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Hello, Android

Introducing Google's Mobile Development Platform, 2nd Edition

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The
Pragmatic
Programmers

Android
1.5 & 1.6

Hello, Android

Introducing Google's Mobile
Development Platform

Second Edition

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ANDROID





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Preface

Android is a new open source software toolkit for mobile phones that was created by Google and the Open Handset Alliance. In a few years, it's expected to be found in millions of cell phones and other mobile devices, making Android a major platform for application developers. Whether you're a hobbyist or a professional programmer, whether you are doing it for fun or for profit, it's time to learn more about developing for Android. This book will help you get started.

What Makes Android Special?

There are already many mobile platforms on the market today, including Symbian, iPhone, Windows Mobile, BlackBerry, Java Mobile Edition, Linux Mobile (LiMo), and more. When I tell people about Android, their first question is often, Why do we need another mobile standard? Where's the "wow"?

Although some of its features have appeared before, Android is the first environment that combines the following:

- *A truly open, free development platform based on Linux and open source:* Handset makers like it because they can use and customize the platform without paying a royalty. Developers like it because they know that the platform "has legs" and is not locked into any one vendor that may go under or be acquired.
- *A component-based architecture inspired by Internet mashups:* Parts of one application can be used in another in ways not originally envisioned by the developer. You can even replace built-in components with your own improved versions. This will unleash a new round of creativity in the mobile space.
- *Tons of built-in services out of the box:* Location-based services use GPS or cell tower triangulation to let you customize the user experience depending on where you are. A full-powered SQL database

lets you harness the power of local storage for occasionally connected computing and synchronization. Browser and map views can be embedded directly in your applications. All these built-in capabilities help raise the bar on functionality while lowering your development costs.

- *Automatic management of the application life cycle:* Programs are isolated from each other by multiple layers of security, which will provide a level of system stability not seen before in smart phones. The end user will no longer have to worry about what applications are active or close some programs so that others can run. Android is optimized for low-power, low-memory devices in a fundamental way that no previous platform has attempted.
- *High-quality graphics and sound:* Smooth, antialiased 2D vector graphics and animation inspired by Flash are melded with 3D accelerated OpenGL graphics to enable new kinds of games and business applications. Codecs for the most common industry-standard audio and video formats are built right in, including H.264 (AVC), MP3, and AAC.
- *Portability across a wide range of current and future hardware:* All your programs are written in Java and executed by Android's Dalvik virtual machine, so your code will be portable across ARM, x86, and other architectures. Support for a variety of input methods is included such as keyboard, touch, and trackball. User interfaces can be customized for any screen resolution and orientation.

Android offers a fresh take on the way mobile applications interact with users, along with the technical underpinnings to make it possible. But the best part of Android is the software that you are going to write for it. This book will help you get off to a great start.

Who Should Read This Book?

The only requirement is a basic understanding of programming in Java or a similar object-oriented language (C# will do in a pinch). You don't need any prior experience developing software for mobile devices. In fact, if you do, it's probably best if you try to forget that experience. Android is so different that it's good to start with an open mind.

What's in This Book?

Hello, Android is divided into three parts. Roughly speaking, the book progresses from less advanced to more advanced topics, or from more common to less common aspects of Android.

Several chapters share a common example: an Android Sudoku game. By gradually adding features to the game, you'll learn about many aspects of Android programming including user interfaces, multimedia, and the Android life cycle.

In Part I, we'll start with an introduction to Android. This is where you'll learn how to install the Android emulator and how to use an integrated development environment (IDE) to write your first program. Then we'll introduce a few key concepts like the Android life cycle. Programming in Android is a little different from what you're probably used to, so make sure you get these concepts before moving on.

Part II talks about Android's user interface, two-dimensional graphics, multimedia components, and simple data access. These features will be used in most programs you write.

Part III digs deeper into the Android platform. Here you'll learn about connecting to the outside world, location-based services, the built-in SQLite database, and three-dimensional graphics.

At the end of the book, you'll find appendices that cover the differences between Android and Java Standard Edition (SE), how to create a widget, and publishing your application.

What's New for Cupcake?

Android 1.5 (Cupcake) introduced a number of enhancements to the Android platform including support for soft (on-screen) keyboards, video recording, and application widgets. Under the covers, there were more than 1,000 changes to the Android API between 1.1 and 1.5.¹

1. http://d.android.com/sdk/api_diff/3/changes.html

To accommodate the new version, every page and example in this book has been reviewed and updated so it will work with 1.5. If you've read the first edition of this book, then be sure to check out these chapters in particular:

- Chapter 1, *Quick Start*, on page 18 includes instructions on using target SDKs and Android Virtual Devices (AVDs).
- Chapter 8, *Locating and Sensing*, on page 157 now uses the new `SensorManager` APIs and the new `setBuiltInZoomControls()` method.
- Chapter 10, *3D Graphics in OpenGL*, on page 193 has been greatly simplified thanks to the new `GLSurfaceView` class.

In addition, by popular demand we've added two new appendixes:

- Appendix B, on page 219 shows you how to create a Widget for the Home screen. This is a new feature of Cupcake.
- Appendix C, on page 229 guides you through the steps of making your application available for sale or for free on the Android Market.

Android 1.5 (or later) is now available for all shipping Android devices. All new devices have it installed, and Google says that almost all older devices have upgraded. This edition of the book does not cover version 1.1 or earlier.

What's New for Donut?

Android 1.6 (Donut) added support for high- and low-density displays, plus a number of minor changes that don't affect most developers.² It may be a while before all devices are upgraded to 1.6, so Section C.1, *Building for 1.5, 1.6, and Beyond*, on page 230 covers how to create a single program that supports multiple versions. All the examples in this book have been tested on both 1.5 and 1.6.

Online Resources

At the website for this book, <http://pragprog.com/titles/eband2>, you'll find the following:

- The full source code for all the sample programs used in this book

2. http://d.android.com/sdk/api_diff/4/changes.html

- An errata page, listing any mistakes in the current edition (let's hope that will be empty!)
- A discussion forum where you can communicate directly with the author and other Android developers (let's hope that will be full!)

You are free to use the source code in your own applications as you see fit. Note: If you're reading the PDF version of this book, you can also click the little gray rectangle before the code listings to download that source file directly.

Fast-Forward >>

Although most authors expect you to read every word in their books, I know you're not going to do that. You want to read just enough to let you get something done, and then maybe you'll come back later and read something else to let you get another piece done. So, I've tried to provide you with a little help so you won't get lost.

Each chapter in this book ends with a “Fast-Forward >>” section. These sections will provide some guidance for where you should go next when you need to read the book out of order. You'll also find pointers to other resources such as books and online documentation here in case you want to learn more about the subject.

So, what are you waiting for? The next chapter—Chapter 1, *Quick Start*, on page 18—drops you right into the deep end with your first Android program. Chapter 2, *Key Concepts*, on page 29 takes a step back and introduces you to the basic concepts and philosophy of Android, and Chapter 3, *Designing the User Interface*, on page 43 digs into the user interface, which will be the most important part of most Android programs.

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