Java™ in 60 Minutes a Day

Richard F. Raposa
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The book you now hold is part of our new 60 Minutes a Day series which delivers what we think is the closest experience to an actual hands-on seminar that is possible with a book. Our author is a veteran of hundreds of hours of classroom teaching, and he uses that background to guide you past the hurdles and pitfalls to confidence and mastery of Java in manageable units that can be read and put to use in just an hour. If you have a broadband connection to the Web, you can see Richard introduce each topic — but this book will still be your best learning resource if you download only the audio files or use it strictly as a printed resource. From fundamentals to network and database programming, you’ll find this self-paced training to be your best learning aid.

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A Note from the Consulting Editor

Instructor-led training is proven to be an effective and popular tool for training engineers and developers. To convey technical ideas and concepts, the classroom experience is shown to be superior when compared to other delivery methods. As a technical trainer for more than 20 years, I have seen the effectiveness of instructor-led training firsthand. *60 Minutes a Day* combines the best of the instructor-led training and book experience. Technical training is typically divided into short and discrete modules, where each module encapsulates a specific topic; each module is then followed by “questions and answers” and a review. *60 Minutes a Day* titles follow the same model: each chapter is short, discrete, and can be completed in 60 minutes a day. For these books, I have enlisted premier technical trainers as authors. They provide the voice of the trainer and demonstrate classroom experience in each book of the series. You even get an opportunity to meet the actual trainer: As part of this innovative approach, each chapter of a *60 Minutes a Day* book is presented online by the author. Readers are encouraged to view the online presentation before reading the relevant chapter. Therefore, *60 Minutes a Day* delivers the complete classroom experience—even the trainer.

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Thank you.

Donis Marshall
Founder, Gearhead Press
Consulting Editor, Wiley Technology Publishing Group
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## Contents

**Acknowledgments**  xix  
**About the Author**  xxi  
**Introduction**  xxiii  

### Chapter 1  Getting Started with Java  
1. Why Java?  
2. The Java Virtual Machine  
3. The Editions of Java  
   - J2SE  
   - J2ME  
   - J2EE  
4. Downloading the Java 2 SDK  
5. Installing the SDK  
6. Running the SDK Tools  
   - Running the javac Compiler  
   - Running the JVM  
7. A Simple Java Program  
   - Step 1: Write the Source Code  
   - Step 2: Compile the Program  
   - Step 3: Run the Program  
8. Summary  

### Chapter 2  Java Fundamentals  
1. Java Keywords  
2. Identifiers  
3. Java’s Eight Primitive Data Types  
4. Variables  
   - Assigning Variables  
5. Integral Types  

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*Note: The content is a simplified representation of the actual table of contents.*
## Contents

Floating-Point Types 29  
Boolean Data Type 30  
Char Data Type 31  
Strings 33  
References versus Primitive Data 35  
Constants 37  
Java Operators 37  
  Increment and Decrement Operators 39  
  Assignment Operators 40  
  Shift Operators 40  
  Comparison Operators 42  
  Boolean Operators 43  
  Ternary Operator 43  
Java Comments 44  
Summary 46

### Chapter 3 Control Structures 51

Flow of Control 51  
Boolean Logic 52  
  The and Operator 52  
  The or Operator 53  
  The exclusive or Operator 54  
  The not Operator 54  
Boolean Operators 55  
The if Statement 57  
The if/else Statement 59  
The switch Statement 61  
The while Loop 64  
The do/while Loop 67  
The for Loop 70  
The break Keyword 74  
The continue Keyword 76  
Nested Loops 78  
Summary 80

### Chapter 4 Classes and Objects 85

Overview of Classes and Objects 85  
Procedural Programming 86  
Object-Oriented Programming 87  
Object-Oriented Analysis and Design 88  
Writing a Java Class 89  
  Adding Fields to a Class 89  
  Adding Methods to a Class 90  
Instantiating an Object 92  
Garbage Collection 94  
Accessing Fields and Methods 97  
Using the Dot Operator 97  
  Step 1: Write the Employee Class 97  
  Step 2: Compile the Employee Class 98
Chapter 14  Applets  457

An Overview of Applets  457
The java.applet.Applet Class  459
Swing Applets  462
Life Cycle of an Applet  465
  Step 1: Write the Applet Class  467
  Step 2: Write the HTML Page  468
  Step 3: View the HTML Page  468
  Step 4: View the Java Console  469
The <applet> Tag  473
Document and Code Base  478
The appletviewer Tool  479
Sandbox Security  481
The Applet Context  485
Displaying Images  488
Playing Audio  490
JAR Files and Applets  494
Summary  498

Chapter 15  Threads  503

Overview of Threads  503
Life Cycle of a Thread  506
Creating a Thread  507
Implementing Runnable  508
Extending the Thread Class 511
Methods of the Thread Class 516
Timer and TimerTask Classes 519
Scheduling Tasks 522
Multithreading Issues 526
synchronized Keyword 530
Deadlock Issues 532
Ordering Locks 534
wait() and notify() Methods 536
Summary 546

Chapter 16  Input and Output 551
An Overview of the java.io Package 551
The Output Streams 552
The Input Stream Classes 553
The Writer Class 553
The Reader Class 554
Low-Level and High-Level Streams 557
Low-Level Streams 557
High-Level Streams 559
Chaining Streams Together 561
Low-Level Readers and Writers 564
High-Level Readers and Writers 564
File I/O 565
The RandomAccessFile Class 566
Using Pipes 570
An Overview of Serialization 574
Serializing an Object 577
Deserializing an Object 578
The Logging APIs 579
  An Example of Logging 581
Summary 587

Chapter 17  Network Programming 591
An Overview of Network Programming 591
  Transmission Control Protocol 592
  User Datagram Protocol 592
Using Sockets 594
The ServerSocket Class 596
Socket Class 599
Communicating between Sockets 600
Java Secure Socket Extension (JSSE) 602
Secure Server Socket 603
Secure Client Socket 607
Communicating over a Secure Socket 610
Overview of Datagram Packets 612
DatagramSocket Class 612
DatagramPacket Class 613
Overview of Events 694
  Step 9: Hooking up Buttons to the Movie Bean 695
  Step 10: Viewing Beans in Preview Mode 696
Generating User-Defined Events 698
BeanInfo Class 703
Summary 708

Appendix About the 60 Minutes Web Site 713

Index 717
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Richard F. Raposa is a Java instructor for JLicense, Inc., a Java courseware and training firm based in Rapid City, SD. One of the first Sun Certified Java Instructors, Rich has taught courses on Java, J2EE, XML, Web Services, C++, Visual C++/MFC, Win32 Internals, UML, and other object-oriented technologies at companies around the country. He has developed courses on almost every aspect of Java and the J2EE technologies.
An Overview of Java in 60 Minutes a Day

I will never forget taking my first Java class at Sun Microsystems in Dallas, Texas, in May, 1998. I had heard the many promises about Java and how it would revolutionize software development, but I was skeptical and arrogant as I sat in the back of the class anxious to make life hard on the instructor.

At the time, I was programming and teaching C++, mostly Visual C++ and the Microsoft Foundation Classes. For some reason, after I learned C++, I figured that would be the last programming language I would ever need to learn. My boss, on the other hand, had different ideas, because I was slated to become a Sun Certified Java Instructor.

Contrary to my expectations, I was blown away by Java! It was logical, predictable, powerful, and simple (compared to C++). Sun had taken the best of the existing object-oriented programming languages and removed many of the idiosyncrasies and problem areas. And the best part: Java is platform independent! You write a program once, and it can be executed on different operating systems and devices without your even having to recompile your code.

I have been travelling the country teaching Java now for the last 5 years, and I still get excited about standing up in front of a classroom of students who are seeing Java for the first time. One of my goals was to capture that enthusiasm on the pages of this book. I want you to appreciate why Java has become one of the most popular and widely used programming languages in software development today.
How This Book Is Organized

The goal of this book is for you to be able to study each chapter in one hour, like a student sitting through a one-hour lecture. After you finish a chapter, there are labs that solidify what you learned by having you write code. You will also find review questions and answers at the end of each chapter to help you review the key points of the chapter. Also throughout the book are Classroom Q&A sections where I answer questions that I have frequently been asked by students in the classroom.

The book contains 19 chapters. The first eight chapters discuss the fundamentals of the Java language, and should be read in order. The order of the last 11 chapters isn’t quite as important, although you will find that many of the labs build on the ones from previous chapters. The following sections describe what you will learn in this book’s chapters.

Chapter 1: Getting Started with Java

It just wouldn’t be a programming class if I didn’t start with the “Hello, World” application. In Chapter 1, you will learn what all the hype is about with Java. I will discuss the life cycle of a Java program, then you will see how to write, compile, and execute a Java program using the Java 2 Platform, Standard Edition (J2SE) Standard Developer Kit (SDK).

Here’s a tip: If you have a slow Internet connection, you might want to start downloading the J2SE SDK before you start reading the chapter.

Chapter 2: Java Fundamentals

This chapter covers the fundamentals of Java, such as keywords, the built-in data types, strings, variables, references, and arithmetic operators. The information in this chapter establishes the foundation for the remainder of the book, so take your time and make sure you understand everything.

If you are a C or C++ programmer, don’t skip over this chapter thinking you already know what’s in it. Java looks similar to C++, but it behaves quite differently.

Chapter 3: Control Structures

In this chapter, you will learn the various control structures in Java and the details of how to use them, including if/else, switch, do/while, and if statements. I will also cover Boolean operators and the truth tables.

There are some fun labs in this chapter, including one where you write a program to simulate the Powerball lottery.
Chapter 4: Classes and Objects

In my opinion, this is the most important chapter in the book, whether or not you are new to object-oriented programming (OOP). Java is purely object-oriented, so to be a Java programmer is to understand classes and objects. In this chapter, you will learn how to think like an object-oriented programmer, as opposed to thinking procedurally. The basics of OOP are discussed: that objects consist of attributes and behaviors, and that classes describe objects. I will also briefly discuss the Unified Modeling Language (UML) and give you a taste of Object Oriented Analysis and Design (OOAD). The important topic of Java references is also covered in detail.

Spend extra time on this chapter if you need to, because all of the topics require your complete understanding before you can write Java programs.

Chapter 5: Methods

The behaviors of an object becomes methods in a class. By Chapter 5, you will be familiar with writing classes, so it’s time to discuss all of the details about writing and invoking Java methods. Topics covered in this chapter include the method call stack, method signatures, parameters, arguments, method overloading, constructors, and the always-important discussion of call-by-value in Java.

The labs in this chapter give you the opportunity to really get a feel for objects and OOP. You will write classes, instantiate objects, and invoke methods on those objects.

Chapter 6: Understanding Inheritance

Object-oriented programming has four major aspects: inheritance, encapsulation, polymorphism, and abstraction. This chapter focuses on the most important of the four: inheritance. A new child class can be written that extends an existing class, inheriting the attributes and behaviors of its parent. This chapter discusses when and how to use inheritance, including the “is a” relationship, the extends keyword, the Object class, method overriding, and a repeat discussion on constructors and how they are affected by inheritance.

If I were to rank chapters in order of their importance, I would put this one second behind Chapter 4, “Classes and Objects.” An understanding of inheritance is essential to understanding the remaining chapters of the book.

Chapter 7: Advanced Java Language Concepts

In this chapter, I tie up some loose ends and discuss the details of some of the more advanced topics of Java. Topics covered in this chapter include packages,
the access specifiers, encapsulation, static fields and methods, and the javadoc tool.

Some of these topics, such as packages and the javadoc tool, are of special interest because they are concepts unique to Java. I think javadoc is one of the most impressive features of the Java language, as you may also agree after you see how it works.

**Chapter 8: Polymorphism and Abstraction**

Polymorphism is the capability of an object to take on different forms. Abstraction refers to the use of abstract classes, classes that cannot be instantiated. In this chapter, I discuss the details of these two object-oriented concepts, including polymorphic parameters, heterogeneous collections, the instanceof keyword, virtual methods, and abstract methods.

This is likely the most difficult chapter in the book. The concept of polymorphism is crucial but difficult to explain, so I make an asserted effort to simplify my discussions. Read this chapter carefully, and refer back to it whenever you need to.

**Chapter 9: Collections**

After eight days of building a foundation for programming in Java, you will now be ready to start using some of the many Java APIs that compose the Java 2 Platform, Standard Edition (J2SE). Chapter 9 covers the classes in the Java Collections API. If you have ever had to write code to create a linked list, hash table, tree, or other data structure, you will be happy to find that the J2SE contains classes for all the commonly used data structures.

This is a useful chapter for anyone, no matter what types of problems you will be solving in your Java programming future.

**Chapter 10: Interfaces**

The Java language contains the concept of interfaces, which allow you to create data types based on a set of behaviors. A class implements an interface, thereby causing the class to take on the data type of the interface. The class must also implement the methods of the interface, which is how interfaces can be used to force behavior on classes.

This chapter covers the details of writing and implementing interfaces. Knowledge of interfaces is an absolute must in Java, so study this chapter closely.