Core Java, Volume I--Fundamentals (8th Edition)

By Cay S. Horstmann, Gary Cornell

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Fully updated for the new Java SE 6 platform, this no-nonsense tutorial and reliable reference illuminates the most important language and library features with thoroughly tested real-world examples. The example programs have been carefully crafted to be easy to understand as well as useful in practice, so you can rely on them as an outstanding starting point for your own code.

Volume I is designed to quickly bring you up to speed on what's new in Java SE 6 and to help you make the transition as efficiently as possible, whether you're upgrading from an earlier version of Java or migrating from another language. The authors concentrate on the fundamental concepts of the Java language, along with the basics of user-interface programming. You'll find detailed, insightful coverage of

- Java fundamentals
- Object-oriented programming
- Interfaces and inner classes
- Reflection and proxies
- The event listener model
- GUI programming with Swing
- Packaging applications
- Exception handling
- Logging and debugging
- Generic programming
- The collections framework
- Concurrency

For detailed coverage of XML processing, networking, databases, internationalization, security, advanced AWT/Swing, and other advanced features, look for the forthcoming eighth edition of *Core Java™, Volume*

II—Advanced Features (ISBN: 978-0-13-235479-0).

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Editorial Review

From the Back Cover

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About the Author

Cay S. Horstmann is also coauthor of *Core JavaServer Faces, Second Edition* (Prentice Hall, 2007). Cay is a professor of computer science at San Jose State University, a Java Champion, and a frequent speaker at computer industry conferences.

Gary Cornell has been writing and teaching programming professionals for more than twenty years and is the cofounder of Apress. He has written numerous best-selling books for programming professionals, was a cofinalist for a Jolt Award, and won the Readers Choice award from *Visual Basic Magazine*.

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To the Reader

In late 1995, the Java programming language burst onto the Internet scene and gained instant celebrity status. The promise of Java technology was that it would become the *universal glue* that connects users with information, whether that information comes from web servers, databases, information providers, or any other imaginable source. Indeed, Java is in a unique position to fulfill this promise. It is an extremely solidly engineered language that has gained acceptance by all major vendors, except for Microsoft. Its built-in security and safety features are reassuring both to programmers and to the users of Java programs. Java even has built-in support that makes advanced programming tasks, such as network programming, database connectivity, and multithreading, straightforward.

Since 1995, Sun Microsystems has released seven major revisions of the Java Development Kit. Over the course of the last eleven years, the Application Programming Interface (API) has grown from about 200 to over 3,000 classes. The API now spans such diverse areas as user interface construction, database management, internationalization, security, and XML processing.

The book you have in your hands is the first volume of the eighth edition of *Core Java™* . With the publishing of each edition, the book followed the release of the Java Development Kit as quickly as possible, and each time, we rewrote the book to take advantage of the newest Java features. This edition has been updated to reflect the features of Java Standard Edition (SE) 6.

As with the previous editions of this book, we *still target serious programmers who want to put Java to work on real projects.* We think of you, our reader, as a programmer with a solid background in a programming language other than Java, and we assume that you don't like books filled with toy examples (such as toasters, zoo animals, or "nervous text"). You won't find any of these in this book. Our goal is to enable you to fully understand the Java language and library, not to give you an illusion of understanding.

In this book you will find lots of sample code that demonstrates almost every language and library feature that we discuss. We keep the sample programs purposefully simple to focus on the major points, but, for the most part, they aren't fake and they don't cut corners. They should make good starting points for your own code.

We assume you are willing, even eager, to learn about all the advanced features that Java puts at your disposal. For example, we give you a detailed treatment of:

- Object-oriented programming
- Reflection and proxies
- Interfaces and inner classes
- The event listener model
- Graphical user interface design with the Swing UI toolkit
- Exception handling
- Generic programming
- The collections framework
- Concurrency

With the explosive growth of the Java class library, a one-volume treatment of all the features of Java that serious programmers need to know is no longer possible. Hence, we decided to break up the book into two volumes. The first volume, which you hold in your hands, concentrates on the fundamental concepts of the Java language, along with the basics of user-interface programming. The second volume, *Core Java™, Volume II—Advanced Features* (forthcoming, ISBN: 978-0-13-235479-0), goes further into the enterprise

features and advanced user-interface programming. It includes detailed discussions of:

- Files and streams
- Distributed objects
- Databases
- Advanced GUI components
- Native methods
- XML processing
- Network programming
- Advanced graphics
- Internationalization
- JavaBeans
- Annotations

In this edition, we reshuffled the contents of the two volumes. In particular, multithreading is now covered in Volume I because it has become so important, with Moore's law coming to an end.

When writing a book, errors and inaccuracies are inevitable. We'd very much like to know about them. But, of course, we'd prefer to learn about each of them only once. We have put up a list of frequently asked questions, bugs fixes, and workarounds in a web page at http://horstmann.com/corejava. Strategically placed at the end of the errata page (to encourage you to read through it first) is a form you can use to report bugs and suggest improvements. Please don't be disappointed if we don't answer every query or if we don't get back to you immediately. We do read all e-mail and appreciate your input to make future editions of this book clearer and more informative.

A Tour of This Book

Chapter 1 gives an overview of the capabilities of Java that set it apart from other programming languages. We explain what the designers of the language set out to do and to what extent they succeeded. Then, we give a short history of how Java came into being and how it has evolved.

In **Chapter 2,** we tell you how to download and install the JDK and the program examples for this book. Then we guide you through compiling and running three typical Java programs, a console application, a graphical application, and an applet, using the plain JDK, a Java-enabled text editor, and a Java IDE.

Chapter 3 starts the discussion of the Java language. In this chapter, we cover the basics: variables, loops, and simple functions. If you are a C or C++ programmer, this is smooth sailing because the syntax for these language features is essentially the same as in C. If you come from a non-C background such as Visual Basic, you will want to read this chapter carefully.

Object-oriented programming (OOP) is now in the mainstream of programming practice, and Java is completely object oriented. **Chapter 4** introduces encapsulation, the first of two fundamental building blocks of object orientation, and the Java language mechanism to implement it, that is, classes and methods. In addition to the rules of the Java language, we also give advice on sound OOP design. Finally, we cover the marvelous javadoc tool that formats your code comments as a set of hyperlinked web pages. If you are familiar with C++, then you can browse through this chapter quickly. Programmers coming from a non-object-oriented background should expect to spend some time mastering OOP concepts before going further with Java.

Classes and encapsulation are only one part of the OOP story, and **Chapter 5** introduces the other, namely, inheritance. Inheritance lets you take an existing class and modify it according to your needs. This is a

fundamental technique for programming in Java. The inheritance mechanism in Java is quite similar to that in C++. Once again, C++ programmers can focus on the differences between the languages.

Chapter 6 shows you how to use Java's notion of an interface. Interfaces let you go beyond the simple inheritance model of Chapter 5. Mastering interfaces allows you to have full access to the power of Java's completely object-oriented approach to programming. We also cover a useful technical feature of Java called inner classes. Inner classes help make your code cleaner and more concise.

In **Chapter 7,** we begin application programming in earnest. Every Java programmer should know a bit about GUI programming, and this volume contains the basics. We show how you can make windows, how to paint on them, how to draw with geometric shapes, how to format text in multiple fonts, and how to display images.

Chapter 8 is a detailed discussion of the event model of the AWT, the abstract window toolkit. You'll see how to write the code that responds to events like mouse clicks or key presses. Along the way you'll see how to handle basic GUI elements like buttons and panels.

Chapter 9 discusses the Swing GUI toolkit in great detail. The Swing toolkit allows you to build a cross-platform graphical user interface. You'll learn all about the various kinds of buttons, text components, borders, sliders, list boxes, menus, and dialog boxes. However, some of the more advanced components are discussed in Volume II.

Chapter 10 shows you how to deploy your programs, either as applications or applets. We describe how to package programs in JAR files, and how to deliver applications over the Internet with the Java Web Start and applet mechanisms. Finally, we explain how Java programs can store and retrieve configuration information once they have been deployed.

Chapter 11 discusses exception handling, Java's robust mechanism to deal with the fact that bad things can happen to good programs. Exceptions give you an efficient way of separating the normal processing code from the error handling. Of course, even after hardening your program by handling all exceptional conditions, it still might fail to work as expected. In the second half of this chapter, we give you a large number of useful debugging tips. Finally, we guide you through a sample debugging session.

Chapter 12 gives an overview of generic programming, a major advance of Java SE 5.0. Generic programming makes your programs easier to read and safer. We show you how you can use strong typing and remove unsightly and unsafe casts, and how you can deal with the complexities that arise from the need to stay compatible with older versions of Java.

The topic of **Chapter 13** is the collections framework of the Java platform. Whenever you want to collect multiple objects and retrieve them later, you will want to use a collection that is best suited for your circumstances, instead of just tossing the elements into an array. This chapter shows you how to take advantage of the standard collections that are prebuilt for your use.

Chapter 14 finishes the book, with a discussion on multithreading, which enables you to program tasks to be done in parallel. (A thread is a flow of control within a program.) We show you how to set up threads and how to deal with thread synchronization. Multithreading has changed a great deal in Java SE 5.0, and we tell you all about the new mechanisms.

The **Appendix** lists the reserved words of the Java language. Conventions

As is common in many computer books, we use monospace type to represent computer code.

- NOTE: Notes are tagged with "note" icons.
- TIP: Tips are tagged with the "tip" icon.
- CAUTION: When there is danger ahead, we warn you with a "caution" icon.
- C++ NOTE: There are many C++ notes that explain the difference between Java and C++. You can skip over them if you don't have a background in C++ or if you consider your experience with that language a bad dream of which you'd rather not be reminded.

Application Programming Interface

Java comes with a large programming library or Application Programming Interface (API). When using an API call for the first time, we add a short summary description tagged with an API icon at the end of the section. These descriptions are a bit more informal but, we hope, also a little more informative than those in the official on-line API documentation. We now tag each API note with the version number in which the feature was introduced, to help the readers who don't use the "bleeding edge" version of Java.

Programs whose source code is on the Web are listed as examples.

Sample Code

The web site for this book at http://horstmann.com/corejava contains all sample code from the book, in compressed form. You can expand the file either with one of the familiar unzipping programs or simply with the jar utility that is part of the Java Development Kit. See Chapter 2 for more information about installing the Java Development Kit and the sample code.

Users Review

From reader reviews:

Mary Richie:

Have you spare time for any day? What do you do when you have a lot more or little spare time? Yep, you can choose the suitable activity with regard to spend your time. Any person spent their spare time to take a walk, shopping, or went to often the Mall. How about open or even read a book called Core Java, Volume I--Fundamentals (8th Edition)? Maybe it is to become best activity for you. You realize beside you can spend your time using your favorite's book, you can more intelligent than before. Do you agree with it has the opinion or you have various other opinion?

Matthew McDaniel:

Information is provisions for those to get better life, information today can get by anyone on everywhere. The information can be a knowledge or any news even a huge concern. What people must be consider when those information which is inside the former life are hard to be find than now could be taking seriously which one is suitable to believe or which one the particular resource are convinced. If you get the unstable resource then you have it as your main information there will be huge disadvantage for you. All those possibilities will not happen within you if you take Core Java, Volume I--Fundamentals (8th Edition) as the daily resource information.

Lea Wheeler:

What is your hobby? Have you heard in which question when you got learners? We believe that that concern was given by teacher on their students. Many kinds of hobby, Everybody has different hobby. So you know that little person just like reading or as studying become their hobby. You have to know that reading is very important as well as book as to be the thing. Book is important thing to incorporate you knowledge, except your current teacher or lecturer. You get good news or update about something by book. Amount types of books that can you go onto be your object. One of them are these claims Core Java, Volume I--Fundamentals (8th Edition).

Jonathan Sanders:

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