zip?raw=true).

You can also download the source code from [https://github.com/soroushjp/BMICalc\\_iOS/archive/master.zip](https://github.com/soroushjp/BMICalc_iOS/archive/master.zip) and build it for a real device. You can use the same steps to build the BMICalc that we used for the SafariLaucher app earlier in this chapter. Initially, we will get the BMI calculator as shown in following screenshot:



In this section, we will calculate the body mass index as per the height and weight. To do this, we need to perform the following steps:

1. Update the desired capabilities in the `setup()` method to launch the BMICalc:

```
File app=new  
File("/Users/mhans/appium/ios/BmiCalc.app"); //You can  
change it with your app address  
caps.setCapability(MobileCapabilityType.APP,app); //To set  
the app path
```

2. Now, we have to find the elements to type in the height and weight text box; we will find them by Xpath:

```
WebElement  
height=driver.findElement(By.xpath("//UIATextField [2]"));  
WebElement  
weight=driver.findElement(By.xpath("//UIATextField [4]"));
```

3. Now, we need to find the calculate button; we are going to find it by name:

```
WebElement  
calculateBMI=driver.findElement(By.name("Calculate BMI"));
```

4. Now type a value in the first box:

```
height.sendKeys("1.82");
```

5. Type a value in the second box:

```
weight.sendKeys("75");
```

6. Now, click on the **Calculate BMI** button:

```
calculateBMI.click();
```

7. Run your script using TestNG; this is how it should look:

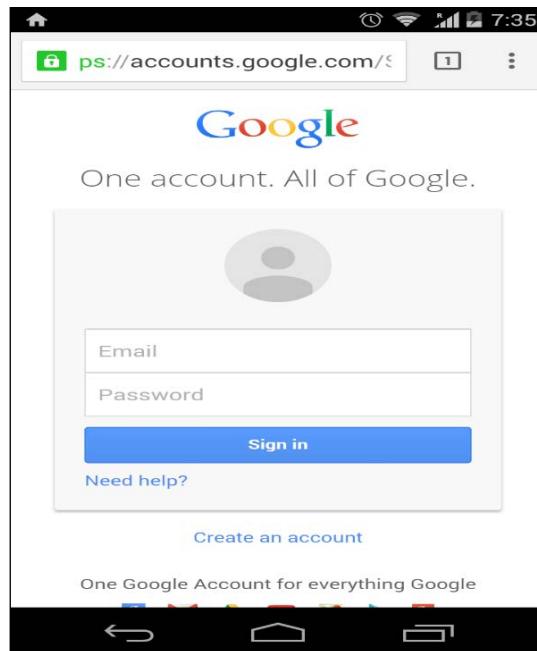
```
public class TestApplication {  
    IOSDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException{  
        File app=new  
        File("/Users/mhans/appium/ios/BmiCalc.app");//You can  
        change it with your app address  
        DesiredCapabilities caps = new DesiredCapabilities();  
        caps.setCapability(MobileCapabilityType.APP,app);  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
        "8.1");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
        "iOS");  
        caps.setCapability(MobileCapabilityType.DEV  
        ICE_NAME, "iPad");  
        caps.setCapability("udid", "Real Device Id ");  
        driver = new IOSDriver (new  
        URL("http://127.0.0.1:4723/wd/hub"), caps);  
        driver.manage().timeouts().implicitlyWait  
        (30, TimeUnit.SECONDS);  
    }  
    @Test  
    public void testExample(){  
        WebElement height=driver.findElement  
        (By.xpath("//UIATextField)[2]"));  
        height.sendKeys("1.82");  
        WebElement weight=driver.findElement  
        (By.xpath("//UIATextField)[4]"));  
        weight.sendKeys("75");  
        WebElement  
        calculateBMI=driver.findElement(By.name ("Calculate  
        BMI"));  
        calculateBMI.click();  
    }  
    @AfterClass  
    public void tearDown(){  
        driver.closeApp();  
    }  
}
```

# Working with web apps

Web apps can be run on any device or platform. The only requirement for running them is a web browser and an Internet connection; the best part is that you don't need to install the app on the device. Web apps are generally designed with cross-browser compatibility.

## Web apps on Android

We will take the example of the Gmail login page. In this section, we are going to take a look at how to load the Chrome browser on a real device and then type in invalid credentials and click on the **Sign in** button that is shown in the following screenshot:



Let's start with the following steps to automate the web apps:

1. Set the desired capabilities to launch the Chrome browser:

```
caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
"Chrome");
```

2. Now, we need to navigate to <https://www.gmail.com> using the `driver.get("https://www.gmail.com");` command.

3. We need to find the `username` box element (we can take a reference from *Chapter 4, Finding Elements with Different Locators*, to find an element); in this section, we are going to find an element by name:

```
WebElement username=driver.findElement(By.name("Email"));
```

4. Now, we need type into the `username` box:

```
username.sendKeys("test");
```

5. We need to find the `password` box element; in this section, we are going to find an element by name:

```
WebElement  
password=driver.findElement(By.name("Passwd"));
```

6. Now, we need to type into the `password` box element:

```
password.sendKeys("test");
```

7. We need to find the **Sign in** button; in this section, we are going to find an element by name:

```
WebElement signIn=driver.findElement(By.name("signIn"));
```

8. Now, we need to perform a click on it:

```
signIn.click();
```

9. Run your script using TestNG; this is how it should look:

```
public class TestApplication {  
    AndroidDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException {  
        DesiredCapabilities caps = new DesiredCapabilities();  
        caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
        "Chrome");  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
        "4.4");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
        "Android");  
        caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Moto  
X");  
        driver = new AndroidDriver (new  
        URL("http://127.0.0.1:4723/wd/hub"), caps);  
        driver.manage().timeouts().implicitlyWait  
        (30, TimeUnit.SECONDS);  
    }  
    @Test
```

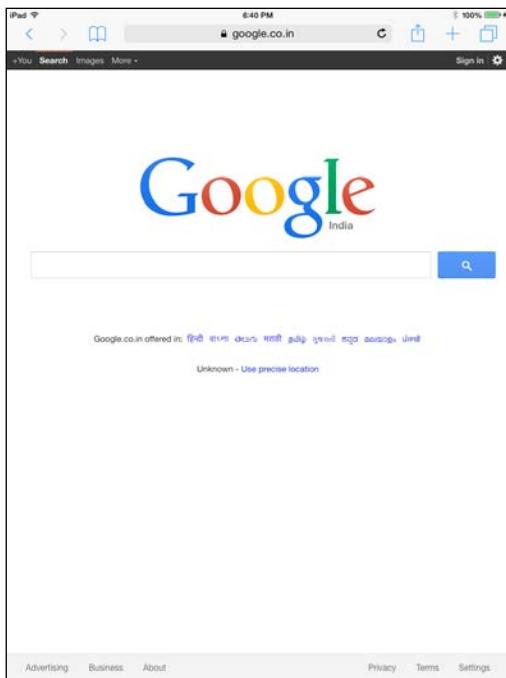
```
public void testExample(){
driver.get("https://www.gmail.com");
WebElement username=driver.findElement(By.name("Email"));
username.sendKeys("test");
WebElement
password=driver.findElement(By.name("Passwd"));
password.sendKeys("test");
WebElement signIn=driver.findElement(By.name("signIn"));
signIn.click(); }

@AfterClass
public void tearDown() {
driver.quit();
}

}
```

## Web apps on iOS

We are going to take an example of the Google search page. In this section, we are going to take a look at how to load the browser on a real iOS device and then type data in the Google search box shown in the following screenshot:



Let's start with the following steps to automate web apps:

1. Update the desired capabilities in the `setup()` method to launch the Safari browser:

```
caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
"Safari");
```

2. Now, we need to navigate to `https://www.google.com` using the `driver.get("https://www.google.com")` command.

3. We need to find the `searchBox` element; in this section, we are going to find an element by name:

```
WebElement searchBox=driver.findElement(By.name("q"));
```

4. Now, we need to type into the search box:

```
searchBox.sendKeys("Appium for mobile automation");
```

5. Before running the test script, we need to start the proxy using the following command:

```
ios_webkit_debug_proxy -c  
2e5n6f615z66e98c1d07d22ee09658130d345443:27753 -d
```

Replace `2e5n6f615z66e98c1d07d22ee09658130d345443` with the attached device's UDID and make sure that the port is set to 27753.

6. Make sure that the **Web Inspector** is turned ON on a real device

(**Settings | Safari | Advanced**) and the `SafariLauncher` app is installed:

7. Run your script using TestNG; this is how it should look:

```
public class TestApplication {  
    IOSDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException{  
        DesiredCapabilities caps = new DesiredCapabilities();  
        caps.setCapability(MobileCapabilityType.BROWSER_NAME,  
"Safari");  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
"8.1");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
"iOS");
```

```

        caps.setCapability(MobileCapabilityType.DEVICE_NAME,
        "iPad");
        caps.setCapability("udid","Real Device Identifier");
        driver = new IOSDriver (new
        URL("http://127.0.0.1:4723/wd/hub"), caps);
        driver.manage().timeouts().implicitlyWait
        (30, TimeUnit.SECONDS);
    }
    @Test
    public void testExample(){
        driver.get("https://www.google.com");
        WebElement searchBox=driver.findElement(By.name("q"));
        searchBox.sendKeys("Appium for mobile automation");
    }
    @AfterClass
    public void tearDown(){
        driver.quit();
    }
}

```

## Automating hybrid apps

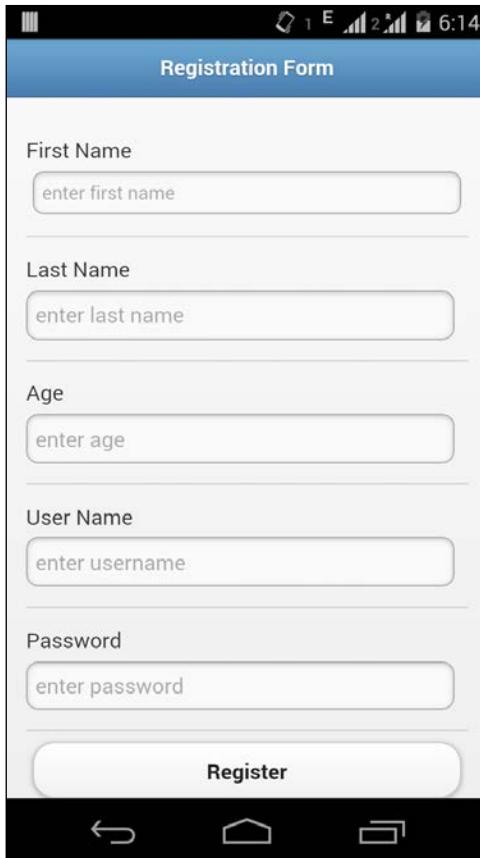
A hybrid app is a combination of native and web apps. Similar to native apps, you can get hybrid apps through an application store. Nowadays, hybrid apps are very popular because they provide a cross-platform solution and display the content that they get from the Web rather than the contents installed on the device only.

## Android hybrid apps

Here, we will take an example of the Hybridtestapp; you can get it from <https://github.com/manojhans/Appium/blob/master/Application/Android/Hybrid/Hybridtestapp.zip?raw=true>.

If you are working with an Android version higher than 4.4, then you have to use Selendroid (in that case, you have to set the capability as `(MobileCapabilityType.AUTOMATION_NAME, "Selendroid")`); otherwise, Appium has built-in support through the `ChromeDriver`.

While working with hybrid apps, you need to make the changes defined at <https://developer.chrome.com/devtools/docs/remote-debugging#configure-webview>. We have already made these changes in Hybridtestapp. Initially, we will get the Hybridtestapp as shown in following screenshot:



In this section, we will interact with web view and fill the registration form by performing the following steps:

1. Set the desired capabilities to launch the hybrid app:

```
File app=new File("C:\\Appium_test\\HybridtestApp.apk");  
(On window platform)  
caps.setCapability(MobileCapabilityType.APP,app);  
caps.setCapability(MobileCapabilityType.APP_PACKAGE,  
"com.example.hybridtestapp");  
caps.setCapability(MobileCapabilityType.APP_ACTIVITY,  
"com.example.hybridtestapp.MainActivity");
```

2. We need to switch on the web view to take action on the registration form. We can have the list of contexts using the following command:

```
Set<String> contexts = driver.getContextHandles();
for (String context : contexts) {
    System.out.println(context); //it will print the list of
    contexts like NATIVE_APP \n
    WEBVIEW_com.example.hybridtestapp
}
```

3. Now, switch on the web view using this command:

```
driver.context("WEBVIEW_com.example.hybridtestapp");
```

Alternatively, you can use the following command:

```
driver.context((String) contextNames.toArray() [1]);
```

Make sure that all the other apps are closed before you execute the scripts.

4. Once we are inside web view, we need to find the **First Name** box to type in; here, we are going to find an element by name:

```
WebElement firstName=driver.findElement(By.name("fname"));
firstName.sendKeys("test");
```

5. We need to find the **Last Name** box to type in; here, we are going to find an element by name:

```
WebElement lastName=driver.findElement(By.name("lname"));
lastName.sendKeys("test");
```

6. We need to find the **Age** box to type in; here, we are going to find an element by name:

```
WebElement age=driver.findElement(By.name("age"));
age.sendKeys("26");
```

7. We need to find the **User Name** box to type in; here, we are going to find an element by name:

```
WebElement
username=driver.findElement(By.name("username"));
username.sendKeys("appiumTester");
```

8. We need to find the **Password** box to type in; here, we are going to find an element by id:

```
WebElement password=driver.findElement(By.id("psw"));
password.sendKeys("appium@123");
```

9. We need to find the **Register** button to submit the form; we are going to find an element by id:

```
WebElement  
registerButton=driver.findElement(By.id("register"));  
registerButton.click();
```

10. Run your script using TestNG; this is how it should look:

```
public class TestApplication {  
    AndroidDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException{  
        File app=new File("C:\\Appium_test\\HybridtestApp.apk");//  
        (On window platform)  
  
        caps.setCapability(MobileCapabilityType.APP,app);  
        DesiredCapabilities caps = new DesiredCapabilities();  
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,  
        "4.4");  
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
        "Android");  
        caps.setCapability(MobileCapabilityType.DEVICE_NAME,  
        "Moto X");  
        caps.setCapability(MobileCapabilityType.AUTOMATION_NAME,  
        "Appium");//Use Selendroid in case of <4.4 android  
        version  
        caps.setCapability(MobileCapabilityType.APP_PACKAGE,  
        "com.example.hybridtestapp");  
        caps.setCapability(MobileCapabilityType.APP_ACTIVITY,  
        "com.example.hybridtestapp.MainActivity");  
        driver = new AndroidDriver (new  
        URL("http://127.0.0.1:4723/wd/hub"), caps);  
        driver.manage().timeouts().implicitlyWait  
        (30, TimeUnit.SECONDS);  
    }  
    @Test  
    public void testExample(){  
        Set<String> contexts = driver.getContextHandles();  
        for (String context : contexts) {  
            System.out.println(context); //it will print NATIVE_APP  
            \n WEBVIEW_com.example.hybridtestapp  
        }  
        driver.context((String) contexts.toArray()[1]);  
        WebElement  
        firstName=driver.findElement(By.name("fname"));  
        firstName.sendKeys("test");
```

```

WebElement lastName=driver.findElement(By.name("lname"));
lastName.sendKeys("test");
WebElement age=driver.findElement(By.name("age"));
age.sendKeys("26");
WebElement
username=driver.findElement(By.name("username"));
username.sendKeys("appiumTester");
WebElement password=driver.findElement(By.id("psw"));
password.sendKeys("appium@123");
WebElement
registerButton=driver.findElement(By.id("register"));
registerButton.click();
}
@AfterClass
public void tearDown() {
    driver.closeApp();
}
}

```

## iOS hybrid apps

Here, we are going to use the example of a WebViewApp. You can get it from [https://github.com/manojhans/Appium/blob/master/Application/iOS/Real\\_Device/Hybrid/WebViewApp.zip?raw=true](https://github.com/manojhans/Appium/blob/master/Application/iOS/Real_Device/Hybrid/WebViewApp.zip?raw=true) or download the source code from <https://github.com/appium/sample-code/archive/master.zip> and build WebViewApp for real devices.

You can perform the same steps to build WebViewApp that you took for the SafariLaucher app earlier in this chapter. Initially, we will get the WebViewApp as shown in following screenshot:



In this section, we are going to see how to interact with web view, as follows:

1. Update the desired capabilities in the `setup()` method to launch the hybrid app:

```
File app=new  
File("/Users/mhans/appium/ios/WebViewApp.app"); //Change it  
with your app address  
caps.setCapability(MobileCapabilityType.APP, app);
```

2. We need to find the edit box in order to type in the desired URL(`www.google.com`) to open; here, we are going to find an element by `className`:

```
WebElement  
editBox=driver.findElement(By.className("UIATextField"));  
editBox.sendKeys("www.google.com");
```

3. Now, we need to find the **Go** button; we are going to find an element by name:

```
WebElement goButton=driver.findElement(By.name("Go"));  
Click on the Go button to open the URL in web view:  
goButton.click();
```

4. Now, we need to switch on the web view to take further action; we can have the list of contexts using the following command:

```
Set<String> contexts = driver.getContextHandles();  
for (String context : contexts) {  
System.out.println(context); //it will print the list of  
contexts like NATIVE_APP \n WEBVIEW_1  
}
```

5. Now, switch on the web view using this command:

```
driver.context("WEBVIEW_com.example.testapp");
```

You can also use this command alternatively:

```
driver.context((String) contextNames.toArray()[1]);
```

6. Now, you can interact with the Google page. Here, we are going to click on the **Images** tab; let's find an element by `linkText`:

```
WebElement  
images=driver.findElement(By.linkText("Images"));  
images.click();
```

7. Run your script using TestNG. Before running the test script, you need to start the proxy using the `ios_webkit_debug_proxy -c 2e5n6f615z66e98c1d07d22ee09658130d345443:27753 -d` command. Replace the UDID with the attached device and make sure that the port is set to 27753.

Make sure that the **web inspector** is turned ON on the real device (**Settings | Safari | Advanced**) and the SafariLauncher app is installed. This is how the test script should look:

```
public class TestApplication {
    IOSDriver driver;
    @BeforeClass
    public void setUp() throws MalformedURLException{
        DesiredCapabilities caps = new DesiredCapabilities();
        File app=new
        File("/Users/mhans/appium/ios/WebViewApp.app");
        caps.setCapability(MobileCapabilityType.APP,app);
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
        "8.1");
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
        "iOS");
        caps.setCapability(MobileCapabilityType.DEVICE_NAME,
        "iPad");
        caps.setCapability("udid","Real Device Identifier");
        driver = new IOSDriver (new
        URL("http://127.0.0.1:4723/wd/hub"), caps);
        driver.manage().timeouts().implicitlyWait
        (30, TimeUnit.SECONDS);
    }
    @Test
    public void testExample(){
        WebElement
        editBox=driver.findElement(By.className("UIATextField"));
        editBox.sendKeys("https://www.google.com");
        WebElement goButton=driver.findElement(By.name("Go"));
        goButton.click();
        Set<String> contexts = driver.getContextHandles();
        for (String context : contexts) {
            System.out.println(context); //it will print NATIVE_APP
            \n WEBVIEW_com.example.testapp
    }
}
```

```
        driver.context((String) contexts.toArray()[1]);
        WebElement
        images=driver.findElement(By.linkText("Images"));
        images.click();
    }
    @AfterClass
    public void tearDown() {
        driver.closeApp();
    }
}
```

## Summary

In this chapter, we looked at how we can execute the test scripts of native, hybrid, and web mobile apps on iOS and Android real devices. Specifically, we learned how to perform actions on native mobile apps and also got to know about the desired capabilities for real devices. We ran a test with the Android Chrome browser and learned how to load the Chrome browser on an Android real device with the necessary capabilities.

We then moved on to starting the Safari browser on a real device and setting up the desired capabilities to test web applications. Lastly, we looked at how easily we can automate hybrid apps and switch from native to web view.

In the last chapter, we will take a look at different mobile gestures.

# 7

## Advanced User Interactions

In the preceding chapters, we covered a lot of things that are quite straightforward with Appium. In this chapter, we will take a look at mobile gestures, such as long press, zoom, and swipe.

In this chapter, we will learn about the following topics:

- The advanced user interactions API
- Mobile gestures, such as long press, drag and drop, so on
- Handling alerts, spinners (dropdowns), the switch button, and the slide seekBar.
- Capturing screenshots
- Capturing screenshots on test failure

### Exploring advanced user interactions

In Appium, the advanced user interactions API allows you to perform complex mobile gestures, such as drag and drop, swipe, and zoom by using the `TouchAction` and `MultiTouchAction` classes. It simply builds a complex chain of events, similar to what users do manually on their mobile devices. In the upcoming sections, we will see these classes in detail.

## Long press

Long press is a mobile gesture that is widely used by people. It is a wonderful feature; most people say that you should touch and hold instead of using long press. By using long press, you can get more information about a particular feature. Just like a context-click on the Web, it also enables multiselection in mobile apps.

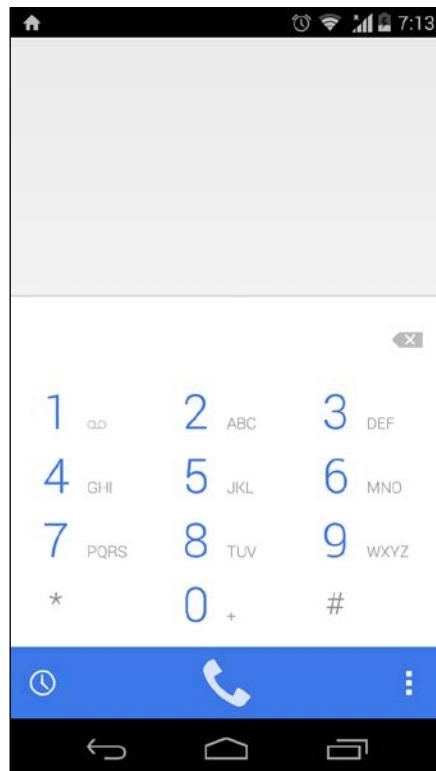
Let's try and create a long press example using the TouchAction class. Here, we are going to take an example of a dialer pad on an Android real device. In this section, we will long press the number 0 and it will be converted into +. To do this, we need to perform the following steps:

1. Open up Eclipse and create an Appium project.
2. Create a new class that has the following test code:

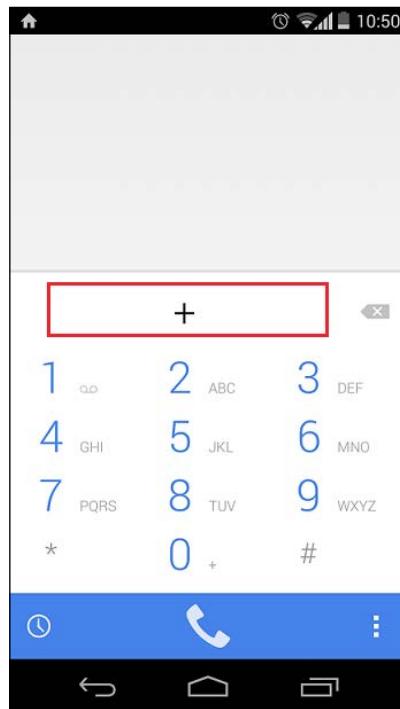
```
AndroidDriver driver;
@BeforeClass
public void setUp() throws MalformedURLException{
    DesiredCapabilities caps = new DesiredCapabilities();
    caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
    "4.4");
    caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
    "Android");
    caps.setCapability(MobileCapabilityType.DEVICE_NAME,
    "Moto X");//I am using Moto X as Real Device
    caps.setCapability(MobileCapabilityType.APP_PACKAGE,
    "com.android.dialer");
    caps.setCapability(MobileCapabilityType.APP_ACTIVITY,
    "com.android.dialer.DialtactsActivity");
    driver = new AndroidDriver (new
    URL("http://127.0.0.1:4723/wd/hub"), caps);
    driver.manage().timeouts().implicitlyWait
    (30, TimeUnit.SECONDS);
}
@Test
public void testExample(){
    WebElement dialPad=
    driver.findElementByAccessibilityId("dial pad");
    dialPad.click();
    TouchAction tAction=new TouchAction(driver);
```

```
tAction.longPress(driver.findElement  
(By.name("0"))).perform();  
WebElement results=  
driver.findElementByClassName("android.widget.EditText");  
assert results.getText().equals("+") :"Actual value  
is : "+results.getText()+" did not match with expected  
value: +";  
}  
@AfterClass  
public void tearDown(){  
driver.closeApp();  
}
```

3. Run the test code; initially, you should see the following screen:



4. After running the test code, you will get + in the dialer box, as shown in the following screen:



We just saw how easy it is to perform a long press on the mobile app. For this, we need to create a `TouchAction` object and using its reference, call the `longpress` function. We then pass the `MobileElement`, where we want to perform the long press, and finally call `perform()` to send the action command to the mobile app.

In the next section, we will take a look at another mobile gesture: scroll and swipe.

## Scroll and swipe

In general, scrolling is the process of moving the visual portions of mobile apps in order to see additional information.

On a mobile device, you can use your finger to swipe up or down in order to scroll down or scroll up the screen. Swiping your finger upwards will lead to a scroll down and swiping down will perform a scroll up.

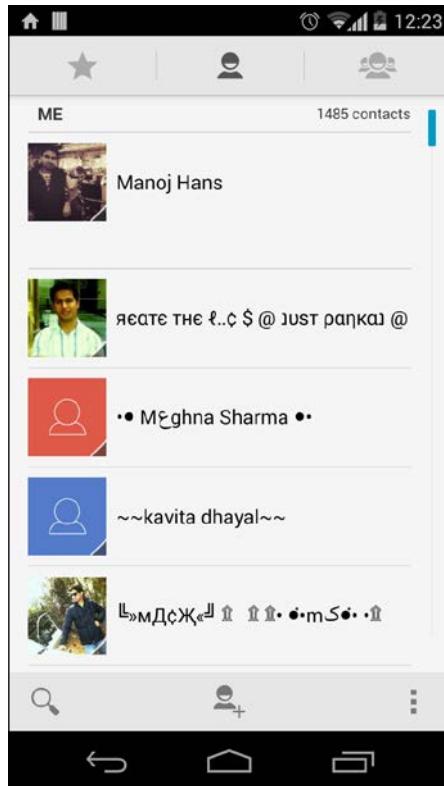
Here, we are going to take the example of a contact app to view the desired contact details on an Android device. In the test code, we will pass the name Nitika.

Let's see this in action, as follows:

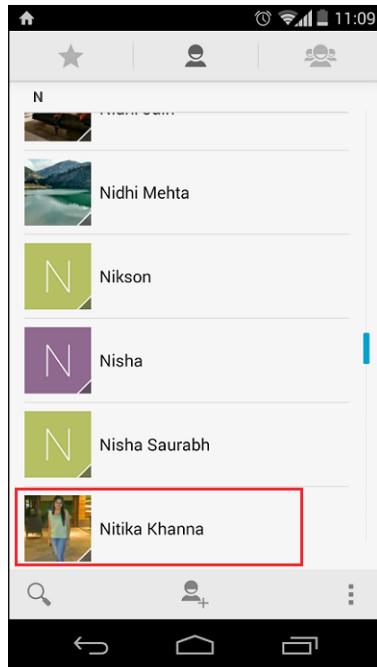
1. Create a new class in the existing Appium project with the following test code:

```
AndroidDriver driver;
@BeforeClass
public void setUp() throws MalformedURLException{
    DesiredCapabilities caps = new DesiredCapabilities();
    caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
    "4.4");
    caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
    "Android");
    caps.setCapability(MobileCapabilityType.DEVICE_NAME,
    "Moto X");//I am using Moto X as a Real Device
    caps.setCapability
    (MobileCapabilityType.APP_PACKAGE, "com.android.contacts");
    caps.setCapability
    (MobileCapabilityType.APP_ACTIVITY,
    "com.android.contacts.activities.PeopleActivity");
    driver = new AndroidDriver (new
    URL("http://127.0.0.1:4723/wd/hub"), caps);
    driver.manage().timeouts().implicitlyWait
    (30, TimeUnit.SECONDS);
}
@Test
public void testExample(){
    driver.scrollTo("Nitika"); //You can keep another name
    which is in your contact list
}
@AfterClass
public void tearDown(){
    driver.closeApp();
}
```

2. Run the test code; initially, you should see the following screen:



3. After the execution of the test code, you should see something similar to the following screen:



We have just seen scrolling on a particular text in the contact list. We need to call the `scrollTo("text")` function of the `AndroidDriver` to view the desired contact. We have another function, `scrollToExact("text")`, to scroll on the page, which we will see later in this chapter while handling spinners.

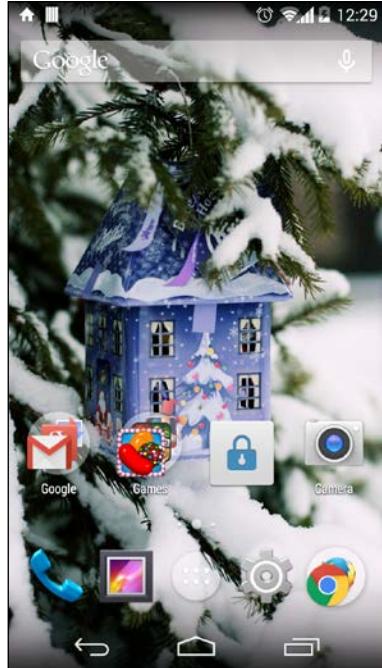
Let's create an example of swiping using the x and y offsets. We can swipe the screen on the basis of a screen coordinator. Here, we are taking an example of the Google Now Launcher. You can download it from the Play Store and make it your default launcher.

In the following example, we are going to swipe to the right in order to access Google Now:

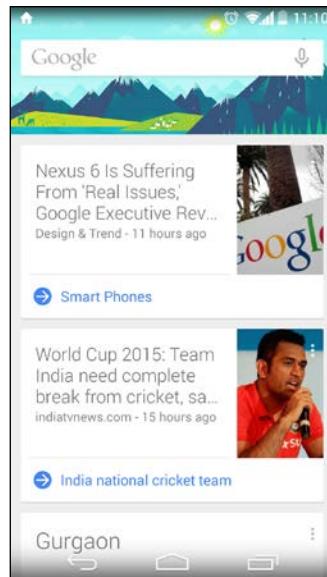
1. Create a new class with the following test code:

```
AndroidDriver driver;
@BeforeClass
public void setUp() throws MalformedURLException{
    DesiredCapabilities caps = new DesiredCapabilities();
    caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
    "4.4");
    caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
    "Android");
    caps.setCapability(MobileCapabilityType.DEVICE_NAME,
    "Moto X");//I am using Moto X as a Real Device
    caps.setCapability(MobileCapabilityType.APP_PACKAGE,
    "com.google.android.launcher");
    caps.setCapability(MobileCapabilityType.APP_ACTIVITY,
    "com.google.android.launcher.StubApp");
    driver = new AndroidDriver (new
    URL("http://127.0.0.1:4723/wd/hub"), caps);
    driver.manage().timeouts().implicitlyWait
    (30, TimeUnit.SECONDS);
}
@Test
public void testExample(){
    TouchAction tAction=new TouchAction(driver);
    tAction.press(300,500).moveTo(600,500).release()
    .perform(); //First tap on the screen and swipe it right
    using moveTo function
}
@AfterClass
public void tearDown(){
    driver.closeApp();
}
```

2. Run the test code; initially, you should see the following screen:



3. After the execution of the test code, you should see the following screen:



We have just seen how easy it is to do a scroll and swipe on the mobile device. In the next section, we will take a look at the drag and drop gesture.

## Drag and drop

A drag and drop operation allows you to move objects from one location to another. It is one of those mobile gestures that can really support you to make an interface simple to use.

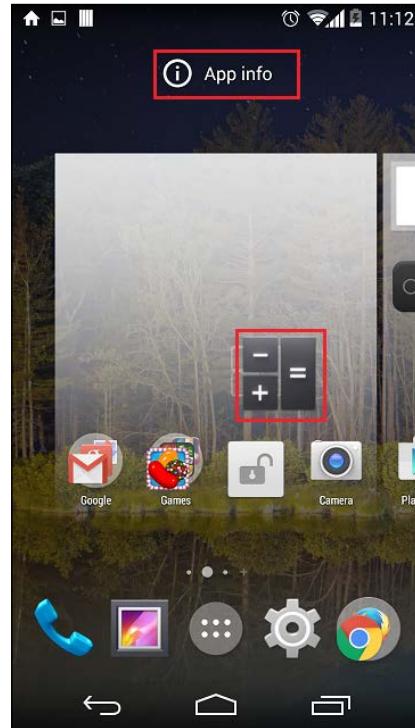
On Android, if we press the app for a short while, it shows the options **Uninstall** and **App info** for the pressed app. Let's write the test code to get the **App info** option. In the case of stock apps, you will get only one option, that is, **App info**. Here, we are going to drag the calculator app and drop it in App info using the following steps. We are assuming that you already have Google Now Launcher:

1. Create a new class with the following test code:

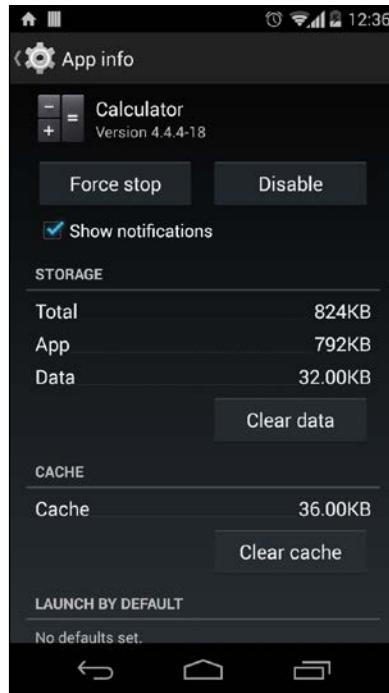
```
AndroidDriver driver;
@BeforeClass
public void setUp() throws MalformedURLException{
    DesiredCapabilities caps = new DesiredCapabilities();
    caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
    "4.4");
    caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
    "Android");
    caps.setCapability(MobileCapabilityType.DEVICE_NAME,
    "Moto X");//I am using Moto X as a Real Device
    caps.setCapability(MobileCapabilityType.APP_PACKAGE,
    "com.google.android.launcher");
    caps.setCapability(MobileCapabilityType.APP_ACTIVITY,
    "com.google.android.launcher.StubApp");
    driver = new AndroidDriver (new
    URL("http://127.0.0.1:4723/wd/hub"), caps);
    driver.manage().timeouts().implicitlyWait
    (30, TimeUnit.SECONDS);
}
@Test
public void testExample(){
    MobileElement appsIcon=(MobileElement)driver.find
    ElementByAccessibilityId("Apps");
    appsIcon.click();
```

```
MobileElement calculator=(MobileElement)driver.find
ElementByName("Calculator");
TouchAction act=new TouchAction(driver);
act.press(calculator).perform();//we are not releasing
calculator icon
act.moveTo(driver.findElement(By.name("App
info"))).release().perform();// then move the icon into App
Info and now released the icon
}
@AfterClass
public void tearDown(){
    driver.closeApp();
}
```

2. Run the test code; initially, you should see the following screen:



3. After the execution of the test code, you should see the following screen:



Here, we saw how easily we can perform a drag and drop operation on the mobile device. In the preceding test code, we pressed the calculator app until the **App info** option became visible; once it was visible, we dropped the app in it.

In the next section, we will see another useful mobile gesture: pinch and zoom.

## Pinch and zoom

The pinch and zoom gesture is similar to the drag gesture, but it starts when the second finger is pressed on the mobile screen. Fortunately, Appium also supports multitouch gestures using the `MultiTouchAction` class. You can add multiple actions simultaneously using the `MultiTouchAction` class.

Let's create a sequence of actions using the `TouchActions` chain generator and then add these actions using the `MultiTouchAction` class. Here, we are taking an example of an iOS app, which can be downloaded from <https://github.com/manojhans/Appium/blob/master/Application/iOS/Native/Zoom.zip?raw=true>.

Initially, you will see the following image:



Now, let's perform the following steps to pinch and zoom:

1. Create a new class with the following code:

```
IOSDriver driver;  
@BeforeClass  
public void setUp() throws MalformedURLException{  
    File app=new File("/Users/mhans/appium/ios/Zoom.app");  
    //You can change it with your app address  
    DesiredCapabilities caps = new DesiredCapabilities();  
    caps.setCapability(MobileCapabilityType.APP,app);  
    caps.setCapability  
(MobileCapabilityType.PLATFORM_VERSION,"8.1");  
    caps.setCapability(MobileCapabilityType.PLATFORM_NAME,  
    "iOS");  
    caps.setCapability  
(MobileCapabilityType.DEVICE_NAME,"iPad");  
    caps.setCapability("udid","Real Device Id");  
    driver = new IOSDriver (new  
    URL("http://127.0.0.1:4723/wd/hub"), caps);  
    driver.manage().timeouts().implicitlyWait  
(30, TimeUnit.SECONDS);  
}
```

```
@Test
public void testExample(){
    int scrHeight = driver.manage().window().getSize().get
    Height(); //To get the mobile screen height
    int scrWidth = driver.manage().window().getSize().get
    Width(); //To get the mobile screen width
    MultiTouchAction multiTouch = new
    MultiTouchAction(driver);
    TouchAction tAction0 = new TouchAction(driver);
    TouchAction tAction1 = new TouchAction(driver);
    tAction0.press(scrWidth/2,scrHeight/2).wait
    Action(1000).moveTo(0,60).release(); //press finger center
    of the screen and then move y axis
    tAction1.press(scrWidth/2,scrHeight/2+40).wait
    Action(1000).moveTo(0,80).release(); // press thumb slightly
    down on the center of the screen and then move y axis
    multiTouch.add(tAction0).add(tAction1);
    multiTouch.perform(); // now perform both the actions
    simultaneously (tAction0 and tAction1)
}
@AfterClass
public void tearDown(){
    driver.closeApp();
}
```

2. After the test execution, the image will be zoomed in and this is how it will look:



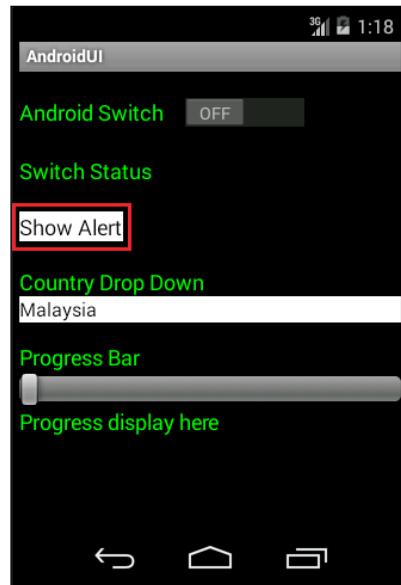
We learned a lot about advanced user interactions and have finished discussing the core aspects of Appium. In the next section, we will learn how to handle an alert dialog box.

## Alerts

An alert is a small window that requires a user action to make a decision or enter some extra information. We can't interact with the original window while the alert dialog is present; to work with the original window, we need to close the alert dialog.

On iOS, an alert dialog box can be handled by the Selenium Alert API but on Android OS, alert handling is not yet implemented for native apps. However, we have an alternative to handle the alert. We can find the buttons that are present on the alert box using locator strategy.

Let's take an example of the AndroidUI app, which can be downloaded from <https://github.com/manojhans/Appium/blob/master/Application/Android/AndroidUI.zip?raw=true>. The downloaded app will be look like:



Now, let's perform the following steps to handle the alert:

1. Create a new class with the following code:

```
AndroidDriver driver;
@BeforeClass
public void setUp() throws MalformedURLException{
    File app=new File("C:\\mobileapp\\AndroidUI.apk");//You
    can change it with your app address
    DesiredCapabilities caps = new DesiredCapabilities();
    caps.setCapability(MobileCapabilityType.APP,app);
    caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
    "4.4");
    caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
    "Android");
    caps.setCapability(MobileCapabilityType.DEVICE_NAME,
    "Moto X");//I am using Moto X as a Real Device
    caps.setCapability("appPackage",
    "com.android.androidui"); // This is package name of your
    app (you can get it from apk info app)
    caps.setCapability("appActivity",
    "com.android.androidui.MainActivity");
    driver = new AndroidDriver (new
    URL("http://127.0.0.1:4723/wd/hub"), caps);
    driver.manage().timeouts().implicitlyWait
    (30, TimeUnit.SECONDS);
}
@Test
public void testExample(){
    WebElement showAlert= driver.findElement(By.name("Show
    Alert"));
    showAlert.click();// it will open the Alert box
    WebElement yes=driver.findElement(By.name("Yes"));
    yes.click();// Click on Yes button
}
@AfterClass
public void tearDown(){
    driver.closeApp();
}
```

2. Now, execute the test script:

We saw how we could handle an alert dialog box by locating the button, but this is not the preferred way to handle it. The Appium community hopes that we soon get some support via the Alert API.

In the case of hybrid and web apps, we first need to switch from web view to native apps, as shown in the following snippet:

```
Set<String> allContext=driver.getContextHandles();
for(String context:allContext){
    if(context.contains("NATIVE")){
        driver.context(context);// switch on the native app
    }
}
```

Then, we can handle the alert in the same way as a native app. In the next section, we will learn how to select a value from a drop-down list.

## Spinners

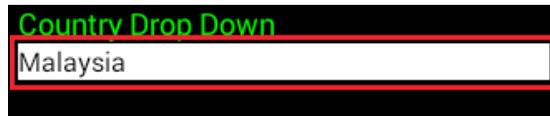
Spinners allow you to select a value from the dropdown list and also show the currently selected value. Now, we are going to take an example of the AndroidUI app, which we used in alert handling.

Now, let's perform the following steps to select the value from drop down:

1. First, we need to find the spinner; we will find it using id:

```
WebElement spinner=driver.findElement
(By.id("android:id/text1"));
```

You should get something similar to the following screen:



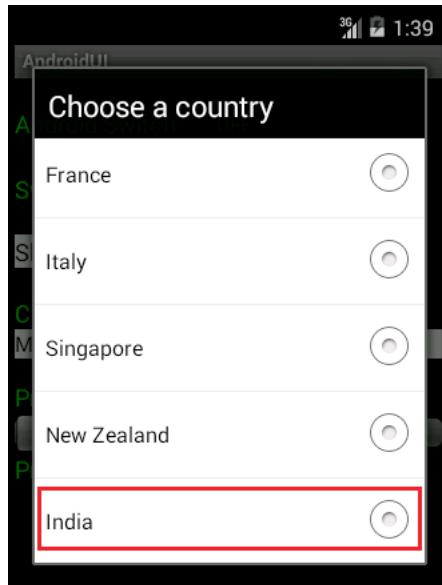
2. Now, click on the spinner; it will open the list of values:

```
spinner.click();
```

3. Select the country as **India**, but first we need to scroll in order to view **India** as name:

```
driver.scrollToExact("India");
WebElement
optionIndia=driver.findElement(By.name("India"));
optionIndia.click();
```

You should get something similar to this screen:



4. This is how the code snippet will look:

```
@Test
public void testExample(){
    WebElement
    spinner=driver.findElement(By.id("android:id/text1"));
    spinner.click();
    driver.scrollToExact("India");
    WebElement
    optionIndia=driver.findElement(By.name("India"));
    optionIndia.click();
}
```

We just saw how to select a value from the drop-down list. In the next section, we will learn how to handle the switch button.

## The switch button

Switches are used to change the settings options; this can be easily handled in Appium.

A switch can be turned ON/OFF by just clicking on it. We can use the following code snippet to handle Android switches (using the AndroidUI app):

```
@Test  
public void testExample() {  
    WebElement switchbtn=driver.findElement ("com.android.  
    androidui:id/mySwitch");  
    switchbtn.click();  
}
```

You should get the following screenshot:



We learned how we can handle the Android switches. In the next section, we will take a look at the progress bar (SeekBar).

## The slide SeekBar

A SeekBar is an extension of the progress bar, which allows you to set the progress level by sliding it to the left or right using the thumb.

It is a little tricky to handle this in Appium; let's take an example that shows how to slide the SeekBar. Here, we are going to use the AndroidUI app again.

To do this, we need to perform the following steps:

1. First, we need to find the SeekBar; we will find it with `id`:



```
WebElement slider=driver.findElement  
ById("com.android.androidui:id/seekBar1");
```

Then, we need to get the SeekBar's start point and end point locations, as follows:

```
int xAxisStartPoint = slider.getLocation().getX();  
int xAxisEndPoint = xAxisStartPoint +  
    slider.getSize().getWidth();
```

2. Now, get the SeekBar's *y* axis:

```
int yAxis = slider.getLocation().getY();
```

3. Now, we will use the `touchAction` class to slide the SeekBar:

```
TouchAction act=new TouchAction(driver);  
act.press(xAxisStartPoint,yAxis).moveTo  
(xAxisEndPoint-1,yAxis).release().perform();
```

4. This is how the code snippet will look:

```
@Test  
public void testExample(){  
    WebElement slider=driver.findElement  
    ById("com.android.androidui:id/seekBar1");  
    int xAxisStartPoint = slider.getLocation().getX();  
    int xAxisEndPoint = xAxisStartPoint +  
        slider.getSize().getWidth();  
    int yAxis = slider.getLocation().getY();  
    TouchAction act=new TouchAction(driver);  
    act.press(xAxisStartPoint,yAxis).moveTo  
(xAxisEndPoint-1,yAxis).release().perform(); //pressed  
    x axis & y axis of seekbar and move seekbar till the end  
}
```

5. After execution of the test code, this is how the SeekBar will look:



We have just seen how we can slide the SeekBar using the `touchAction` class. Now, in the next section, we are going to learn how to capture a screenshot of a mobile app.

## Capturing screenshots

This topic is not necessary to show Appium functionalities but will be convenient when there are problems with your test application and you want have more information. Basically, a screenshot is captured for reporting purposes, when the test fails.

There are three approaches to taking screenshots:

- Byte
- Base64
- File

Here, we will use a file to save a screenshot. Let's take a screenshot of the calculator app, as shown here:

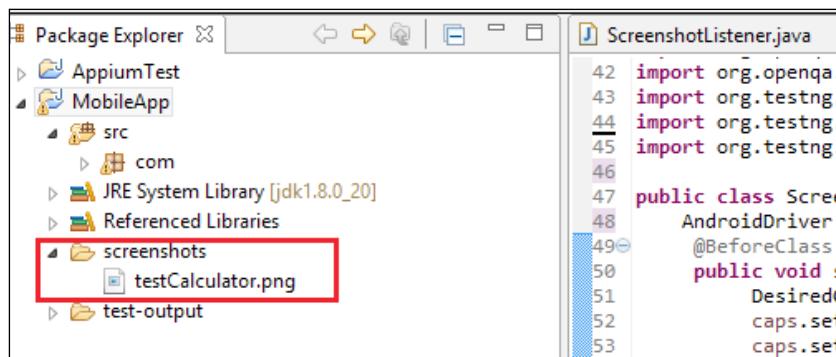
1. Create a new class with the following test code:

```
AndroidDriver driver;
@BeforeClass
public void setUp() throws MalformedURLException{
    DesiredCapabilities caps = new DesiredCapabilities();
    caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
    "4.4");
    caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
    "Android");
    caps.setCapability(MobileCapabilityType.DEVICE_NAME,
    "Moto X");//I am using Moto X as a Real Device
    caps.setCapability(MobileCapabilityType.APP_PACKAGE,
    "com.android.calculator2");
    caps.setCapability(MobileCapabilityType.APP_ACTIVITY,
    "com.android.calculator2.Calculator");
    driver = new AndroidDriver (new
    URL("http://127.0.0.1:4723/wd/hub"), caps);
    driver.manage().timeouts().implicitlyWait
    (30, TimeUnit.SECONDS);
}
@Test
public void testExample(){
    WebElement five=driver.findElement(By.name("5"));//this
    element is use to wait for app open
    File screenShot=driver.getScreenshotAs(OutputType.FILE);
    File location=new File("screenshots");
```

```
        String screenShotName=location.getAbsolutePath()
        +File.separator+"testCalculator.png";
        FileUtils.copyFile(screenShot,new File(screenShotName));
    }

    @AfterClass
    public void tearDown() {
        driver.closeApp();
    }
}
```

2. In this section, we have captured a screenshot and saved it in a project under the screenshots folder:



If we can capture screenshots on test failure, it will be the icing on the cake! In the next section, we will see how to take a screenshot on test failure.

## Capturing screenshots on test failure

Now that we are familiar with capturing screenshots, we are going to take a look at how to capture screenshots on test failure in this section. Here, we will use TestNG listeners; listeners basically run on particular events. An event can be anything such as test passed, failed, or skipped.

TestNG gives us the flexibility to choose listeners as per our requirement, so we are going to use `TestListenerAdapter`, which has methods to override when the test fails. So, let's write the code for a screenshot on test failure.

We need to create two classes: one for the listener and another for the test code; we need to import the following packages:

- `import io.appium.java_client.AppiumDriver;`

- import java.io.File;
- import java.io.IOException;
- import org.apache.commons.io.FileUtils;
- import org.openqa.selenium.OutputType;
- import org.testng.ITestResult;
- import org.testng.TestListenerAdapter;

Perform the following steps to capture screenshots on test failure:

1. Create a new class with the following code:

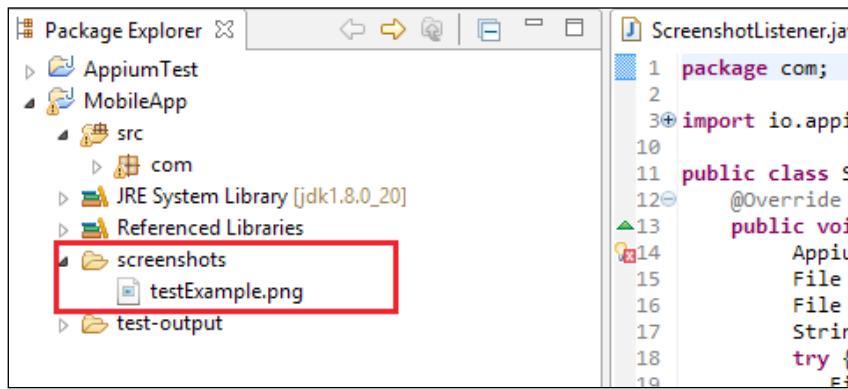
```
public class ScreenshotListener extends  
TestListenerAdapter{  
    @Override  
    public void onTestFailure(ITestResult tr){  
        AppiumDriver driver=Screenshot.getDriver(); // getting  
        driver instance from TestApplication class  
        File location=new File("screenshots"); // it will create  
        screenshots folder in the project  
        String screenShotName = location.getAbsolutePath()  
        +File.separator+ tr.getMethod().getMethodName() + ".png";  
        // Getting failure method name using ITestResult  
        File screenShot=driver.getScreenshotAs(OutputType.FILE);  
        try {  
            FileUtils.copyFile(screenShot,new File(screenShotName));  
        }  
        catch (IOException e) {  
            e.printStackTrace();  
        }  
    }  
}
```

2. We can use this listener in any class, which has unit test cases, using the `@Listeners` annotation. Let's create another class to use this listener, as shown here:

```
@Listeners({ScreenshotListener.class})  
public class Screenshot {  
    static AppiumDriver driver;  
    @BeforeClass  
    public void setUp() throws MalformedURLException{
```

```
DesiredCapabilities caps = new DesiredCapabilities();
caps.setCapability(MobileCapabilityType.PLATFORM_VERSION,
"4.4");
caps.setCapability(MobileCapabilityType.PLATFORM_NAME,
"Android");
caps.setCapability(MobileCapabilityType.DEVICE_NAME,
"Moto X");//I am using Moto X as a Real Device
caps.setCapability(MobileCapabilityType.APP_PACKAGE,
"com.android.calculator2");
caps.setCapability(MobileCapabilityType.APP_ACTIVITY,
"com.android.calculator2.Calculator");
driver = new AndroidDriver (new
URL("http://127.0.0.1:4723/wd/hub"), caps);
driver.manage().timeouts().implicitlyWait
(5, TimeUnit.SECONDS);
}
@Test
public void testExample() throws IOException{
    WebElement two=driver.findElement(By.name("2"));
    two.click();
    WebElement plus=driver.findElement(By.name("+"));
    plus.click();
    WebElement four=driver.findElement(By.name("4"));
    four.click();
    WebElement equalTo=driver.findElement(By.name("="));
    equalTo.click();
    WebElement result=driver.findElement(By.className
("android.widget.EditText"));
    //Check the calculated value on the edit box
    assert result.getText().equals("8"):"Actual value is :
"+result.getText()+" did not match with expected value: 8";
}
@AfterClass
public void tearDown(){
    driver.closeApp();
}
public static AppiumDriver getDriver(){
    return driver;
}
}
```

3. In the example, we are putting the `false` condition to fail the test; once the test fails, the `ScreenshotListener` class will be called automatically and will take a screenshot of the mobile app:



The screenshot shows the Eclipse IDE interface. On the left, the Package Explorer view displays a project structure for 'MobileApp'. It includes a 'src' folder containing a 'com' package, a 'JRE System Library [jdk1.8.0\_20]', and a 'Referenced Libraries' section. A red box highlights a 'screenshots' folder within the 'src/com' directory, which contains a file named 'testExample.png'. On the right, the code editor view shows the content of 'ScreenshotListener.java'. The code defines a class 'ScreenshotListener' that implements the 'TestNGListener' interface. It overrides the 'onTestFailure' method to capture a screenshot when a test fails.

```

1 package com;
2
3 import io.appium.java_client.AppiumDriver;
4 import io.appium.java_client.android.AndroidDriver;
5 import io.appium.java_client.ios.IOSDriver;
6 import org.openqa.selenium.OutputType;
7 import org.openqa.selenium.TakesScreenshot;
8 import org.testng.ITestContext;
9 import org.testng.ITestListener;
10 import org.testng.ITestResult;
11
12 public class ScreenshotListener implements ITestListener {
13     @Override
14     public void onTestFailure(ITestResult result) {
15         AppiumDriver driver = (AppiumDriver) result.getTestClass().getRealClass().getDeclaredField("driver").get(result.getInstance());
16         File sourceFile = ((TakesScreenshot) driver).getScreenshotAs(OutputType.FILE);
17         String screenshotName = "testExample.png";
18         try {
19             FileUtil.copyFile(sourceFile, new File("screenshots/" + screenshotName));
20         } catch (IOException e) {
21             e.printStackTrace();
22         }
23     }
24 }

```



To learn more about TestNG listeners, you can visit <http://testng.org/doc/documentation-main.html#testng-listeners>.



## Summary

We learned how to handle mobile gestures using the Appium advanced interaction API, such as `TouchAction` and `MultiTouchAction`.

We started off by learning about the advanced user interactions API. We then moved on to chaining multiple actions on mobile apps and observed some actions that are frequently used on the mobile, with the help of the Appium client library. We also looked at how to capture screenshots and how to save them to the desired location. Lastly, we used the TestNG listener to capture screenshots on test failure.

I hope this book has assisted and/or inspired you to perform mobile apps automation. In the end, if you still have questions related to apps automation, shoot me an e-mail at [hmanoj36@gmail.com](mailto:hmanoj36@gmail.com); I will be happy to help you!



# Index

## A

### **advanced user interactions**

about 135  
alert dialog box 149, 150  
drag and drop operation 144-146  
long press, using 136, 138  
pinch and zoom gesture 146-149  
screenshots, capturing 155, 156  
screenshots, capturing on test  
failure 156-159  
scrolling 138-144  
slide SeekBar 153, 154  
spinners 151, 152  
swiping 139  
swiping process 139-144  
switch button 152, 153

### **alert dialog box 149, 150**

### **Android**

desired capabilities 78, 79  
prerequisites 77, 78, 105, 106

### **Android capabilities**

about 8  
androidDeviceReadyTimeout 10  
androidDeviceSocket 10  
appActivity 9  
appPackage 9  
appWaitActivity 9  
appWaitPackage 9  
autoWebviewTimeout 11  
Avd 10  
avdArgs 11  
avdLaunchTimeout 10  
avdReadyTimeout 11  
chromedriverExecutable 11

deviceReadyTimeout 10

enablePerformanceLogging 10  
intentAction 11  
intentCategory 11  
intentFlags 12  
resetKeyboard 12  
unicodeKeyboard 12

### **Android driver**

initiating 78-80, 107-109

### **Android emulator 26, 27**

### **Android hybrid apps**

about 98, 99, 127-129  
desired capabilities 82

### **Android native apps**

about 89, 90, 118, 119  
desired capabilities 82

### **Android requirements**

on Mac 19  
on Windows 19

### **Android SDK**

installing 22, 23  
URL 22

### **Android Settings, Appium GUI for Mac 44**

### **Android Settings, Appium GUI for Windows**

about 36  
Advanced pane 38  
Application pane 37  
Capabilities pane 38  
Launch Device pane 37

### **AndroidUI app**

URL 149

### **Android web app**

about 94-96  
desired capabilities 83

**Appium**  
about 17, 53  
advantages 15-19  
architecture 1  
client libraries 15  
disadvantages 17, 18  
installing, for Android 20  
server 15  
session 4  
URL 25  
working, in Android 2, 3  
working, in iOS 2

**Appium doctor** 48

**Appium GUI, for Mac**  
about 43  
Android Settings 44  
Appium doctor 48  
Inspector 48-50  
iOS Settings 44  
Recording panel 50  
Robot Settings 47  
Save/Open configuration 47, 48

**Appium GUI, for Windows**  
about 35, 41  
Android Settings 36  
Developer settings 40, 41  
General Settings 38  
Inspector 42

**Appium Inspector**  
about 42  
Clear button 43  
elements, finding with 70, 71  
Launch/Stop button 42

**Appium installation**  
for Android 20-24  
for iOS 24, 25  
for Mac 25, 26  
for Windows 25

**Appium installation, for Android**  
Android SDK, installing 22, 23  
JDK, installing on Windows 20-22  
system variables, setting for Mac 23, 24

**Appium installation, for iOS**  
about 24  
Homebrew, installing 24  
Node 25

npm 25  
Xcode, installing 24

**Appium Java client**  
URL 26

**Appium server** 35

**App Under Test (AUT)** 18

**B**

**BMI calculator**  
URL 120  
using 120-122

**C**

**Chrome ADB plugin**  
used, for finding elements 53-56

**Clear button, Appium Inspector** 43

**D**

**desired capabilities**  
about 5-7  
Android capabilities 8-12  
app 6  
autoLaunch 7  
automationName 5  
autoWebview 8  
browserName 7  
deviceName 6  
fullReset 8  
iOS capabilities 12-14  
iOS driver, initiating 114, 115  
language 7  
locale 8  
newCommandTimeout 7  
orientation 8  
platformName 5  
platformVersion 6  
udid 8  
used, for Android 107-109  
used, for hybrid app 110, 115  
used, for iOS 114, 115  
used, for native app 110, 115  
used, for web apps 110-117

**Developer settings, Appium GUI for Windows** 40, 41

**Develop option, Safari**  
elements, finding for iOS web-based apps 57-59  
**drag and drop operation** 144-146

**E**

**Eclipse Java project**  
setting up 28-33  
URL 28

**elements**  
finding, for Android web-based apps 53-56  
finding, for hybrid app 63  
finding, for iOS web-based apps 57-59  
finding, for native app 63  
finding, with Appium Inspector 70, 71  
finding, with UIAutomatorviewer 64, 65

**elements, for iOS web-based apps**  
finding, by cssSelector 63  
finding, by ID 59, 60  
finding, by linkText 62  
finding, by name 61  
finding, by Xpath 63

**elements, with Appium Inspector**  
finding, by IosUIAutomation 74  
finding, by name 73  
finding, by Xpath 72, 73

**elements, with UIAutomatorviewer**  
finding, by AccessibilityId 69  
finding, by AndroidUIAutomator 69, 70  
finding, by className 67, 68  
finding, by ID 66  
finding, by name 67

**emulators**  
Android emulator 26, 27  
creating 26

**F**

**fields, Advanced pane**  
Bootstrap Port 38  
Chromedriver Port 38  
Coverage Class 38  
SDK Path 38  
Selendroid Port 38

**fields, Application pane**  
Application Path 37  
Full Reset 37  
Intent Action 37  
Intent Arguments 37  
Intent Category 37  
Intent Flags 37  
Launch Activity 37  
No Reset 37  
Package 37  
Use Browser 37  
Wait for Activity 37  
Wait for Package 37

**fields, Capabilities pane**  
Automation Name 38  
Device Name 38  
Language 38  
Locale 38  
Platform Name 38  
PlatformVersion 38

**fields, Developer settings**  
Break on Application Start 41  
Custom Server Flags 41  
Enabled 41  
NodeJS Debug Port 41  
Use External Appium Package 41  
Use External NodeJS Binary 41

**fields, Launch Device pane**  
Arguments 37  
Device Ready Timeout 37  
Launch AVD 37

**fields, Logging pane**  
Log to File 40  
Log to WebHook 40  
Quiet Logging 40  
Show Timestamps 40  
Use Local Timezone 40

**fields, Server pane**  
Check for Updates 39  
Override Existing Session 39  
Port 39  
Selenium Grid Configuration File 39  
Server Address 39  
Use Remote Server 39

## G

**General Settings, Appium GUI for Windows**  
about 38  
Logging pane 40  
Server pane 39

## H

**Homebrew**  
installing 24  
**hybrid apps**  
Android hybrid app 127-129  
automating 127  
iOS hybrid app 131, 132  
**hybrid apps automation**  
about 98  
Android hybrid apps 98, 99  
iOS hybrid apps 101, 102

## I

**iOS**  
desired capabilities 85, 86  
initiating 85, 86  
native app 120, 121  
prerequisites 19, 78, 105, 106  
requirements 19  
**iOS capabilities**  
about 12  
autoAcceptAlerts 13  
bundleId 12  
calendarFormat 12  
interKeyDelay 14  
keepKeyChains 14  
launchTimeout 12  
locationServicesAuthorized 13  
locationServicesEnabled 13  
nativeInstrumentsLib 13  
nativeWebTap 13  
processArguments 14  
safariAllowPopups 13  
safariIgnoreFraudWarning 14  
safariOpenLinksInBackground 14  
**iOS Developer Program**

URL 111

## iOS hybrid apps

about 101  
desired capabilities 86

## iOS Settings, Appium GUI for Mac

about 44  
Advanced tab 46  
Application tab 45  
Device Settings tab 46

## iOS simulator 26

**iOS web apps**  
about 96, 97  
desired capabilities 87, 88

## ios-webkit-debug-proxy

about 113  
installing 111

## J

**JAR files**  
downloading 26

## JavaScript Object Notation (JSON) 1

## JDK

installing, on Windows 20-22

## JSON wire protocol (JSONWP) 3

## L

## Launch/Stop button, Appium Inspector 42

**long press**  
using 136-138

## N

## native apps

Android native app 89, 90, 118, 119  
automating 89, 118  
iOS native app 120, 121

## O

## options, Advanced tab

Backend Retries 46  
Choose 46  
Instruments Launch Timeout 46  
Trace Template Path 46  
Use Native Instruments Library 46

Xcode Path 46  
**options, Application tab**  
  App Path 45  
  BundleID 45  
  Choose 45  
  Use Mobile Safari 45  
**options, Device Settings tab**  
  Force Calendar 46  
  Force Device 46  
  Force Language 46  
  Force Locale 46  
  Force Orientation 46  
  Full Reset 46  
  No Reset 46  
  Platform Version 46  
  Show Simulator Log 46  
  UDID 46

## P

**pinch and zoom gesture** 146-149  
**provisional profile**  
  about 111, 112  
  installing 111

## R

**Recording panel, Appium GUI for Mac** 50  
**Robot Settings, Appium GUI for Mac** 47

## S

**SafariLauncher app**  
  about 113  
  installing 111  
**scrolling process** 138-144  
**Selenium JSON wire protocol** 3, 4  
**simulators**  
  creating 26  
  iOS simulator 26

**slide SeekBar** 153, 154  
**spinners** 151, 152  
**swiping process** 139-144  
**switch button** 152, 153  
**system requisites**  
  for Android 19  
  for iOS 19

## T

**testApp, GitHub**  
  URL, for example 98  
**TestNG**  
  installing 32  
  listeners, URL 159

## U

**UIAutomator library**  
  URL 70  
**UIAutomatorviewer**  
  elements, finding with 64, 65  
**USB debugging**  
  enabling 106, 107

## W

**web apps**  
  on Android 123, 124  
  on iOS 125, 126  
  working with 94, 123  
**WebDriver Java client**  
  URL 26  
**WebViewApp, GitHub**  
  URL, for example 101

## X

**Xcode**  
  installing 24  
  URL 24





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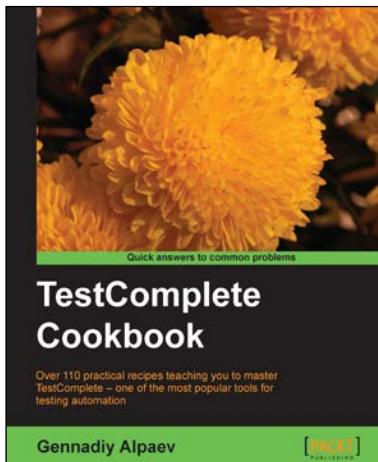
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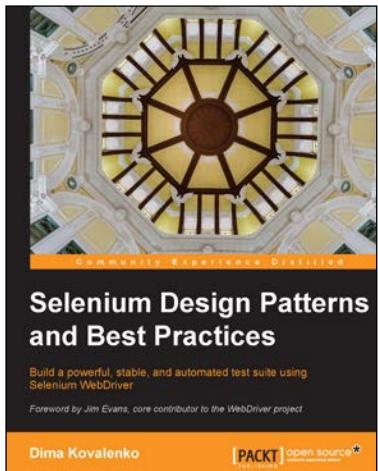


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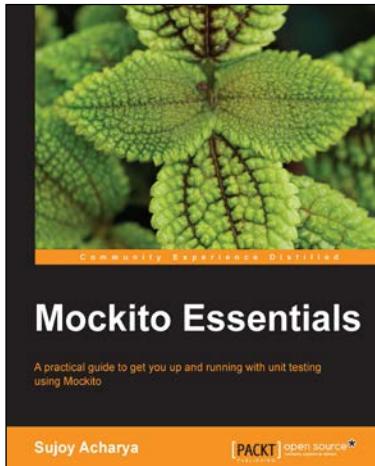
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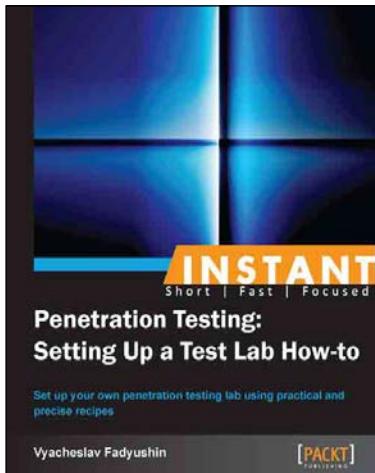


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