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Java in a Nutshell

Java技术手册 (影印版)

東南大學出版社

Benjamin J. Evans,
David Flanagan 著

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This book is dedicated to all who teach peace and resist violence.



Foreword

In the winter of 2013–14, the United Kingdom was battered by an extended series of exceptionally violent winter storms. These storms uncovered shipwrecks and some amazing archaeology, especially in my home county of Cornwall. One of the most striking discoveries was a petrified forest, dating back to the end of the last Ice Age, now covered by the sea and sand. Before the sea claimed it again, I was lucky enough to visit it at very low tide and spend some hours exploring it.

Among the remaining roots and tree stumps and beds of organic matter on their way to becoming peat, I could still make out pieces of trunk branch and bark. As I wandered along the shore with the tide coming in, I came across a single hemisphere from a nut—from a tree that no longer grows in these latitudes. Despite being embedded in the organic layer, the shape of the nutshell and its ability to survive over long periods of time was still unmistakable.

In working on this new edition of David's classic text, I hope to have embodied the spirit of that prehistoric tree. If I have preserved the tenacious form and, crucially, the feel of *Java in a Nutshell*, while bringing it to the attention of a new generation of developers, with the important parts emphasized, then I shall be well satisfied.

—Ben Evans, 2014



Preface

This book is a desktop Java reference, designed to sit faithfully by your keyboard while you program. *Part I* of the book is a fast-paced, “no-fluff” introduction to the Java programming language and the core runtime aspects of the Java platform. *Part II* is a reference section that blends elucidation of core concepts with examples of important core APIs. The book covers Java 8, but we recognize that some shops may not have adopted it yet—so where possible we call out if a feature was introduced in Java 8 (and sometimes Java 7). We use Java 8 syntax throughout, including using lambda expressions in code that would previously have used a trivial anonymous nested class.

Changes in the Sixth Edition

The fifth edition of this book covers Java 5, whereas this edition covers Java 8. The language, and the working environment of the programmer, have both changed considerably since the last edition was published nearly a decade ago. This new edition has, accordingly, changed a vast amount as well. One very important aspect is that this book does not attempt to be as complete a description of the core platform APIs as was possible in earlier editions.

For one thing, the sheer size of the core APIs render this utterly impractical for a printed book. A more compelling reason is the continued rise of fast, always-on Internet. The amount of Java programmers who regularly work without Internet access is now vanishingly small. The proper place for detailed reference API docs is online, not printed out.

Accordingly, the reference section, which occupied two-thirds of the fifth edition, is gone. In the space we’ve recovered, we have tried to update the concept of what it means to be a “Nutshell” guide. The modern Java developer needs to know more than just syntax and APIs. As the Java environment has matured, such topics as concurrency, object-oriented design, memory, and the Java type system have all gained in importance—even among mainstream developers.

In this edition, we have tried to reflect this changed world, and have largely abandoned the historical approach of earlier editions. In particular, the exhaustive attempt to detail exactly which version of Java particular features arrived with has mostly been abandoned—only the most recent versions of Java are likely to be of interest to the majority of Java developers.

Contents of This Book

The first six chapters of this book document the Java language and the Java platform—they should all be considered essential reading. The book is biased toward the Oracle/OpenJDK (Open Java Development Kit) implementation of Java, but not greatly so—developers working with other Java environments will still find plenty to occupy them. *Part I* includes:

Chapter 1, Introduction

This chapter is an overview of the Java language and the Java platform. It explains the important features and benefits of Java, including the lifecycle of a Java program. We also touch on Java security and answer some criticisms of Java.

Chapter 2, Java Syntax from the Ground Up

This chapter explains the details of the Java programming language, including the Java 8 language changes. It is a long and detailed chapter that does not assume substantial programming experience. Experienced Java programmers can use it as a language reference. Programmers with substantial experience with languages such as C and C++ should be able to pick up Java syntax quickly by reading this chapter; beginning programmers with only a modest amount of experience should be able to learn Java programming by studying this chapter carefully, although it is best read in conjunction with a second text (such as O'Reilly's *Head First Java* by Bert Bates and Kathy Sierra).

Chapter 3, Object-Oriented Programming in Java

This chapter describes how the basic Java syntax documented in *Chapter 2* is used to write simple object-oriented programs using classes and objects in Java. The chapter assumes no prior experience with OO programming. It can be used as a tutorial by new programmers or as a reference by experienced Java programmers.

Chapter 4, The Java Type System

This chapter builds on the basic description of object-oriented programming in Java, and introduces the other aspects of Java's type system, such as generic types, enumerated types, and annotations. With this more complete picture, we can discuss the biggest change in Java 8—the arrival of lambda expressions.

Chapter 5, Introduction to Object-Oriented Design in Java

This chapter is an overview of some basic techniques used in the design of sound object-oriented programs, and briefly touches on the topic of design patterns and their use in software engineering.

Chapter 6, Java’s Approach to Memory and Concurrency

This chapter explains how the Java Virtual Machine manages memory on behalf of the programmer, and how memory and visibility is intimately entwined with Java’s support for concurrent programming and threads.

These first six chapters teach you the Java language and get you up and running with the most important concepts of the Java platform. The second part of the book is all about how to get real programming work done in the Java environment. It contains plenty of examples and is designed to complement the cookbook approach found in some other texts. *Part II* includes:

Chapter 7, Programming and Documentation Conventions

This chapter documents important and widely adopted Java programming conventions. It also explains how you can make your Java code self-documenting by including specially formatted documentation comments.

Chapter 8, Working with Java Collections and Arrays

This chapter introduces Java’s standard collections libraries. These contain data structures that are vital to the functioning of virtually every Java program—such as `List`, `Map`, and `Set`. The new `Stream` abstraction and the relationship between lambda expressions and the collections is explained in detail.

Chapter 9, Handling Common Data Formats

This chapter discusses how to use Java to work effectively with very common data formats, such as text, numbers, and temporal (date and time) information.

Chapter 10, File Handling and I/O

This chapter covers several different approaches to file access—from the more classic approach found in older versions of Java, through to more modern and even asynchronous styles. The chapter concludes with a short introduction to networking with the core Java platform APIs.

Chapter 11, Classloading, Reflection, and Method Handles

This chapter introduces the subtle art of metaprogramming in Java—first introducing the concept of metadata about Java types, then turning to the subject of classloading and how Java’s security model is linked to the dynamic loading of types. The chapter concludes with some applications of classloading and the relatively new feature of method handles.

Chapter 12, Nashorn

This chapter describes Nashorn, an implementation of JavaScript running atop the Java Virtual Machine. Nashorn ships with Java 8, and provides an alternative to other JavaScript implementations. Toward the end of the chapter, we discuss `Avatar.js`—a server-side technology compatible with Node.

Chapter 13, Platform Tools and Profiles

Oracle’s JDK (as well as OpenJDK) includes a number of useful Java development tools, most notably the Java interpreter and the Java compiler. This chapter documents those tools. The second part of the chapter covers

Compact Profiles—a new feature in Java 8 allowing cut-down Java Runtime Environments (JREs) with a significantly reduced footprint.

Related Books

O'Reilly publishes an entire series of books on Java programming, including several companion books to this one. The companion books are:

Learning Java by Pat Niemeyer and Daniel Leuck

This book is a comprehensive tutorial introduction to Java, and includes topics such as XML and client-side Java programming.

Java 8 Lambdas by Richard Warburton

This book documents the new Java 8 feature of lambda expressions in detail, and introduces concepts of functional programming that may be unfamiliar to Java developers coming from earlier versions.

Head First Java by Bert Bates and Kathy Sierra

This book uses a unique approach to teaching Java. Developers who think visually often find it a great accompaniment to a traditional Java book.

You can find a complete list of Java books from O'Reilly at <http://java.oreilly.com/>.

Examples Online

The examples in this book are available online and can be downloaded from the home page for the book at <http://www.oreilly.com/catalog/javanut6>. You may also want to visit this site for any important notes or errata that have been published there.

Conventions Used in This Book

We use the following formatting conventions in this book:

Italic

Used for emphasis and to signify the first use of a term. Italic is also used for commands, email addresses, websites, FTP sites, and file and directory names.

Constant Width

Used for all Java code as well as for anything that you would type literally when programming, including keywords, data types, constants, method names, variables, class names, and interface names.

Constant Width Italic

Used for the names of function arguments and generally as a placeholder to indicate an item that should be replaced with an actual value in your program.

Sometimes used to refer to a conceptual section or line of code as in *statement*.



This element signifies a tip or suggestion.



This element signifies a general note.



This element indicates a warning or caution.

Request for Comments

You can send comments, fixes and suggestions directly to the authors by using the email address javanut6@gmail.com.

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