



# Table of Contents

<b>Introduction .....</b>	<b>xv</b>
---------------------------	-----------

## **SECTION 1: DEVELOPING DESKTOP APPLICATIONS USING JAVA**

<b>Chapter 1: Getting Started with Java .....</b>	<b>1</b>
Introducing Object Oriented Programming .....	2
Explaining OOP concepts .....	2
Objects .....	3
Classes .....	3
Encapsulation .....	3
Data Abstraction .....	3
Inheritance .....	4
Polymorphism .....	4
Exploring the Evolution of Java .....	5
Emergence of C++ .....	5
Introduction of Java .....	5
Describing the Features of Java .....	8
Portable .....	9
Robust .....	9
Multithreading .....	9
Platform Independent .....	9
Distributed .....	9
Enhanced Collection Framework .....	10
Dynamic Compilation .....	10
Database .....	10
Web Services .....	10
Security .....	10
Introducing the Java Environment .....	10
Explaining JDK .....	11
Explaining Java Platform Component .....	11
Defining JVM .....	11
Defining Java API .....	12
Exploring Types of Java Programs .....	12
Exploring Keywords in Java .....	13
Exploring Identifiers in Java .....	15
Developing a Simple Java Program .....	15
Compiling and Running the Program .....	16
Summary .....	17
Quick Revise .....	17
<b>Chapter 2: Working with Java Fundamental Programming Concepts .....</b>	<b>19</b>
Exploring Data Types .....	20
The Integer Data Type .....	20

## Table of Contents

---

The Floating-point Data Type .....	21
The Character Data Type .....	21
The Boolean Data Type .....	22
Working with Variables.....	22
Declaring Variables.....	22
Initializing Variables.....	22
Working with Literals .....	23
Integer Literals.....	23
Floating-Point Literals .....	25
Boolean Literals .....	27
Character Literals .....	28
String Literals.....	28
Understanding Type Casting and Type Conversion .....	28
Automatic Type Casting .....	29
Explicit Type Casting.....	29
Working with Constants and Separators .....	30
Working with Operators.....	31
Arithmetic Operators.....	31
Relational Operators .....	36
Boolean Logical Operators.....	37
Increment and Decrement Operators.....	39
Implementing Arrays in Java.....	44
Working with One-Dimensional Arrays .....	45
Declaring One-Dimensional Arrays .....	45
Working with Two-Dimensional Arrays.....	48
Summary .....	50
Quick Revise .....	51
<b>Chapter 3: Working with Access Modifiers, Packages, Classes, and Constructors.....</b>	<b>53</b>
Introducing Access Modifiers in Java.....	54
Working with Packages .....	55
The Built-in Packages.....	55
The User-defined Packages.....	69
Working with Classes.....	71
Declaring a Class .....	72
Working with Methods in a Class .....	75
Identifying Variable Scope .....	86
Working with Nested Classes in Java .....	87
Working with Constructors.....	88
Exploring Default Constructors.....	89
Exploring Parameterized Constructors .....	90
Passing Parameters to Constructors.....	91
Using the this Keyword.....	91
Summary .....	92
Quick Revise .....	93
<b>Chapter 4: Working with Flow Control Statements .....</b>	<b>95</b>
Implementing the Conditional Statements.....	96
Using the if Statement .....	96
Using the if-else Statement .....	97
Using the switch Statement .....	97
Implementing the Iteration Statements.....	99
Using the while Loop.....	99
Using the do-while Loop.....	100
Using the for Loop .....	101
Using the for-each Loop.....	102

Working with Nested Loop .....	103
Implementing the Jump Statements .....	104
Using the break statement .....	104
Using the continue Statement .....	106
Using the return Statement.....	107
Summary .....	107
Quick Revise .....	108
<b>Chapter 5: Implementing Inheritance, Interface, and Polymorphism in Java.....</b>	<b>111</b>
Working with Inheritance .....	112
Exploring Forms of Inheritance .....	113
Exploring the Class Hierarchy in Java .....	117
Working with Access Modifiers in Inheritance.....	118
Referencing Subclass Objects .....	123
Using the super Keyword .....	124
Implementing Method Overriding.....	125
Invocation of Constructors in Inheritance.....	126
Using the final Keyword .....	127
Working with Abstract Class .....	129
Working with Interfaces in Java .....	130
Declaring Interfaces .....	130
Implementing Interfaces .....	130
Difference between Abstract Class and Interfaces .....	134
Working with Polymorphism .....	135
The Static Polymorphism.....	135
The Dynamic Polymorphism .....	137
Summary .....	138
Quick Revise .....	138
<b>Chapter 6: Exception Handling and I/O Operations.....</b>	<b>141</b>
Handling Exceptions in Java .....	142
Exploring Exceptions .....	143
Describing Exception Hierarchy .....	145
Working with Exception Handling Mechanisms.....	147
Handling I/O Operations.....	156
Exploring the java.io Package .....	156
Working with Streams.....	170
Writing Console Output.....	171
Reading and Writing Files .....	172
Summary .....	174
Quick Revise .....	174
<b>Chapter 7: Implementing Threads in Java.....</b>	<b>177</b>
Defining Threads .....	178
Describing the Main Thread .....	179
Extending the Thread Class.....	179
Implementing the Runnable Interface .....	180
Instantiating a Thread .....	180
Starting Threads .....	181
Starting and Running Multiple Threads .....	182
Thread States.....	183
Exploring the Thread States.....	183
Thread Priorities .....	184
Thread Scheduler .....	186
Running and Yielding .....	186
Sleeping and Waking Up Threads.....	186

## Table of Contents

---

The join() Method .....	188
Blocking for I/O .....	190
hread Termination.....	190
Deadlock .....	190
Implementing the Thread Synchronization Mechanism.....	191
Synchronized Methods.....	192
Synchronized Blocks .....	194
Implementing Thread Interaction .....	195
Summary .....	197
Quick Revise .....	198
<b>Chapter 8: Working with the java.lang and java.util Packages .....</b>	<b>201</b>
Working with the java.lang Package .....	202
Describing Wrapper Classes in Java .....	203
Working with Strings in Java .....	207
Working with the java.util Package.....	228
Describing Vectors in Java .....	228
Working with the Enumeration and Iterator Interfaces .....	231
Describing the Collection Framework .....	239
Summary .....	261
Quick Revise .....	262
<b>Chapter 9: Working with Windows-based Application.....</b>	<b>267</b>
Working with java.awt Package .....	268
Exploring the Component Class .....	268
Exploring the Container Class .....	269
Exploring the Panel Class .....	270
Exploring the Window Class.....	270
Exploring the Frame Class.....	270
Creating a Desktop Application using AWT .....	270
Creating a Frame Window.....	270
Hiding and Showing a Window .....	272
Setting the Window's Title.....	272
Closing a Frame Window .....	274
Using the Button Class .....	275
Using the Label and TextField Classes .....	277
Using the CheckBox and RadioButton Classes .....	279
Using the Choice Class .....	281
Using the Scrollbar Class .....	283
Using the TextArea Class.....	284
Working with Panel Container .....	286
Creating a Desktop Application using Swing.....	287
Implementing the JFrame Class.....	288
Using the JButton Class.....	289
Using JLabel and JTextField Classes .....	291
Using the JTextArea Class.....	293
Using the JTable Class .....	294
Using the JTabbedPane Class.....	296
Implementing the Layout Managers .....	298
The FlowLayout Manager.....	299
The BorderLayout Manager .....	300
The GridLayout Manager .....	302
The CardLayout Manager.....	303
The GridBagLayout Manager.....	306
Summary .....	309
Quick Revise .....	309

---

<b>Chapter 10: Working with Applets</b> .....	<b>311</b>
Overview of Applets .....	312
Life Cycle of an Applet.....	312
Comparing Applets and Applications.....	313
Creating Applets .....	313
Using the HTML <Applet> Tag.....	316
Initializing and Terminating an Applet.....	317
Using the paint () Method.....	318
Using the update() Method.....	318
Invoking the repaint() Method.....	319
Implementing Multithreading with Applets.....	320
Passing Parameters to Applets.....	321
Working with the Graphics Class .....	322
Drawing Lines.....	324
Drawing Rectangles .....	325
Drawing Ovals.....	326
Drawing Arcs .....	327
Drawing Polygon .....	327
Working with the Color Class.....	328
Working with the Font Class .....	331
Determining the Available Fonts .....	334
Creating and Selecting Fonts.....	336
Using the FontMetrics Class .....	337
Summary .....	339
Quick Revise .....	339
<b>Chapter 11: Implementing Event Handling</b> .....	<b>347</b>
Overview of Events .....	348
Components of Event .....	348
Event Classes.....	348
Listeners for Events .....	351
The ActionListener Interface .....	352
The ComponentListener Interface .....	352
The KeyListener Interface .....	353
The MouseListener Interface .....	353
Exploring the Methods of Event Listeners .....	354
Using the ActionListener Interface.....	354
Using the KeyListener Interface.....	355
Using the MouseListener Interface.....	356
Using Adapter Classes .....	358
Summary .....	359
Quick Revise .....	359
<b>Chapter 12: Working with JavaBeans</b> .....	<b>361</b>
Introducing JavaBeans .....	362
Advantages of JavaBeans.....	363
Introspection .....	363
Customizers.....	364
Exploring the JavaBeans API .....	364
Designing Programs Using JavaBeans .....	366
Creating a Java Bean.....	367
Creating a Bean Manifest File.....	368
Creating a Bean JAR File .....	368
Using the New Bean .....	368
Adding Controls to a Bean .....	369

**Table of Contents**

---

Exploring the Properties of a Bean.....	370
Describing Design Patterns for Properties.....	375
Simple Properties .....	375
Indexed Properties .....	376
Using the BeanInfo Interface.....	376
Creating Bound Properties .....	377
Giving a Bean an Icon.....	378
Creating a BeanInfo Class.....	379
Bound and Constrained Properties.....	380
Persistence .....	382
Using Beans with JSP Pages .....	382
Summary .....	383
Quick Revise .....	383
<b>Chapter 13: Java Database Programming .....</b>	<b>385</b>
Introduction to JDBC.....	386
Components of JDBC.....	386
JDBC Specification.....	387
JDBC Architecture.....	387
JDBC Drivers.....	388
Describing the Type-1 Driver.....	388
Describing the Type-2 Driver (Java to native API).....	389
Describing the Type-3 Driver (Java to Network Protocol/ All Java Driver).....	391
Describing the Type-4 Driver (Java to Database protocol).....	392
Features of JDBC .....	393
New Features in JDBC 4.0.....	394
JDBC APIs .....	396
The <b>java.sql</b> Package .....	396
The <b>javax.sql</b> Package .....	398
Major Classes and Interfaces.....	400
Understanding the DriverManager Class .....	400
Understanding the Driver Interface .....	401
Understanding the Connection Interface .....	402
Understanding the Statement Interface.....	404
JDBC Processes with java.sql Package.....	407
Exploring Basic JDBC Steps.....	407
Creating a Simple JDBC Application .....	410
Working with the PreparedStatement Interface .....	414
Working with the CallableStatement Interface .....	419
Working with ResultSets.....	427
Working with Batch Updates .....	437
Describing SQL 99 Data Types.....	441
JDBC Processes with the <b>javax.sql</b> Package.....	456
Using DataSource to Make a Connection.....	457
Describing Connection Pooling .....	457
Using RowSet Objects.....	461
Working with Transactions.....	474
ACID Properties .....	475
Types of Transactions.....	475
Transaction Management.....	476
Summary .....	479
Quick Revise .....	479

**SECTION 2: DEVELOPING WEB APPLICATIONS USING JAVA**

<b>Chapter 14: Getting Started with Web Applications in Java.....</b>	<b>481</b>
Introduction to Web Applications.....	482
Exploring Java Based Web Technologies.....	482
Describing JDBC.....	483
Exploring the JDBC Architecture.....	483
Describing Servlets.....	484
Describing Java Server Pages (JSP).....	485
Introducing Web Architecture Models.....	487
Describing the Model-1 Architecture.....	487
Describing the Model-2 Architecture.....	488
Introducing the MVC Architecture.....	489
Describing the Model Component.....	490
Describing the View Component.....	490
Describing the Controller Component.....	490
Summary.....	491
Quick Revise.....	491
<b>Chapter 15: Working with Servlet Programming.....</b>	<b>493</b>
Introducing Servlet 2.5.....	494
Exploring the Features of Java Servlets.....	495
Servlet - A Request and Response Model.....	496
Servlet and Environment State.....	496
Security Features.....	498
HTML-Aware Servlets.....	498
HTTP-Specific Servlets.....	499
Performance Feature.....	500
3-Tier Applications.....	501
Web Publishing System.....	501
Exploring the Servlet API.....	502
The javax.servlet Package.....	502
The javax.servlet.http Package.....	505
Introducing the Servlet Life-Cycle.....	506
The init() Method.....	507
The service() Method.....	507
The destroy() Method.....	508
Configuring Servlet in web.xml.....	508
Working with ServletConfig and ServletContext Interfaces.....	510
Creating a Simple Servlet.....	510
Creating Directory Structure.....	511
Configuring the Servlet.....	512
Packaging, Deploying and Running the Web Application.....	512
Working with HttpServletRequest and HttpServletResponse.....	513
HttpServletRequest.....	513
HttpServletResponse.....	522
Describing Request Delegation and Request Scope.....	527
Understanding Servlet Collaboration.....	530
Collaboration through the System Properties List.....	530
Collaboration through a Shared Object.....	531
Collaboration through Inheritance.....	537
Understanding Session Tracking.....	539
Cookies.....	540
Hidden Form Fields.....	544
URL Rewriting.....	544
Session using Secure Socket Layer (SSL).....	547

## Table of Contents

---

Describing Session Tracking with Java Servlet API .....	547
History of Session Tracking .....	547
Session Creation and Tracking .....	548
Working with Login Application using Session Tracking .....	555
Creating Directory Structure of a Login Application .....	556
Building the Front-End .....	556
Creating and Managing Session .....	557
Configuring the Login Application .....	559
Running the Login Application .....	559
Summary .....	561
Quick Revise .....	561
<b>Chapter 16: Working with JSP .....</b>	<b>563</b>
Understanding JSP .....	564
Advantages of JSP over Servlets .....	565
Introducing the Tag-Based Approach .....	566
Describing the JSP Architecture .....	566
Describing the JSP Life Cycle .....	567
The Page Translation Stage .....	567
The Compilation Stage .....	569
The Loading & Initialization Stage .....	569
The Request Handling Stage .....	570
The Destroying Stage .....	570
Creating Simple JSP Pages .....	570
Working with JSP Basic Tags and Implicit Objects .....	573
Exploring Scripting Elements .....	573
Exploring Implicit Objects .....	577
Exploring Directive Elements .....	582
Using JavaBeans and Action Tags in JSP .....	587
Understanding JavaBean .....	587
Action Tags .....	588
Using a Bean in a JSP .....	600
Using the JSP Standard Tag Library (JSTL) .....	605
Describing JSTL Core Tags .....	605
Describing the JSTL SQL Tags .....	615
JSTL Formatting Tags .....	620
JSTL XML Tags .....	631
Implementing JSTL Tags .....	634
Summary .....	637
Quick Revise .....	637
<b><u>SECTION 3: DEVELOPING ENTERPRISE APPLICATIONS USING JAVA</u></b>	
<b>Chapter 17: Understanding EJB 3.0 .....</b>	<b>639</b>
EJB 3.0 Fundamentals .....	640
Need of EJB 3.0 .....	640
EJB 3.0 Architecture and Concepts .....	641
Features of EJB 3.0 .....	644
Classifying EJBs .....	647
Understanding Session Bean .....	647
Conversational State .....	648
State Management of a Bean .....	648
Stateless Session Beans .....	648
Life-cycle of Stateless Session Beans .....	649
Stateful Session Beans .....	649
Life-cycle Of Stateful Session Beans .....	650



Stateless versus Stateful Session Beans .....	651
Implementing Session Beans.....	651
Business Interface .....	651
Bean Class.....	652
Developing a Stateless Session Bean.....	652
Running the Application.....	657
Developing a Stateful Session Bean.....	658
Understanding Message-Driven Bean.....	661
Characteristics of Message-Driven Bean .....	662
Structure of Message-Driven Bean.....	662
Life-cycle of Message-Driven Bean .....	662
Implementing the Message-Driven Bean.....	664
Implementation of MessageDrivenBean and MessageListener .....	664
Implementation of Business Logic inside the onMessage() .....	665
A Sample MDB Application .....	665
Packaging, Deploying, and Running the Application .....	669
Managing Transactions in Java EE Application .....	674
Transaction Properties.....	675
Transaction Model.....	676
Distributed Transactions.....	678
Implementing Transaction Management in EJB 3.0 .....	680
Bean-Managed Transactions .....	680
Container-Managed Transactions .....	682
Different Types of Timers .....	684
Strengths and Limitations of EJB Timer Services.....	684
Timer Service API.....	684
The TimerService Interface .....	685
The Timer Interface.....	686
The TimedObject Interface.....	687
The TimerHandle Interface .....	687
Implementing EJB 3.0 Timer Service .....	688
Creating the Timer Objects.....	688
Canceling a Timer Object.....	690
Expiration of Timer Object.....	690
Understanding EJB 3.0 Interceptors.....	690
Specifying Interceptors.....	690
Life-cycle of Interceptors.....	691
Interceptor class.....	692
Applying Interceptors through XML.....	692
Disabling Interceptors .....	693
Using Annotations for Interceptors.....	693
Programming by using the Business Methods.....	694
Programming by using the Life-cycle Call Back Methods .....	694
Specifying Default Interceptor Methods .....	695
Life-cycle Call Back Methods in an Interceptor Class.....	696
The @PreDestroy Annotation.....	696
The @PostConstruct Annotation.....	696
The @PostActivate Annotation .....	697
The @PrePassivate Annotation .....	697
Life-cycle Call-back Interceptor Methods in a MDB .....	697
Life-cycle Callback Interceptor Methods in a session bean.....	699
Summary .....	701
Quick Review .....	701

<b>Chapter 18: Implementing Entities and Java Persistence API .....</b>	<b>703</b>
Understanding Object-Relational Mapping (ORM) .....	704
Understanding the Java Persistence API .....	704
Exploring Entities .....	705
Specifying the @Entity Annotation .....	710
Specifying the @Table Annotation .....	711
Specifying the @Columns Annotation .....	711
Specifying the @Enumerated Annotation .....	712
Specifying the @Lob Annotation .....	712
Specifying the @Temporal Annotation .....	712
Implementing Entity and Session Beans .....	713
Using an Entity Bean .....	713
Implementing the Entity Class .....	714
Describing the Life Cycle of an Entity .....	714
Defining Entity Listeners and Callbacks .....	715
Packaging a Persistence Unit .....	716
Obtaining an EntityManager API .....	717
Interacting with EntityManager .....	718
Introducing Entity Relationship Types .....	719
Describing the One-to-One Type .....	720
Describing the One-to-Many Type .....	724
Describing the Many-to-One Type .....	728
Describing the .....	732
Many-to-Many Type .....	732
Mapping Collection-Based Relationships .....	736
Entity Inheritance .....	737
Single Table per Class Hierarchy Strategy .....	739
Separate Table per Subclass Strategy .....	742
Single Table per Concrete Entity Class Strategy .....	743
Understanding Java Persistence Query Language .....	743
JPQL Functions .....	744
JPQL Statements .....	746
The SELECT Clause .....	747
The FROM Clause .....	748
The WHERE Clause .....	748
The ORDER BY Clause .....	748
Conditional Expressions .....	749
The Query API .....	751
Creating a Sample Application .....	756
Implementing the Directory Structure .....	756
Creating a Web Module .....	758
Configuring the Connection Pool and JDBC Resource .....	765
Summary .....	768
Quick Revise .....	768
<b>Appendix A: RMI-IIOP .....</b>	<b>771</b>
<b>Glossary .....</b>	<b>807</b>
<b>Index .....</b>	<b>811</b>
<b>What's on the CD-ROM .....</b>	<b>826</b>