Preface

Welcome to the dynamic world of Android smartphone and tablet app development with the Android Software Development Kit (SDK) 2.3.x and 3.x, the Java™ programming language and the Eclipse™ integrated development environment (IDE).

This book presents leading-edge mobile computing technologies for professional software developers. At the heart of the book is our *app-driven approach*. We present concepts in the context of *17 complete working Android apps*—16 developed in the native Android environment and one developed in HTML5 for the portable world of the web—rather than using code snippets. Chapters 3–19 each present one app. We begin each of these chapters with an introduction to the app, an app test-drive showing one or more sample executions and a technologies overview. Then we proceed with a detailed code walk-through of the app's source code. The source code for all the apps is available at `www.deitel.com/books/AndroidFP/`.

Sales of Android devices and app downloads have been growing exponentially. The first-generation Android phones were released in October 2008. A study by comScore® showed that by July 2011, Android had 41.8% of the U.S. smartphone market share, compared to 27% for Apple's iPhone and 21.7% for Blackberry.[1] Billions of apps have been downloaded from Android Market. More than 500,000 Android devices are being activated daily. The opportunities for Android app developers are enormous.

The demand for mobile devices is increasing as more people rely on smartphones and tablets to stay connected and be productive while away from their personal computers. According to comScore, 234 million Americans used mobile devices in a three-month period ending in July 2011. Of those subscribers, 40.6% used apps.[2]

Fierce competition among popular mobile platforms (Android, BlackBerry, iPhone, Palm, Symbian, Windows Phone 7 and others) and among mobile carriers is leading to rapid innovation and falling prices. Competition among the dozens of Android device manufacturers is driving hardware and software innovation within the Android community. There are now over 300 different Android devices.

Android for Programmers: An App-Driven Approach was fun to write! We got to know and love Android, many of its most popular apps and the diversity of Android-based devices. We developed lots of Android apps. The book's apps were carefully designed to introduce you to a broad range of Android features and technologies, including audio, video, animation, telephony, Bluetooth®, speech recognition, the accelerometer, GPS, the compass, widgets, App Widgets, 3D graphics and more. You'll quickly learn everything you'll need to start building Android apps—beginning with a test-drive of the **Doodlz** app

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1. `www.comscore.com/Press_Events/Press_Releases/2011/8/comScore_Reports_`
   `July_2011_U.S._Mobile_Subscriber_Market_Share`.
2. `www.comscore.com/Press_Events/Press_Releases/2011/8/comScore_Reports_July_`
   `2011_U.S._Mobile_Subscriber_Market_Share`.

in Chapter 1, then creating your first app in Chapter 3. Chapter 2, Android Market and App Business Issues walks you through designing great apps, uploading your apps to Google's Android Market and other online app stores, what to expect in the process, deciding whether to sell your apps or offer them for free, and marketing them using the Internet and word-of-mouth, and more.

Copyright Notice and Code License

All of the code and Android apps in the book are copyrighted by Deitel & Associates, Inc. The sample programs in the book are licensed under a Creative Commons Attribution 3.0 Unported License (`creativecommons.org/licenses/by/3.0/`*), with the exception that they may not be reused in any way in educational tutorials and textbooks, whether in print or digital format. You're welcome to use the apps in the book as shells for your own apps, building on their existing functionality. If you have any questions, contact us at* `deitel@deitel.com`*.*

Intended Audience

We assume that you're a Java programmer with object-oriented programming experience and that you're familiar with XML. We use only complete, working apps, so if you don't know Java and XML but have object-oriented programming experience in C#/.NET, Objective-C/Cocoa or C++ (with class libraries), you should be able to master the material quickly, learning a good amount of Java, Java-style object-oriented programming and XML along the way.

This book is *neither* a Java *nor* an XML tutorial, but it presents a significant amount of Java and XML technology in the context of Android app development. If you're interested in learning Java, check out our publications:

- *Java for Programmers, 2/e* (`www.deitel.com/books/javafp2/`)

- *Java Fundamentals: Parts I and II* LiveLessons videos (`www.deitel.com/books/LiveLessons/`).

- *Java How to Program, 9/e* (`www.deitel.com/books/jhtp9/`)

Key Features

App-Driven Approach. Each of the apps chapters (3–19) presents one app—we discuss what the app does, show screen shots of the app in action, test-drive it and overview the technologies and architecture we'll use to build it. Then we build the app, present the complete code and do a detailed code walkthrough. We discuss the programming concepts and demonstrate the functionality of the Android APIs used in the app. Figure 1 lists the book's apps and the key technologies we used to build each.

Apps	Technologies
Chapter 3, **Welcome** App	Dive-Into® Eclipse and the ADT
Chapter 4, **Tip Calculator** App	Building an Android App with Java

Fig. 1 | *Android for Programmers* apps and the technologies they introduce.

Apps	Technologies
Chapter 5, **Favorite Twitter® Searches** App	Collections, Widgets and Views
Chapter 6, **Flag Quiz** App	Intents and Menus
Chapter 7, **Cannon Game** App	Frame-By-Frame Animation and Handling User Events
Chapter 8, **Spot-On Game** App	Tweened Animation and Listening for Touches
Chapter 9, **Doodlz** App	Graphics and Accelerometer
Chapter 10, **Address Book** App	`AdapterViews` and `Adapters`
Chapter 11, **Route Tracker** App	Maps API and Compass
Chapter 12, **Slideshow** App	Photos and Audio Library Access
Chapter 13, **Enhanced Slideshow** App	Serializing Objects and Playing Video
Chapter 14, **Weather Viewer** App	Internet Enabled Applications, Web Services and App Widgets
Chapter 15, **Pizza Ordering** App	Android Telephony and Speech APIs
Chapter 16, **Voice Recorder** App	Audio Recording and Playback
Chapter 17, **Enhanced Address Book** App	Managing Persistent Data with SQLite 3 and Transferring Data Via Bluetooth
Chapter 18, **3D Art** App	3D Graphics and Animation with OpenGL ES
Chapter 19, **Favorite Twitter® Searches** App using HTML5 Technologies	Online Bonus Chapter: HTML5, CSS3 and JavaScript for Experienced Web Developers

Fig. 1 | *Android for Programmers* apps and the technologies they introduce.

Android SDK 2.x. We cover many of the new features included in the Android Software Development Kit (SDK) 2.x, including Bluetooth, Google Maps, the Camera APIs, graphics APIs and support for multiple screen sizes and resolutions.

Android SDK 3.x for Tablet Apps. We cover many of the features of the new Android SDK 3.x for developing tablet apps, including property animation, action bar, fragments, status bar notifications and drag-and-drop.

Android Maps APIs. The **Route Tracker** App uses the Android Maps APIs which allow you to incorporate Google™ Maps in your app. Before developing any app using the Maps APIs, you *must* agree to the Android Maps APIs *Terms of Service* (including the related Legal Notices and Privacy Policy) at `code.google.com/android/maps-api-tos.pdf`.

Eclipse. The free Eclipse integrated development environment (IDE) combined with the free Android SDK and the free Java Development Kit (JDK), provide everything you need to develop and test Android apps.

Multimedia. The apps use a broad range of Android multimedia capabilities, including graphics, images, frame-by-frame animation, property animation, audio, video, speech synthesis and speech recognition.

Android Best Practices. We adhere to accepted Android best practices, pointing them out in the detailed code walkthroughs. Check out our Android Best Practices Resource Center at www.deitel.com/AndroidBestPractices/.

Web Services. Web services allow you to use the web as a rich library of services—many of which are free. Chapter 11's **Route Tracker** app uses the built-in Android Maps APIs to interact with the Google Maps web services. Chapter 14's **Weather Viewer** app uses WeatherBug's web services.[3]

Features

Syntax Shading. For readability, we syntax shade the code, similar to Eclipse's use of syntax coloring. Our syntax-shading conventions are as follows:

```
comments appear in gray
constants and literal values appear in bold darker gray
keywords appear in bold black
all other code appears in non-bold black
```

Code Highlighting. We emphasize the key code segments in each program by enclosing them in light gray rectangles.

Using Fonts for Emphasis. We place defining occurrences of key terms in *bold italic* text for easy reference. We identify on-screen components in the **bold Helvetica** font (e.g., the **File** menu) and Java and Android program text in the Lucida font (e.g., int x = 5;).

In this book you'll create GUIs using a combination of visual programming (drag and drop) and writing code. We use different fonts when we refer to GUI elements in program code versus GUI elements displayed in the IDE:

- When we refer to a GUI component that we create in a program, we place its variable name and class name in a Lucida font—e.g., "Button" or "myEditText."

- When we refer to a GUI component that's part of the IDE, we place the component's text in a **bold Helvetica** font and use a plain text font for the component's type—e.g., "the **File** menu" or "the **Run** button."

Using the > Character. We use the **>** character to indicate selecting a menu item from a menu. For example, we use the notation **File > New** to indicate that you should select the **New** menu item from the **File** menu.

Source Code. All of the book's source code is available for download from:

```
www.deitel.com/books/AndroidFP/
www.informit.com/title/9780132121361
```

Documentation. All the Android and Java documentation you'll need to develop Android apps is available free at developer.android.com. The documentation for Eclipse is available at www.eclipse.org/documentation.

Chapter Objectives. Each chapter begins with a list of objectives.

Figures. Hundreds of tables, source code listings and Android screen shots are included.

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3.   apireg.weatherbug.com/defaultAPI.aspx.

Index. We include an extensive index for reference. The page number of the defining occurrence of each key term in the book is highlighted in the index in **bold maroon**.

Online Chapters

Chapter 1–14 are in the print book. Chapters 15–19 are available online, and we may add others as Android evolves. To access the online chapters, go to:

```
www.informit.com/register
```

You must register for an an InformIT account and then login. After you've logged into your account, you'll see the Register a Product box. Enter the book's ISBN to access the page with the online chapters.

Slides for Instructors

PDF slides containing all of the code, tables and art in the text are available *to qualified instructors only* through Pearson Education's Instructor Resource Center at:

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www.pearsonhighered.com/irc
```

The Deitel Online Android Resource Centers

Our Android Resource Centers include links to tutorials, documentation, software downloads, articles, blogs, podcasts, videos, code samples, books, e-books and more—most of these are free. Check out the growing list of Android-related Resource Centers, including:

- Android (`www.deitel.com/android/`)
- Android Best Practices (`www.deitel.com/androidbestpractices/`)
- Java (`www.deitel.com/java/`)
- Eclipse (`www.deitel.com/Eclipse/`)
- SQLite 3 (`www.deitel.com/SQLite3/`)

We announce our latest Resource Centers in our newsletter, the *Deitel® Buzz Online* and on Twitter® and Facebook®—see below.

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Contacting the Authors

As you read the book, we'd sincerely appreciate your comments, criticisms, corrections and suggestions for improvement. Please address all correspondence to:

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deitel@deitel.com
```

We'll respond promptly, and post corrections and clarifications on:

```
www.deitel.com/books/AndroidFP/
```

and on Facebook and Twitter.

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We'd like to thank AWS Convergence Technologies, Inc., owners of WeatherBug (weather.weatherbug.com/), for giving us permission to use their web services in Chapter 14's **Weather Viewer** app.

We'd also like to thank our colleague, Eric Kern, co-author of our related book, *iPhone for Programmers: An App-Driven Approach*, on which many of the apps in *Android for Programmers: An App-Driven Approach* are based.

Reviewers

We wish to acknowledge the efforts of our reviewers. Adhering to a tight time schedule, the reviewers scrutinized the manuscript, providing constructive suggestions for improving the accuracy and completeness of the presentation:

- Paul Beusterien, Principal, Mobile Developer Solutions
- Eric J. Bowden, COO, Safe Driving Systems, LLC
- Ian G. Clifton, Independent Contractor and Android App Developer
- Daniel Galpin, Android Advocate and author of *Intro to Android Application Development*
- Douglas Jones, Senior Software Engineer, Fullpower Technologies
- Sebastian Nykopp, Chief Architect, Reaktor
- Ronan "Zero" Schwarz, CIO, OpenIntents

Well, there you have it! *Android for Programmers: An App-Driven Approach* will quickly get you developing Android apps. We hope you enjoy reading the book as much as we enjoyed writing it!

Paul, Harvey and Abbey Deitel, and Michael Morgano, October 2011

About the Authors

Paul J. Deitel, CEO and Chief Technical Officer of Deitel & Associates, Inc., is a graduate of MIT, where he studied Information Technology. Through Deitel & Associates, Inc., he has delivered hundreds of Java, C++, C, C#, Visual Basic and Internet programming courses to industry clients, including Cisco, IBM, Siemens, Sun Microsystems, Dell, Lucent Technologies, Fidelity, NASA at the Kennedy Space Center, the National Severe Storm Laboratory, White Sands Missile Range, Rogue Wave Software, Boeing, SunGard Higher Education, Stratus, Cambridge Technology Partners, One Wave, Hyperion Software, Adra Systems, Entergy, CableData Systems, Nortel Networks, Puma, iRobot, Invensys and many more. He and his co-author, Dr. Harvey M. Deitel, are the world's best-selling programming-language textbook and professional book authors.

    Dr. Harvey M. Deitel, Chairman and Chief Strategy Officer of Deitel & Associates, Inc., has 50 years of experience in the computer field. Dr. Deitel earned B.S. and M.S. degrees from MIT and a Ph.D. from Boston University. He has extensive college teaching experience, including earning tenure and serving as the Chairman of the Computer Science Department at Boston College before founding Deitel & Associates, Inc., with his son, Paul J. Deitel. He and Paul are the co-authors of dozens of books and LiveLessons video packages and they are writing many more. The Deitels' texts have earned international recognition, with translations published in Japanese, German, Russian, Chinese, Spanish, Korean, French, Polish, Italian, Portuguese, Greek, Urdu and Turkish. Dr. Deitel has delivered hundreds of professional programming seminars to major corporations, academic institutions, government organizations and the military.
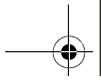
    Abbey Deitel, President of Deitel & Associates, Inc., is a graduate of Carnegie Mellon University's Tepper School of Management where she received a B.S. in Industrial Management. Abbey has been managing the business operations of Deitel & Associates, Inc. for 14 years. She has contributed to numerous Deitel & Associates publications and, together with Paul and Harvey, is the co-author of *iPhone for Programmers: An App-Driven Approach* and *Internet & World Wide Web How to Program, 5/e.*

    Michael Morgano, Android Developer at Imerj™, is a graduate of Northeastern University where he received a B.S. and M.S. degrees in Computer Science. Michael is the co-author of *iPhone for Programmers: An App-Driven Approach.*

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Deitel & Associates, Inc., founded by Paul Deitel and Harvey Deitel, is an internationally recognized authoring, corporate training and software development organization specializing in Android and iPhone app development, computer programming languages, object technology and Internet and web software technology. The company offers instructor-led training courses delivered at client sites worldwide on major programming languages and platforms, such as Android app development, Objective-C and iPhone app development, Java™, C, C++, Visual C++®, Visual C#®, Visual Basic®, XML®, Python®, object technology, Internet and web programming, and a growing list of additional programming and software development courses. The company's clients include many of the world's largest companies, government agencies, branches of the military, and academic institutions.

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books, and *LiveLessons* DVD- and web-based video courses. Deitel & Associates, Inc. and the authors can be reached at:

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