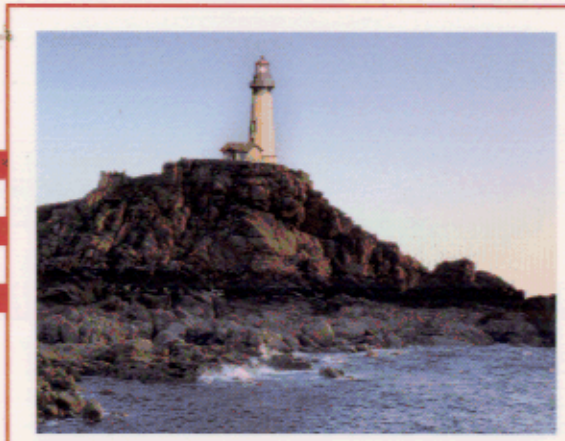
COVERS NEW SCJP EXAM FOR JAVA RELEASE 5.0

Complete Java™ 2 Certification



STUDY GUIDE

Fifth Edition

SCJP: Sun Certified Java Programmer

SCJD: Sun Certified Java Developer

Phil Heller
Simon Roberts

Includes Leading-Edge Software

- Test Engine with Hundreds of Challenging Questions
- Four Bonus Exams
- The Entire Book in PDF

SYBEX®

THE LEADER IN CERTIFICATION EXAM PREP

Contents

Introduction *xvii*

Assessment Test *xxiii*

Chapter 1 Language Fundamentals 3

Source Files 4
Keywords and Identifiers 5
Primitive Data Types 7
Literals 9
String Literals 11
Arrays 11
Importing 15
Class Fundamentals 19
Class Paths 19
The *main()* Method 19
Variables and Initialization 20
Argument Passing: By Reference or by Value 22
Garbage Collection 24
Summary 26
Exam Essentials 27
Review Questions 29
Answers to Review Questions 34

Chapter 2 Operators and Assignments 37

Overview of the Java Operators 38
Evaluation Order 39
The Unary Operators 40
The Increment and Decrement Operators: ++ and -- 40
The Unary Plus and Minus Operators: + and - 41
The Bitwise Inversion Operator: ~ 41
The *Boolean* Complement Operator: *!* 41
The Cast Operator: *(type)* 42
The Arithmetic Operators 43
The Multiplication and Division Operators: * and / 43
The Modulo Operator: % 45
The Addition and Subtraction Operators: + and - 46
Arithmetic Error Conditions 48
Arithmetic Promotion of Operands 49

The Comparison Operators 49
The Ordinal Comparisons Operators: <, <=, >, and >= 50
The *instanceof* Operator 50
The Equality Comparison Operators: == and != 52
The Bitwise Operators 52
Boolean Operations 56
The Short-Circuit Logical Operators 58
The Conditional Operator 60
The Assignment Operators 61
Summary 62
Exam Essentials 64
Review Questions 65
Answers to Review Questions 69

Chapter 3 Modifiers 71

Modifier Overview 72
The Access Modifiers 73
Other Modifiers 79
Modifiers and Features 89
Summary 90
Exam Essentials 90
Review Questions 91
Answers to Review Questions 98

Chapter 4 Converting and Casting 101

Explicit and Implicit Type Changes 102
Primitives and Conversion 103
Primitive Conversion: Assignment 103
Primitive Conversion: Method Call 107
Primitive Conversion: Arithmetic Promotion 108
Primitives and Casting 109
Object Reference Conversion 112
Object Reference Assignment Conversion 112
Object Method-Call Conversion 115
Object Reference Casting 115
Summary 120
Exam Essentials 120
Review Questions 121
Answers to Review Questions 127

Chapter 5 Flow Control, Assertions, and Exception Handling 129

The Loop Constructs 130
The *while()* Loop 130
The *do* Loop 132
The *for()* Loop 132
The *break* and *continue* Statements in Loops 136
The Selection Statements 137
The *if()/else* Construct 138
The *switch()* Construct 139
Exceptions 140
Catching Exceptions 140
Declaring Exceptions 143
How the JVM Dispatches Exceptions 143
Two Kinds of Exception 144
The *finally* Block 145
Throwing Exceptions 146
Creating Your Own Exception Classes 147
Exceptions and Overriding 148
Assertions 150
Assertions and Compilation 150
Runtime Enabling of Assertions 151
Using Assertions 151
Summary 154
Exam Essentials 154
Review Questions 156
Answers to Review Questions 164

Chapter 6 Objects and Classes 167

Benefits of Object-Oriented Implementation 169
Encapsulation 169
Re-use 170
Coupling and Cohesion 171
Implementing Object-Oriented Relationships 172
Methods, Overloading and Overriding 172
Overloading Method Names 173
Method Overriding 175
Constructors and Subclassing 181
Overloading Constructors 182
Inner Classes 183
The Enclosing *this* Reference and Construction of Inner Classes 185
Member Classes 187
Classes Defined inside Methods 188
Contracts and Naming Conventions 193

Enums 195
Summary 200
Exam Essentials 201
Review Questions 203
Answers to Review Questions 210

Chapter 7 Threads 213

Thread Fundamentals 214
What a Thread Executes 214
When Execution Ends 217
Thread States 217
Thread Priorities 219
Daemon Threads 219
Controlling Threads 220
Yielding 220
Suspending 222
Sleeping 222
Blocking 223
Monitor States 224
Monitors, Waiting, and Notifying 225
The Object Lock and Synchronization 227
wait() and *notify()* 229
The Class Lock 234
notifyAll() 234
Deadlock 236
Synchronizing Part of a Method 238
Summary 239
Exam Essentials 240
Review Questions 241
Answers to Review Questions 246

Chapter 8 The *java.lang* and *java.util* Packages 249

The *Object* Class 251
The *Math* Class 253
Strings 254
The *String* Class 254
The *StringBuffer* and *StringBuilder* Classes 258
String Concatenation the Easy Way 260
The Wrapper Classes 262
The Collections Framework 268
The *Collection* Superinterface and Iteration 269
Lists 271
Sets 272
Maps 275

	Support Classes	277
	Collections and Code Maintenance	279
	Generic Collections	285
	Generics and the API Pages	288
	Generics and Enhanced *For* Loops	289
	Scanning and Formatting Text	290
	Scanning Text	291
	Formatting Text	294
	Summary	302
	Exam Essentials	302
	Review Questions	304
	Answers to Review Questions	309
Chapter 9	**I/O and Streams**	**311**
	Text, UTF, and Unicode	312
	File Input and Output	313
	The *File* Class	313
	The *RandomAccessFile* Class	317
	Streams, Readers, and Writers	321
	Low-Level Streams	321
	High-Level Streams	323
	Readers and Writers	327
	Encodings	330
	Object Streams and Serialization	332
	Summary	338
	Exam Essentials	338
	Review Questions	339
	Answers to Review Questions	345
Chapter 10	**About the Developer's Exam**	**349**
	Are You Ready?	350
	Formalities of the Exam	351
	The Project Assignment	352
	The Essay Exam	353
	Grading	354
Chapter 11	**Swing Components**	**357**
	A Strategy for Designing the GUI	358
	Step 1: Identify Needed Components	359
	Step 2: Isolate Regions of Behavior	359
	Step 3: Sketch the GUI	359
	Step 4: Choose Layout Managers	362

Common Swing Methods 362
getSize() and *setSize()* 362
getLocation() and *setLocation()* 362
setForeground() and *setBackground()* 362
setFont() 363
setEnabled() 363
Basic Swing Components 363
Container Components 364
Ordinary Components 367
Menu Components 376
JTable 377
JTree 382
*JMenu*s and *Action*s 387
Panes 389
JSplitPane 389
JOptionPane 391
Summary 392

Chapter 12 Layout Managers 395

Layout Manager Theory 396
Component Size and Position 399
Layout Policies 401
The Flow Layout Manager 401
The Grid Layout Manager 404
The Border Layout Manager 405
The Card Layout Manager 412
The GridBag Layout Manager 417
Other Layout Options 433
Summary 434

Chapter 13 Object Streams and RMI 435

Sockets and Streams 436
TCP: A Reliable Protocol 436
Sockets and Ports 437
Client Sockets in Java 437
Server Sockets in Java 440
Object Streams and Serialization 443
Remote Control Using Object Streams 447
Remote Method Invocation 452
Remote References 452
RMI Step by Step 453
Summary 459

Chapter 14 Putting It All Together **461**

Javadoc 462
Thread Issues 465
Extra Credit 466
RMI or Object Streams? 467
Common-Sense GUI Design 468
Using the *jar* Tool 472
Summary 474

Appendix A Practice Exam **475**

Questions 476
Answers 493

Glossary **499**

Index *509*