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Find solutions to
common problems

Doug Lowe
Paul McFedries



Java[®] Essentials

by Doug Lowe
and Paul McFedries

for
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Java® Essentials For Dummies®

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Contents at a Glance

Introduction	1
CHAPTER 1: Installing and Using Java Tools	3
CHAPTER 2: Working with TextPad	11
CHAPTER 3: Java Programming Basics	17
CHAPTER 4: Working with Variables and Data Types	39
CHAPTER 5: Working with Numbers and Expressions	63
CHAPTER 6: Making Choices	79
CHAPTER 7: Going Around in Circles (or, Using Loops)	99
CHAPTER 8: Adding Some Methods to Your Madness	111
CHAPTER 9: Handling Exceptions	121
CHAPTER 10: Making Your Own Classes	133
CHAPTER 11: Using Subclasses and Inheritance	147
CHAPTER 12: Using Arrays	161
CHAPTER 13: Ten Techniques for Easier Java Coding	179
Index	187

Table of Contents

INTRODUCTION	1
About This Book	1
Foolish Assumptions	1
Icons Used in This Book	2
Where to Go from Here	2
CHAPTER 1: Installing and Using Java Tools	3
Downloading and Installing the Java Development Kit	4
Downloading the JDK	4
Installing the JDK	5
Perusing the JDK folders	5
Setting the JAVA_HOME and path variables	6
Confirming Your Java Version	8
CHAPTER 2: Working with TextPad	11
Downloading and Installing TextPad	11
Editing Source Files	13
Compiling a Program	15
Running a Java Program	16
CHAPTER 3: Java Programming Basics	17
Looking at the Venerable Hello, World! Program	18
Dealing with Keywords	21
Working with Statements	24
Types of statements	24
White space	25
Working with Blocks	26
Creating Identifiers	27
Crafting Comments	28
End-of-line comments	28
Traditional comments	29
Introducing Object-Oriented Programming	29
Understanding classes and objects	30
Understanding static methods	30
Creating an object from a class	31
Viewing a program that uses an object	32
So what's the difference?	34
Importing Java API Classes	36

CHAPTER 4:	Working with Variables and Data Types	39
	Declaring Variables	39
	Declaring two or more variables in one statement	41
	Declaring class variables	41
	Declaring instance variables	42
	Declaring local variables	43
	Initializing Variables	45
	Initializing variables with assignment statements	46
	Initializing variables with initializers	46
	Using Final Variables (Constants)	47
	Working with Primitive Data Types	48
	Integer types	49
	Floating-point types	51
	The char type	52
	The Boolean type	53
	Using wrapper classes	54
	Using reference types	54
	Working with Strings	56
	Declaring and initializing strings	57
	Combining strings	57
	Converting primitives to strings	58
	Converting strings to primitives	59
	Understanding Scope	60
CHAPTER 5:	Working with Numbers and Expressions	63
	Working with Arithmetic Operators	63
	Using Compound Assignment Operators	65
	Using the Math Class	65
	Using constants of the Math class	66
	Working with mathematical functions	67
	Creating random numbers	70
	Rounding functions	72
	Formatting Numbers	75
CHAPTER 6:	Making Choices	79
	Using Simple Boolean Expressions	79
	Using if Statements	82
	Simple if statements	82
	if-else statements	83
	else-if statements	84

Using Mr. Spock's Favorite Operators (Logical Ones, of Course).....	85
Using the ! operator.....	85
Using the & and && operators	87
Using the and operators.....	88
Combining logical operators	89
Using the switch Statement	91
Viewing an example else-if program	93
Creating a better version of the example program.....	95
CHAPTER 7: Going Around in Circles (or, Using Loops).....	99
Using Your Basic while Loop	99
The while statement	100
A counting loop	100
Breaking Out of a Loop.....	101
Using the continue Statement	102
Running do-while Loops.....	103
Using the Famous for Loop.....	105
Understanding the formal format of the for loop	105
Scoping out the counter variable.....	107
Counting even numbers	108
Counting backward.....	109
CHAPTER 8: Adding Some Methods to Your Madness	111
The Basics of Making Methods	111
Methods That Return Values	113
Declaring the method's return type	113
Using the return statement to return the value	114
Using a method that returns a type	115
You gotta have a proper return statement	116
Methods That Take Parameters	118
CHAPTER 9: Handling Exceptions.....	121
Understanding Exceptions	121
Catching Exceptions.....	122
A simple example.....	124
Another example	124
Handling Exceptions with a Preemptive Strike.....	127
Catching All Exceptions at Once	128
Using a finally Block	130

CHAPTER 10: Making Your Own Classes	133
Declaring a Class	133
Picking class names	134
Knowing what goes in the class body.....	134
Seeing where classes live.....	135
Working with Members	137
Understanding fields	137
Understanding instance methods	138
Understanding visibility.....	139
Using Getters and Setters	140
Creating Constructors.....	142
Creating basic constructors	142
Creating default constructors	143
Calling other constructors	145
CHAPTER 11: Using Subclasses and Inheritance	147
Introducing Inheritance	147
Motorcycles, trains, and automobiles	149
Game play	149
A businesslike example	150
Inheritance hierarchies	151
Creating Subclasses	151
Overriding Methods.....	152
Protecting Your Members	154
Using the this and super Keywords in Your Subclasses.....	155
Understanding Inheritance and Constructors.....	156
Using the final Keyword.....	158
Final methods.....	158
Final classes.....	159
CHAPTER 12: Using Arrays	161
Understanding Arrays.....	161
Creating Arrays	163
Initializing an Array.....	164
Using for Loops with Arrays.....	165
Solving a homework problem with an array	166
Using the enhanced for loop.....	169
Using Arrays with Methods	170
Using Varargs.....	171
Using Two-Dimensional Arrays.....	172
Creating a two-dimensional array	173

Accessing two-dimensional array elements	174
Initializing a two-dimensional array.....	176
Using jagged arrays	176
CHAPTER 13: Ten Techniques for Easier Java Coding	179
Compiling a Java Program from the Command Line	179
Running a Java Program from the Command Line	180
Casting Numeric Data	180
Printing Data with System.out	181
Getting Input with the JOptionPane Class	181
Using the Unary Plus and Minus Operators	182
Using the Increment and Decrement Operators	183
Using the Conditional Operator	183
Comparing Strings.....	184
Nesting Your Loops	184
INDEX.....	187

Introduction

Welcome to *Java Essentials For Dummies*. This book contains all the basic information you need to know to get going with Java programming, starting with writing statements and using variables and ending with techniques for using Java features such as arrays. Along the way, you find plenty of not-so-basic information about working with classes and objects, handling exceptions, and working from the command line.

The basic idea here is that we've tried to wring out the not-quite-200-or-so most useful pages of information on the most important Java programming topics: setup and configuration, basic programming, and object-oriented programming. Thus, you get a nice, trim book with just the Java you need to know.

So, whether you're just getting started with Java programming or you're a seasoned pro, you've found the right book.

About This Book

In *Java Essentials For Dummies*, all the information you need is conveniently packaged for you in-between one set of covers. And all the information is current for a recent release of Java, known as JDK 19. This book doesn't pretend to be a comprehensive reference for every detail on every possible topic related to Java programming. Instead, it shows you how to get up and running fast so that you have more time to do the things you really want to do. Designed using the easy-to-follow *For Dummies* format, this book helps you get the information you need without laboring to find it.

Foolish Assumptions

We've never met, so it's difficult for us to make any assumptions about why you're interested in this book. However, let's start with a few basic assumptions:

» **You own or have access to a relatively modern computer.**

The examples were created on a Windows computer, but you can learn to program in Java just as easily on a Mac or Linux computer.

- » **You're an experienced computer user.** In other words, we assume that you know the basics of using your computer, such as starting programs and working with the file system.
- » **You're interested in learning how to write programs in the Java language.** That's what this book is about, so it's a fair assumption.

We do *not* assume you have any previous programming experience in Java or in any other programming language.

Icons Used in This Book

Like any *For Dummies* book, this book is chock-full of helpful icons that draw your attention to items of particular importance. You find the following icons throughout this book:



WARNING

Danger, Will Robinson! This icon highlights information that may help you avert disaster.



REMEMBER

Did we tell you about the memory course we took?



TIP

Pay special attention to this icon; it lets you know that some particularly useful tidbit is at hand.

Where to Go from Here

This isn't the kind of book you pick up and read from start to finish, as if it were a cheap novel. If we ever see you reading it at the beach, we'll kick sand in your face. Beaches are for reading romance novels or murder mysteries, not programming books. Although you could read straight through from start to finish, this book is the kind you can pick up, open to just about any page, and start reading. You don't have to memorize anything in this book. It's a "need-to-know" book: You pick it up when you need to know something. Need a reminder on how to declare a class? Pick up the book. Can't remember the goofy syntax of the `for` loop? Pick up the book. After you find what you need, put the book down and get on with your life.

- » Downloading Java from the Oracle website
- » Installing Java
- » Identifying your version of Java

Chapter 1

Installing and Using Java Tools

Java development environments have two basic approaches. On the one hand, you can use a sophisticated integrated development environment (IDE) such as NetBeans or Eclipse. These tools combine a full-featured source editor that lets you edit your Java program files with integrated development tools, including visual development tools that let you create applications by dragging and dropping visual components onto a design surface.

At the other extreme, you can use just the basic command-line tools that are available free from Oracle's Java website (<https://java.oracle.com>). Then you can use any text editor you want to create the text files that contain your Java programs (called *source files*), and compile and run your programs by typing commands at a command prompt.



TIP

As a compromise, you may want to use a simple development environment, such as TextPad. TextPad is an inexpensive text editor that provides some nice features for editing Java programs (such as automatic indentation) and shortcuts for compiling and running programs. It doesn't generate any code for you or provide any type of visual design aids, however. TextPad is the tool we used to develop all the examples shown in this book. For information about downloading and using TextPad, see Chapter 2.



TIP

If you prefer a free alternative, you can also investigate Notepad++ at <https://notepad-plus-plus.org>.

You can also compile and run simple Java programs online at sites such as JDoodle (www.jdoodle.com/online-java-compiler) or Programiz (www.programiz.com/java-programming/online-compiler). At these sites, you can enter simple Java programs, compile them, and run them. They're a great way to dip your toes into the shallow end of the Java programming pool without having to install anything.

Downloading and Installing the Java Development Kit

Before you can start writing Java programs, you have to download and install the correct version of the Java Development Kit (JDK) for the computer system you're using. Oracle's Java website provides versions for Windows, macOS, and Unix. The following sections show you how to download and install the JDK.



TIP

If you prefer, you can download and install the open-source version of Java from <https://openjdk.org>.

Downloading the JDK

To get to the download page, point your browser to www.oracle.com/java/technologies. Then follow the appropriate links to download the latest version of Java SE for your operating system. (At the time we wrote this, the latest version was 18.0.1.1. However, Java 19 was available in early release form. By the time this book hits the shelves, Java 19 or later should be available from www.oracle.com/java/technologies.)

When you get to the Java download page, you'll need to select your operating system; Java is available for Linux, macOS, and Windows. In this chapter, we show you how to deploy Java to a Windows 10 or 11 computer. The procedures for deploying Java to Linux or macOS are similar.

The JDK download comes in three versions: a compressed.zip file, an executable installer (.exe), or a Windows installer package (.msi). All are about the same size (under 200MB). We find it easier to download and run the .exe installer.

Installing the JDK

After you download the JDK file, you can install it by running the executable file you downloaded. The procedure varies slightly depending on your operating system, but basically, you just run the JDK installation program file after you download it, as follows:

- » On a Windows system, open the folder in which you saved the installation program and double-click the installation program's icon.
- » On a Linux or macOS system, use console commands to change to the directory to which you downloaded the file and then run the program.

After you start the installation program, it prompts you for any information that it needs to install the JDK properly, such as which features you want to install and what folder you want to install the JDK in. You can safely choose the default answer for each option.

Perusing the JDK folders

When the JDK installs itself, it creates several folders on your hard drive. The locations of these folders vary depending on your system and how you installed Java. The three most likely places to find the Java home folder in Windows are the root of your C: drive, the folder C:\Program Files\Java, or the folder C:\Program Files (x86)\Java. Within one of these locations, you'll find the Java home folder, whose name starts with `jdk-` and ends with the version number. For version 19, the home folder is named `jdk-19`.

Table 1-1 lists the subfolders created in the JDK home folder. As you work with Java, you'll refer to these folders frequently.

TABLE 1-1 Subfolders of the JDK Home Folder

Folder	Description
bin	The compiler and other Java development tools
conf	Configuration file
include	This library contains files needed to integrate Java with programs written in other languages

TABLE 1-1 (continued)

Folder	Description
jmods	Modules for the Java Module System
legal	Copyright and license information for various Java components
lib	Library files, including the Java API class library

Setting the JAVA_HOME and path variables

After you install the JDK, you need to configure your operating system so that it can find the JDK command-line tools. To do that, you must set two environment variables: `JAVA_HOME`, which provides the location of the Java home folder, and `Path`, which lists the folders that the operating system uses to locate executable programs. Follow these steps:

- 1. Open File Explorer, right-click This PC, and choose Properties.**
This brings up the System Properties page.
- 2. Click the Advanced System Settings link.**
- 3. Click the Environment Variables button.**
The Environment Variables dialog box appears, as shown in Figure 1-1.
- 4. In the System Variables list, click the New button.**
The New System Variable dialog box, shown in Figure 1-2, appears.
- 5. Type `JAVA_HOME` in the Variable Name text box.**
- 6. Click the Browse Directory button, browse to the Java home folder, and then click OK.**
This action inserts the path to the home folder in the Variable Value text box.
- 7. Click OK.**
The `JAVA_HOME` variable is created.
- 8. Scroll to the Path variable in the System Variables list, select it, and then click the Edit button.**

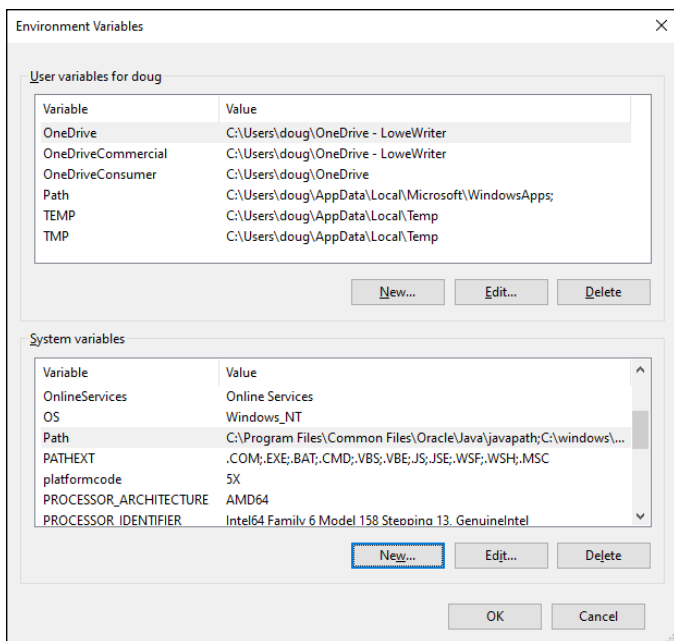


FIGURE 1-1: The Environment Variables dialog box.

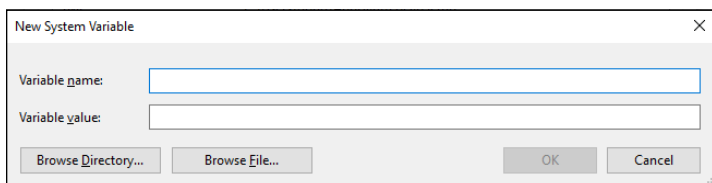


FIGURE 1-2: Creating the JAVA_HOME variable.

This brings up a handy dialog box that lets you add or remove paths to the Path variable or change the order of the paths, shown in Figure 1-3.

9. Peruse the list of entries in the Path variable. If you find one that references a previous version of Java, delete it.

Specifically, look for an entry that begins with `C:\Program Files\Java`. If you find such an entry, select it and then click Delete.

10. Click the New button.

This opens a line for you to create a new path entry.

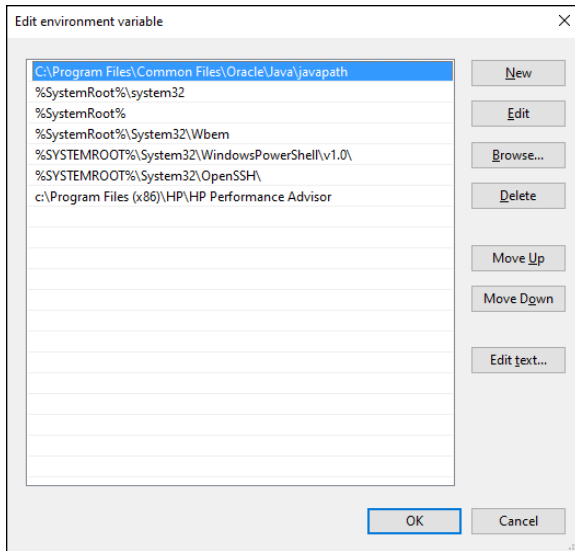


FIGURE 1-3: Editing the Path variable.

11. Type `%JAVA_HOME%\bin` as the new path entry.

The percent signs insert the value of the `JAVA_HOME` variable in your new path entry. For example, if `JAVA_HOME` is set to `C:\Program Files\Java\jdk19`, the new path entry will be `C:\Program Files\Java\jdk19\bin`.

12. Click **OK three times to exit.**

The first **OK** gets you back to the Environment Variables dialog box; the second **OK** gets you back to the System Properties dialog box; and the third **OK** closes the System Properties dialog box.

For Linux, the procedure depends on which shell you're using. For more information, consult the documentation for the shell you're using.

Confirming Your Java Version

After you've installed Java, it's a good idea to confirm that you've installed the correct version. To do that, follow these steps:

- 1. Press the Windows key, type `cmd`, and press Enter to open a command prompt.**
- 2. Type `java -version` and press Enter.**

This command instructs Java to display its version number. You'll see output similar to this:

```
openjdk version "19-ea" 222-09-20
OpenJDK Runtime Environment (build 19-ea+27-2074)
OpenJDK 64-Bit Server VM (build 19-ea+27-2074, mixed
mode, sharing)
```

- 3. Confirm that the first line of the output reflects the version you installed.**

In this example, Java version 19-ea is installed. The `ea` indicates that we're using the early-access version of Java 19, which is the version we used as we wrote this book. By the time you read this, you'll see a slightly different version of Java 19 or later. Or, you may see a Java 18 or even a Java 17 version number. Any of these versions will work for the coding examples in this book, unless we specifically mention that a specific Java version is required.

- 4. Close the command window.**