

# Learn Java for Android Development



**Jeff “JavaJeff” Friesen**

**Apress®**

## **Learn Java for Android Development**

Copyright © 2010 by Jeff “JavaJeff” Friesen

All rights reserved. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system, without the prior written permission of the copyright owner and the publisher.

ISBN-13 (pbk): 978-1-4302-3156-1

ISBN-13 (electronic): 978-1-4302-3157-8

Printed and bound in the United States of America 9 8 7 6 5 4 3 2 1

Trademarked names, logos, and images may appear in this book. Rather than use a trademark symbol with every occurrence of a trademarked name, logo, or image we use the names, logos, and images only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

President and Publisher: Paul Manning

Lead Editor: Steve Anglin

Development Editor: Tom Welsh

Technical Reviewer: Paul Connolly

Editorial Board: Clay Andres, Steve Anglin, Mark Beckner, Ewan Buckingham, Gary Cornell,

Jonathan Gennick, Jonathan Hassell, Michelle Lowman, Matthew Moodie, Duncan

Parkes, Jeffrey Pepper, Frank Pohlmann, Douglas Pundick, Ben Renow-Clarke, Dominic

Shakeshaft, Matt Wade, Tom Welsh

Coordinating Editor: Debra Kelly

Copy Editor: Bill McManus

Compositor: MacPS, LLC

Indexer: John Collin

Artist: April Milne

Cover Designer: Anna Ishchenko

Distributed to the book trade worldwide by Springer Science+Business Media, LLC., 233 Spring Street, 6th Floor, New York, NY 10013. Phone 1-800-SPRINGER, fax (201) 348-4505, e-mail [orders-ny@springer-sbm.com](mailto:orders-ny@springer-sbm.com), or visit [www.springeronline.com](http://www.springeronline.com).

For information on translations, please e-mail [rights@apress.com](mailto:rights@apress.com), or visit [www.apress.com](http://www.apress.com).

Apress and friends of ED books may be purchased in bulk for academic, corporate, or promotional use. eBook versions and licenses are also available for most titles. For more information, reference our Special Bulk Sales–eBook Licensing web page at [www.apress.com/info/bulksales](http://www.apress.com/info/bulksales).

The information in this book is distributed on an “as is” basis, without warranty. Although every precaution has been taken in the preparation of this work, neither the author(s) nor Apress shall have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the information contained in this work.

The source code for this book is available to readers at [www.apress.com/book/view/1430231564](http://www.apress.com/book/view/1430231564).

*To my best friend*

# Contents at a Glance

■ Contents .....	v
■ About the Author .....	x
■ About the Technical Reviewer .....	xi
■ Acknowledgments .....	xii
■ Introduction .....	xiii
■ Chapter 1: Getting Started with Java .....	1
■ Chapter 2: Learning Language Fundamentals .....	43
■ Chapter 3: Learning Object-Oriented Language Features .....	97
■ Chapter 4: Mastering Advanced Language Features Part 1 .....	139
■ Chapter 5: Mastering Advanced Language Features Part 2 .....	181
■ Chapter 6: Exploring the Basic APIs Part 1 .....	227
■ Chapter 7: Exploring the Basic APIs Part 2 .....	269
■ Chapter 8: Discovering the Collections Framework .....	315
■ Chapter 9: Discovering Additional Utility APIs .....	381
■ Chapter 10: Performing I/O .....	449
■ Appendix: Solutions to Exercises .....	533
■ Index .....	595

# Contents

■ Contents at a Glance.....	iv
■ About the Author .....	x
■ About the Technical Reviewer.....	xi
■ Acknowledgments .....	xii
■ Introduction .....	xiii
■ Chapter 1: Getting Started with Java .....	1
What Is Java?.....	1
Java Is a Language .....	2
Java Is a Platform .....	3
Java SE, Java EE, Java ME, and Android .....	5
Installing and Exploring the JDK.....	6
Installing and Exploring Two Popular IDEs.....	12
NetBeans IDE .....	13
Eclipse IDE .....	17
Four of a Kind.....	20
Understanding Four of a Kind .....	21
Modeling Four of a Kind in Pseudocode .....	21
Converting Pseudocode to Java Code.....	23
Compiling, Running, and Distributing FourOfAKind .....	37
Summary .....	41
■ Chapter 2: Learning Language Fundamentals .....	43
Classes.....	43
Declaring Classes .....	44
Introducing Fields .....	45
Introducing Methods.....	58
Introducing Constructors .....	75
Introducing Other Initializers.....	76
Interface Versus Implementation .....	82

Objects .....	85
Creating Objects and Arrays .....	85
Accessing Fields .....	87
Calling Methods .....	89
Garbage Collection .....	92
Summary .....	94
<b>Chapter 3: Learning Object-Oriented Language Features.....</b>	<b>97</b>
Inheritance .....	97
Extending Classes .....	98
The Ultimate Superclass .....	103
Composition .....	112
The Trouble with Implementation Inheritance .....	112
Polymorphism .....	116
Upcasting and Late Binding .....	117
Abstract Classes and Abstract Methods .....	120
Downcasting and Runtime Type Identification .....	121
Covariant Return Types .....	123
Interfaces .....	125
Declaring Interfaces .....	125
Implementing Interfaces .....	127
Extending Interfaces .....	130
Why Use Interfaces? .....	131
Summary .....	137
<b>Chapter 4: Mastering Advanced Language Features Part 1 .....</b>	<b>139</b>
Nested Types .....	139
Static Member Classes .....	139
Nonstatic Member Classes .....	142
Anonymous Classes .....	146
Local Classes .....	148
Interfaces Within Classes .....	150
Packages .....	151
What Are Packages? .....	151
The Package Statement .....	152
The Import Statement .....	153
Searching for Packages and Types .....	154
Playing with Packages .....	155
Packages and JAR Files .....	159
Static Imports .....	160
Exceptions .....	161
What Are Exceptions? .....	162
Representing Exceptions in Source Code .....	162
Throwing Exceptions .....	166
Handling Exceptions .....	168
Performing Cleanup .....	172
Summary .....	178
<b>Chapter 5: Mastering Advanced Language Features Part 2 .....</b>	<b>181</b>
Assertions .....	181

Declaring Assertions .....	182
Using Assertions .....	183
Avoiding Assertions .....	188
Enabling and Disabling Assertions.....	189
Annotations.....	190
Discovering Annotations .....	190
Declaring Annotation Types and Annotating Source Code.....	193
Processing Annotations .....	198
Generics.....	200
Collections and the Need for Type Safety .....	200
Generic Types .....	202
Generic Methods.....	212
Enums .....	214
The Trouble with Traditional Enumerated Types .....	214
The Enum Alternative.....	215
The Enum Class .....	220
Summary .....	225
■ <b>Chapter 6: Exploring the Basic APIs Part 1 .....</b>	<b>227</b>
Math APIs.....	227
Math and StrictMath .....	227
BigDecimal.....	234
BigInteger .....	239
Package Information.....	243
Primitive Wrapper Classes .....	247
Boolean .....	248
Character .....	250
Float and Double .....	251
Integer, Long, Short, and Byte .....	255
Number .....	257
References API.....	257
Basic Terminology .....	257
Reference and ReferenceQueue .....	259
SoftReference .....	260
WeakReference.....	263
PhantomReference .....	263
Summary .....	268
■ <b>Chapter 7: Exploring the Basic APIs Part 2 .....</b>	<b>269</b>
Reflection API.....	269
String Management .....	277
String .....	278
StringBuffer .....	281
System.....	284
Threading API.....	287
Runnable and Thread.....	288
Thread Synchronization .....	296
Summary .....	313
■ <b>Chapter 8: Discovering the Collections Framework .....</b>	<b>315</b>

Framework Overview .....	315
Comparable Versus Comparator .....	316
Iterable and Collection .....	318
Iterator and the Enhanced For Loop Statement .....	321
Autoboxing and Unboxing .....	323
List .....	325
ArrayList .....	329
LinkedList .....	330
Set .....	332
TreeSet .....	332
HashSet .....	333
EnumSet .....	337
SortedSet .....	339
Queue .....	346
PriorityQueue .....	348
Map .....	351
TreeMap .....	355
HashMap .....	356
IdentityHashMap .....	362
WeakHashMap .....	364
EnumMap .....	366
SortedMap .....	367
Utilities .....	369
Classic Collections Classes .....	372
Summary .....	379
<b>Chapter 9: Discovering Additional Utility APIs .....</b>	<b>381</b>
Concurrency Utilities .....	381
Executors .....	381
Synchronizers .....	390
Concurrent Collections .....	392
Locks .....	394
Atomic Variables .....	397
Internationalization APIs .....	397
Locales .....	398
Resource Bundles .....	400
Break Iterators .....	409
Collators .....	413
Dates, Time Zones, and Calendars .....	415
Formatters .....	421
Preferences API .....	428
Random Number Generation .....	432
Regular Expressions API .....	434
Summary .....	447
<b>Chapter 10: Performing I/O .....</b>	<b>449</b>
File .....	449
RandomAccessFile .....	462
Streams .....	473



Stream Classes Overview .....	473
OutputStream and InputStream .....	475
ByteArrayOutputStream and ByteArrayInputStream .....	477
FileOutputStream and FileInputStream .....	479
PipedOutputStream and PipedInputStream .....	481
FilterOutputStream and FilterInputStream .....	485
BufferedOutputStream and BufferedInputStream .....	492
DataOutputStream and DataInputStream .....	493
Object Serialization and Deserialization .....	496
PrintStream .....	508
Writers and Readers .....	511
Writer and Reader Classes Overview .....	512
Writer and Reader .....	513
OutputStreamWriter and InputStreamReader .....	514
FileWriter and FileReader .....	518
Summary .....	530
The Road Goes Ever On .....	530
■ <b>Appendix: Solutions to Exercises .....</b>	<b>533</b>
Chapter 1: Getting Started with Java .....	533
Chapter 2: Learning Language Fundamentals .....	539
Chapter 3: Learning Object-Oriented Language Features .....	542
Chapter 4: Mastering Advanced Language Features Part 1 .....	549
Chapter 5: Mastering Advanced Language Features Part 2 .....	555
Chapter 6: Exploring the Basic APIs Part 1 .....	560
Chapter 7: Exploring the Basic APIs Part 2 .....	563
Chapter 8: Discovering the Collections Framework .....	569
Chapter 9: Discovering Additional Utility APIs .....	575
Chapter 10: Performing I/O .....	581
■ <b>Index .....</b>	<b>595</b>

# About the Author



**Jeff “JavaJeff” Friesen** has been actively involved with Java since the late 1990s. Jeff has worked with Java in various companies, including a healthcare-oriented consulting firm, where he created his own Java/C++ software for working with smart cards. Jeff has written about Java in numerous articles for JavaWorld ([www.javaworld.com](http://www.javaworld.com)), informIT ([www.informit.com](http://www.informit.com)), and java.net (<http://java.net>), and has authored several books on Java, including *Beginning Java SE 6 Platform: From Novice to Professional* (Apress, 2007; ISBN: 159059830X), which focuses exclusively on Java version 6’s new and improved features. Jeff has also taught Java in university and college continuing education classes. He has a Bachelor of Science degree in mathematics and computer science from Brandon University in Brandon, Manitoba, Canada, and currently freelances in Java and other software technologies.

# About the Technical Reviewer



**Paul Connolly** is the Director of Engineering for Atypon Systems' RightSuite product line. RightSuite is an enterprise access-control and commerce solution used by many of the world's largest publishing and media companies. Paul enjoys designing and implementing high-performance, enterprise-class software systems. He is also an active contributor in the open-source community.

Prior to joining Atypon Systems, Paul worked as a senior software engineer at Standard & Poor's where he architected and developed key communications systems. Paul is a Sun Certified Java Programmer, Sun Certified Business Component Developer, and a Sun Certified Web Component Developer. Paul lives in New York City with his wife, Marina.

# Acknowledgments

I thank Steve Anglin for contacting me to write this book, Debra Kelly for guiding me through the various aspects of this project, Tom Welsh for helping me with the development of my chapters, Paul Connolly for his diligence in catching various flaws that would otherwise have made it into this book, and Bill McManus and the production team for making the book's content look good.

It has been many years since I started writing about Java, and I also thank the following editors who have helped me share my knowledge with others: Chris Adamson, Bridget Collins, Richard Dal Porto, Sean Dixon, Victoria Elzey, Kevin Farnham, Todd Green, Jennifer Orr, Athen O'Shea, Esther Schindler, Daniel Steinberg, Jill Steinberg, Dustin Sullivan, and Atlanta Wilson.