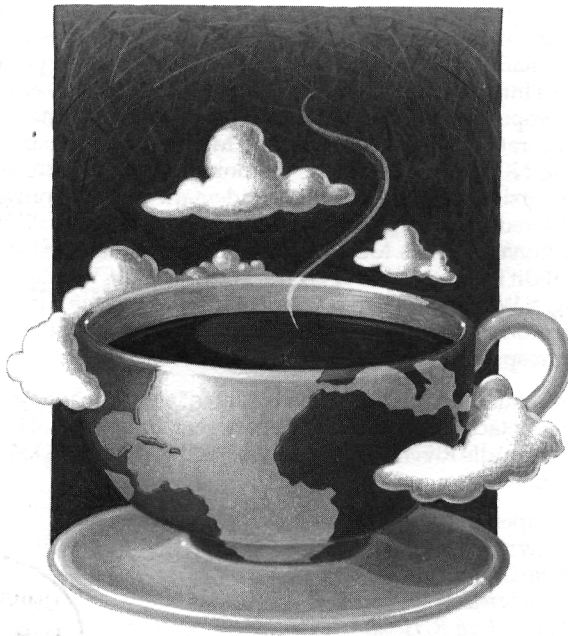


core  
**JAVA**<sup>TM</sup>  
**Volume 1 - Fundamentals**

**1.1**



CAY S. HORSTMANN • GARY CORNELL

**Sun Microsystems Press**  
**A Prentice Hall Title**



# Contents

## **Preface, xix**

To the Reader, xix

About This Book, xxi

*Conventions, xxiii*

*CD ROM, xxvi*

Using the *Core Java* CD ROM, xxiv

## **Acknowledgements, xxv**

### ***Chapter 1***

## **An Introduction to Java, 1**

Java as a Programming Tool, 2

Advantages and Disadvantages of Java, 2

The Java “White Paper” Buzzwords, 3

*Simple, 4*

*Object Oriented, 5*

*Distributed, 6*

*Robust, 6*

*Secure, 7*

*Architecture Neutral, 8*

*Portable, 8*

*Interpreted, 9*

*High Performance, 9*

*Multithreaded, 10*



- Dynamic*, 11
- Java and the Internet, 11
  - Applets at Work*, 12
- A Short History of Java, 14
- Common Misconceptions about Java, 16

## **Chapter 2**

### **The Java Programming Environment, 21**

- Installing the Java Compiler and Tools, 21
  - Development Environments for Windows Users*, 22
  - Installation Tips*, 23
  - CD-ROM Installation*, 24
  - Checking Your Configuration*, 25
  - Adding Core Java Files to an Integrated Development Environment*, 25
- Navigating the Java Directories, 26
- Windows 95/NT as a Programming Environment, 28
  - Long File Names*, 29
  - Multiple Windows*, 31
  - Keyboard Shortcuts*, 31
  - More on DOS Shells*, 33
  - The EDIT Program*, 34
- Compiling and Running Java Programs, 35
- Using TextPad and WinEdit, 36
  - Compiling and Running Programs*, 36
  - Locating Compilation Errors*, 38
- Graphical Applications, 40
- Applets, 43
- Troubleshooting, 47

## **Chapter 3**

### **Fundamental Programming Structures in Java, 51**

- A Very Simple Java Program, 52



- Comments, 54
- Data Types, 55
  - Integers*, 56
  - Floating-Point Types*, 57
  - The Character Type (char)*, 57
  - Boolean*, 58
- Variables, 59
- Assignments and Initializations, 60
  - Constants*, 62
- Operators, 62
- Strings, 66
  - Useful String Functions*, 70
- Control Flow, 79
  - Conditional Statements*, 79
  - Indeterminate Loops*, 83
  - Labeled Breaks*, 90
- Class Methods (User-Defined Functions), 91
  - Recursion*, 95
- Arrays, 96

## **Chapter 4**

### **Objects and Classes, 103**

- Introduction to OOP, 104
  - The Vocabulary of OOP*, 106
  - Objects*, 107
  - Relationships between Classes*, 109
- Using Existing Classes, 112
  - Object Variables*, 113
  - The GregorianCalendar Class of the Java library*, 115
  - Mutator and Accessor Methods*, 120
  - Using Our Day Class*, 121
- Starting to Build Your Own Classes, 126
  - An Employee Class*, 127
  - Method Access to Private Data*, 135



*Private Methods*, 136  
*Static Methods*, 136  
*More on Object Construction and Destruction*, 140  
*A CardDeck Class*, 144

Packages, 148  
    *Using Packages*, 148  
Class Design Hints, 151

## **Chapter 5**

### **Inheritance, 155**

First Steps with Inheritance, 155  
    *Working with Subclasses*, 161  
    *Objects Know How to Do Their Work: Polymorphism*, 162  
    *Preventing Inheritance: Final Classes and Methods*, 164  
Casting, 165  
Abstract Classes, 167  
Object: The Cosmic Superclass, 173  
    *Object Wrappers*, 174  
    *Big Numbers*, 178  
    *Reading a Page in the HTML Documents*, 180  
The Class `Class` (Run-Time Type Identification), 182  
    *Reflection*, 184  
Protected Access, 198  
    *Protected Access and Cloning*, 199  
Design Hints for Inheritance, 203

## **Chapter 6**

### **Interfaces and Inner Classes, 207**

Interfaces, 207  
    *Properties of Interfaces*, 212  
    *Interfaces and Callbacks*, 213  
Inner Classes, 215  
    *The Property Interface*, 216



## **Chapter 7**

### **Graphics Programming and Printing, 233**

Introduction, 233

Frames and Windows, 235

Displaying Information in a Window, 241

Events and the `Update` and `Paint` Functions, 243

Text and Fonts, 244

Colors, 254

Drawing Shapes, 257

*Drawing Rectangles, 261*

Filling Shapes, 263

Paint Mode, 266

Images, 268

Buffering, 271

Image Acquisition, 274

Printing, 279

## **Chapter 8**

### **Event Handling, 291**

Creating a Closeable Frame, 292

Basics of Event Handling, 296

*Capturing Window Events, 298*

*Adapter Classes, 301*

The JDK 1.1 Event Hierarchy, 303

*An Example: Which Button Was Clicked?, 305*

*Laying out Buttons, 305*

*Getting Buttons to Respond, 307*

Semantic and Low-Level Events, 310

Event Handling Summary, 311

Individual Events, 313

Focus Events, 314



- Window Events, 315
- Keyboard Events, 315
- Mouse Events, 321
- Menus, 328
  - Advanced Menu Topics, 332
    - Check Box Menu Items*, 333
    - Pop-up Menus*, 333
    - Keyboard Shortcuts*, 335
- Separating GUI and Application Code, 340
- Multicasting, 342
- Advanced Event Handling, 345
  - Consuming Events*, 345
  - Manipulating the Event Queue*, 347
  - Adding Custom Events*, 350
- Survival Tip for Java 1.0 Programmers, 355

## **Chapter 9**

### **User Interface Components, 359**

- Introduction to Building a User Interface, 360
- Canvases, 364
- Text Input, 367
  - Text Fields*, 367
  - Input Validation*, 372
- Text Areas, 377
  - Labels and Labeling Components*, 380
  - Selecting Text*, 381
  - Text Editing*, 382
- Making Choices, 384
  - Check Boxes*, 384
  - Check Box Groups*, 388
  - Choice Boxes (Drop-Down Lists)*, 391
  - The List Component*, 393



- Scroll Bars, 398
  - Scrolling a Window*, 403
  - Scroll Panes*, 408
- Sophisticated Layout Management, 411
  - Traversal Order*, 413
- Flow Layouts Revisited, 414
- Border Layout, 415
- Card Layout, 417
- Grid Layout, 422
- Grid Bag Layout, 424
  - The gridx, gridy, gridwidth, and gridheight Parameters*, 427
  - Weight Fields*, 427
  - The fill and anchor Parameters*, 427
  - An Alternative Method to Specify the gridx, gridy, gridwidth, and gridheight Parameters*, 428
- Using No Layout Manager, 430
- Custom Layout Managers, 431
- Printing Components, 435
- Dialog Boxes, 440
- Data Exchange, 444
  - File Dialogs*, 448
- Lightweight User Interface Elements, 451
  - Building a Lightweight UI*, 452

## **Chapter 10**

### **Applets, 463**

- Applet Basics, 464
  - A Simple Applet*, 465
  - Testing Applets*, 466
  - Security Basics*, 468
  - Converting Applications to Applets*, 470





- Life Cycle of an Applet, 474*
- The Applet HTML Tags, 476
  - Applet Tags for Positioning, 477*
  - The Applet Tags for Code, 479*
  - The Applet Tags for Java-Challenged Viewers, 480*
  - Embedding an Applet into a Web Page, 480*
- Passing Information to Applets, 485
  - Dialog Boxes in Applets, 490*
- Multimedia, 492
  - URLs, 492
    - Obtaining Multimedia Files, 493*
- The Applet Context, 494
  - Inter-Applet Communication, 495*
  - Displaying Items in the Browser, 496*
  - A Bookmark Applet, 498*
  - JAR Files, 500
  - Resources, 502
- It's an Applet. It's an Application. It's Both!, 506

## **Chapter 11**

### **Data Structures, 511**

- Vectors, 511
  - Working with an Existing Vector, 514*
  - Accessing Vector Element, 518*
  - Inserting and Removing Elements in the Middle of a Vector, 522*
  - Running a Vector Benchmark, 523*
- Bit Sets, 525
  - The Sieve of Eratosthenes Benchmark, 526*
- Hash Tables, 529
  - Keys and Hash Functions, 534*
  - Hashable Classes Creation, 535*
  - Enumerations, 537*



- Property Sets, 539*
- Hash Sets, 546*
- Linked Lists, 549
  - The Code for Our Linked List Class, 551*
  - A Linked List Demonstration, 555*
  - Linked List Enumeration, 558*
  - Access to Links, 559*
- Queues, 560
- Stacks, 562
- Multi-Dimensional Arrays, 564
  - Under the Hood of Multi-Dimensional Arrays, 565*
  - Pascal's Triangle, 565*

## **Chapter 12**

### **Exceptions and Debugging, 573**

- Dealing with Errors, 574
  - The Classification of Error Types, 575*
  - Advertising the Exceptions That a Method Throws, 577*
  - How to Throw an Exception, 579*
  - Creating Exception Classes, 580*
- Catching Exceptions, 581
  - Catching Multiple Exceptions, 584*
  - Rethrowing Exceptions, 584*
  - The finally Clause, 585*
  - A Final Look at Java Error- and Exception-Handling, 586*
- Some Tips on Using Exceptions, 589
- Debugging Techniques, 591
  - Useful Tricks for Debugging, 592*
  - Trapping AWT Events, 593*
  - Displaying Debug Messages in Graphics Programs, 598*
- Using the JDB Debugger, 600



*Appendix I*  
**Java Keywords, 606**

*Appendix II*  
**The javadoc Utility, 608**

How to Insert Comments, 608

How to Extract Comments, 610

**Index, 611**