

# Contents

---

Foreword . . . . .	vii
Acknowledgments . . . . .	viii
Introduction . . . . .	xxix

## Part I: Introduction 1

<b>Chapter 1: Understanding Java and the J2EE Platform . . . . .</b>	<b>3</b>
Reviewing a Brief History of Java . . . . .	3
Understanding J2SE . . . . .	5
Examining the Origin of (J2EE) . . . . .	5
Application components . . . . .	6
Roles . . . . .	7
Working with the Model-View-Controller . . . . .	9
The model . . . . .	9
The view . . . . .	10
The control . . . . .	10
Understanding J2EE APIs . . . . .	10
J2EE standard services . . . . .	11
Application component APIs . . . . .	13
Discovering What's New in J2EE 1.4 . . . . .	13
Looking toward the Future of J2EE . . . . .	14
Understanding the Java Community Process (JCP) . . . . .	14
Summary . . . . .	15
<b>Chapter 2: Reviewing XML Fundamentals . . . . .</b>	<b>17</b>
Explaining XML . . . . .	17
Well-formed XML . . . . .	18
Valid XML . . . . .	18
Understanding XML Document Structure . . . . .	20
Prologue . . . . .	20
Elements . . . . .	20
Attributes . . . . .	21

Examining XML Parsers . . . . .	21
DOM parsers . . . . .	22
SAX parsers . . . . .	22
DOM versus SAX . . . . .	23
Implementing XML DTDs . . . . .	24
Understanding XML Namespaces . . . . .	26
Exploring XML Schema . . . . .	30
Working with eXtensible Stylesheet Language Transformations (XSLT) . . . . .	34
Producing simple HTML with XSLT . . . . .	35
Producing a Wireless Markup Language (WML) Document with XML . . . . .	38
Introducing J2EE XML-Based APIs . . . . .	40
Summary . . . . .	41
<b>Chapter 3: Introducing Application Servers . . . . .</b>	<b>43</b>
Implementing the J2EE Platform . . . . .	43
Understanding the Features of an Application Server . . . . .	45
Scalability . . . . .	46
Client agnosticism . . . . .	46
Server management . . . . .	47
Development . . . . .	47
Examining Full J2EE Implementations . . . . .	47
BEA WebLogic . . . . .	48
Borland Enterprise Server . . . . .	48
IBM WebSphere . . . . .	48
JBoss . . . . .	49
Oracle 9iAS . . . . .	49
Orion . . . . .	50
Sun ONE Application Server . . . . .	50
Examining Partial J2EE Implementations . . . . .	51
Apache Tomcat . . . . .	52
Resin . . . . .	52
ServletExec . . . . .	52
Avoiding Vendor Lock-In . . . . .	53
Summary . . . . .	54
<b>Chapter 4: Understanding Remote Method Invocation . . . . .</b>	<b>55</b>
Providing an Overview of RMI . . . . .	55
Developing Applications with RMI . . . . .	57
Declaring remote interfaces . . . . .	57
Implementing remote interfaces . . . . .	58
Stubs and skeletons . . . . .	60
Registering remote objects . . . . .	61
Writing RMI clients . . . . .	63
Setting up the Flight Server example . . . . .	65

Pushing Data from the RMI Server . . . . .	68
RMI over Inter-ORB Protocol (IIOP) . . . . .	72
Summary . . . . .	73

## Part II: The Presentation Tier

75

### Chapter 5: Studying Servlet Programming . . . . . 77

Creating a Magazine Publisher Application Using Servlets . . . . .	77
The server side . . . . .	78
The client side . . . . .	79
Creating an HTML login screen . . . . .	79
Using the Servlet Context . . . . .	84
Performing URL Redirection	85
Using RequestDispatcher . . . . .	86
Using sendRedirect() . . . . .	86
The Lost Password screen example . . . . .	87
Session tracking with servlets . . . . .	88
Cookies . . . . .	88
URL rewriting . . . . .	90
Hidden fields . . . . .	90
The session-tracking API with HttpSession object . . . . .	91
Example of a LoginServlet with an access counter . . . . .	93
Listeners . . . . .	94
Filters . . . . .	97
Deploying servlets . . . . .	103
The Web-application archive . . . . .	103
Examining the web.xml Deployment Descriptor . . . . .	104
Mandatory servlet elements . . . . .	104
Servlet listener elements . . . . .	105
Servlet filter elements . . . . .	106
Applet-servlet communication . . . . .	107
What's New in the Servlet 2.4 Specification . . . . .	111
Summary . . . . .	112

### Chapter 6: Going Over JSP Basics . . . . . 113

Introducing JSP . . . . .	113
Examining MVC and JSP . . . . .	115
JSP Scripting Elements and Directives . . . . .	116
Declarations . . . . .	117
Expressions . . . . .	117
Directives . . . . .	118
Scriptlets . . . . .	119
Comments . . . . .	119
Actions . . . . .	120
Implicit JSP objects . . . . .	121

Working with Variable Scopes . . . . .	122
Error Pages . . . . .	123
Using JavaBeans . . . . .	124
Using JavaBeans in JSP . . . . .	125
The scope of JavaBeans . . . . .	127
Creating a login JSP using a JavaBean . . . . .	127
Deploying the Login JSP example using Tomcat . . . . .	129
Designing an Online Store with JSP . . . . .	130
Airline Reservations Business Case . . . . .	133
Summary . . . . .	141
<b>Chapter 7: Using JSP Tag Extensions . . . . .</b>	<b>143</b>
Why Use Tag Extensions? . . . . .	143
Explaining Custom-Tag Concepts . . . . .	144
Working with the JSP Standard Tag Library . . . . .	145
Importing a tag library . . . . .	147
The Tag Library Descriptor . . . . .	148
The tag-library-descriptor location . . . . .	151
Explaining taglib Mapping . . . . .	152
Understanding Tag Handlers . . . . .	153
Classic tag handlers . . . . .	153
Simple tag handlers . . . . .	170
Exploring Dynamic Attributes . . . . .	174
Summary . . . . .	177

## Part III: The Enterprise Information System Tier 179

<b>Chapter 8: Working with JavaMail . . . . .</b>	<b>181</b>
Exploring the “Hello World” of JavaMail . . . . .	181
Understanding the Protocols for JavaMail . . . . .	183
SMTP . . . . .	183
POP3 . . . . .	184
IMAP . . . . .	184
MIME . . . . .	185
JavaMail Components . . . . .	185
Session management . . . . .	186
Message manipulation . . . . .	190
Message content . . . . .	199
Mail storage and retrieval . . . . .	205
Transportation with javax.mail.Transport . . . . .	216
Using the JavaMail API . . . . .	218
Sending e-mail and attachments . . . . .	218
Receiving e-mail . . . . .	223
Integrating JavaMail into J2EE . . . . .	229
Summary . . . . .	230

**Chapter 9: Understanding the Java Messaging Service . . . . . 231**

Explaining Messaging . . . . .	231
Introducing JMS . . . . .	232
JMS versus RMI . . . . .	232
Message structure . . . . .	234
Examining Messaging Models . . . . .	235
Point-to-point messaging . . . . .	235
Publish-and-subscribe messaging . . . . .	236
Understanding the Major JMS Components . . . . .	236
Destinations . . . . .	237
Connections . . . . .	237
Connection factories . . . . .	237
Sessions . . . . .	238
Producers . . . . .	238
Consumers . . . . .	238
Configuring JMS . . . . .	239
Connexia Airlines Point-to-Point Messaging Business Case . . . . .	240
Magazine-Publisher Publish-Subscribe Messaging Business Case . . . . .	248
Explaining Reliable Messaging . . . . .	252
Autonomous messages . . . . .	252
Persistent messages . . . . .	252
Synchronous acknowledgments . . . . .	253
Transactions . . . . .	253
Introducing Message-Driven Enterprise JavaBeans . . . . .	254
Summary . . . . .	254

**Chapter 10: Introducing Java Transactions . . . . . 255**

What Are Atomic Transactions? . . . . .	255
Examining Transactional Objects and Participants . . . . .	257
Reviewing Atomicity and the Two-Phase Commit Protocol . . . . .	259
Optimizations . . . . .	260
Heuristics and removing the two-phase block . . . . .	261
Understanding Local and Distributed Transactions . . . . .	262
Local transactions . . . . .	262
Distributed transactions . . . . .	264
Interposition . . . . .	265
Understanding Consistency . . . . .	267
Introducing Isolation (Serializability) . . . . .	268
Optimistic versus pessimistic concurrency control . . . . .	269
Degrees of isolation . . . . .	270
Understanding the Role of Durability . . . . .	272
Performing Failure Recovery . . . . .	273
Using Transaction-Processing Monitors . . . . .	274
Transaction Models . . . . .	275
Nested transactions . . . . .	276
Nested top-level transactions . . . . .	277
Extended transaction models and the J2EE Activity Service . . . . .	278

Understanding Transaction Standards . . . . .	283
X/Open Distributed Transaction Processing . . . . .	284
The Object Transaction Service . . . . .	285
Understanding the Java Transaction API . . . . .	288
The JTA's relationship to the JTS . . . . .	289
The UserTransaction interface . . . . .	290
The TransactionManager interface . . . . .	291
Suspending and resuming a transaction . . . . .	292
The Transaction interface . . . . .	293
The XAResource interface . . . . .	294
Enrolling participants with the transaction . . . . .	295
Transaction synchronization . . . . .	296
Transaction equality . . . . .	297
The XID interface . . . . .	297
Airline Reservation Using Transactions Business Case . . . . .	297
Summary . . . . .	301
<b>Chapter 11: Examining JNDI and Directory Services . . . . .</b>	<b>303</b>
Explaining Naming Services and Directory Services . . . . .	303
Providing an Overview of X.500 and LDAP . . . . .	305
LDAP implementations . . . . .	305
Configuring OpenLDAP . . . . .	306
LDAP schema . . . . .	308
Reviewing the JNDI Structure . . . . .	309
Directories and entries . . . . .	310
Names and attributes . . . . .	310
Binding and references . . . . .	311
Contexts and subcontexts . . . . .	311
File systems . . . . .	311
DNS naming conventions . . . . .	311
LDAP mapping . . . . .	312
Using JNDI and LDAP . . . . .	312
Connecting to the server . . . . .	312
Specifying environment properties . . . . .	313
Implementing authentication . . . . .	316
Performing simple LDAP lookups . . . . .	316
Performing searches and comparing entries . . . . .	318
Modifying the directory . . . . .	322
Adding objects to a directory . . . . .	323
Connecting to DNS . . . . .	328
DNS environment properties . . . . .	330
DNS lookups . . . . .	331
Reverse DNS lookups . . . . .	332

Considering Other JNDI Service Providers . . . . .	332
File systems . . . . .	333
COS naming for CORBA . . . . .	333
Network Information System . . . . .	333
Directory Services Markup Language . . . . .	334
Application-server providers . . . . .	334
Exploring the Enterprise JavaBean Environment . . . . .	335
Airline Reservations Business Case . . . . .	337
Magazine Publisher Business Case . . . . .	342
Summary . . . . .	346
<b>Chapter 12: Understanding Java Authentication and Authorization Services . . . . .</b>	<b>347</b>
Examining the Importance of Java Security . . . . .	348
Typical Java security weaknesses . . . . .	349
Providing an overview of JAAS . . . . .	353
Understanding Security Realms . . . . .	355
Single login across security domains . . . . .	356
Setting up for JAAS . . . . .	358
Callback handlers . . . . .	358
Pluggable/stackable authentication . . . . .	360
Examining the Java Subject Class . . . . .	362
Authenticating Users . . . . .	364
Authorizing users . . . . .	368
JAAS policy files . . . . .	368
Compiling the example . . . . .	369
Debugging the Simple JAAS Module . . . . .	372
Hiding JAAS . . . . .	375
Predefined JAAS login callbacks and their handlers . . . . .	375
Custom login modules . . . . .	384
Writing your own login handler . . . . .	385
Writing your own callback handler . . . . .	394
Authenticating a Web user against a Windows NT domain . . . . .	397
Brief security analysis . . . . .	397
Security limitations . . . . .	398
Implementation . . . . .	398
Alternative methods . . . . .	403
Connexia Airlines Business Case . . . . .	404
Authenticating a Web user against a directory service . . . . .	404
Brief security analysis . . . . .	404
Security limitations . . . . .	405
Implementation . . . . .	405
Summary . . . . .	407

**Chapter 13: Exploring Java Cryptography Extensions . . . . . 409**

Grasping the Basic Terminology . . . . .	410
One-way encryption versus two-way encryption . . . . .	410
Algorithms . . . . .	412
Shared-key cryptography . . . . .	415
Public-key cryptography . . . . .	416
Digital certificates . . . . .	417
Protocols . . . . .	417
Reviewing the Java Cryptography Package . . . . .	420
Writing a Java Program Using JCE . . . . .	421
Magazine Publisher Business Case . . . . .	422
Airline Reservations Business Case . . . . .	424
Summary . . . . .	426

**Part IV: The Service Tier 427****Chapter 14: Understanding EJB Architecture and Design . . . . . 429**

Explaining the EJB Component Model . . . . .	429
Reviewing Roles, Relationships, and Responsibilities . . . . .	432
The deployment descriptor . . . . .	432
The bean provider . . . . .	433
The server/container provider . . . . .	433
The application assembler . . . . .	434
The EJB deployer . . . . .	435
The system administrator . . . . .	435
The Enterprise JavaBean . . . . .	436
Entity beans . . . . .	436
Session beans . . . . .	440
Entity beans versus session beans . . . . .	441
Message-driven beans (MDB) . . . . .	442
What does an EJB contain? . . . . .	443
Understanding EJB Container Functionality . . . . .	446
Restrictions on the bean provider . . . . .	447
Achieving scalability by pooling resources . . . . .	450
The life of an entity bean . . . . .	451
The life of a session bean . . . . .	454
Transactions and EJBs . . . . .	456
Container-managed transactions . . . . .	456
Examining a transactional EJB example . . . . .	462
Naming objects . . . . .	463
The security infrastructure . . . . .	464
The Timer service . . . . .	464
Persistence in BMP and CMP . . . . .	466
Distribution support . . . . .	466
Integrating with CORBA . . . . .	467
Why is CORBA important to J2EE? . . . . .	468
When J2EE met CORBA . . . . .	469

Performance and Scalability Issues . . . . .	472
Application-server availability strategies . . . . .	473
Transaction concerns . . . . .	475
Threading model . . . . .	476
Tools . . . . .	479
Summary . . . . .	481
<b>Chapter 15: Explaining Session Beans and Business Logic . . . . .</b>	<b>483</b>
Writing a Session EJB . . . . .	484
The home interface . . . . .	484
The component interface . . . . .	485
The session bean class . . . . .	487
The deployment descriptor . . . . .	488
The stateless session bean . . . . .	489
Connexia Airlines Business Case . . . . .	492
FlightServiceHome — The home interface . . . . .	493
FlightService — The remote interface . . . . .	493
FlightServiceBean — The bean class . . . . .	494
The ejb-jar.xml deployment descriptor . . . . .	495
Deployment . . . . .	496
Writing an EJB client . . . . .	496
Stateful-session-bean model . . . . .	499
The lifecycle of the stateful session bean . . . . .	500
Passivation and activation . . . . .	502
Implementing the Session Synchronization Interface . . . . .	503
Storing a Handle . . . . .	503
Collecting Payment Business Case . . . . .	504
WorkFlowHome — The home interface . . . . .	504
WorkFlow — The remote interface . . . . .	504
WorkFlowBean — The bean class . . . . .	505
Choosing between Stateless and Stateful Beans . . . . .	509
The stateless model . . . . .	510
The stateful model . . . . .	510
Summary . . . . .	510
<b>Chapter 16: Working with Entity Beans . . . . .</b>	<b>511</b>
Understanding Entity Beans . . . . .	511
Remote and local client views . . . . .	512
Entity-bean components . . . . .	513
The entity-container contract . . . . .	517
Container-managed persistence (CMP) . . . . .	526
Bean-managed persistence (BMP) . . . . .	552
Exceptions . . . . .	562
Summary . . . . .	563

**Chapter 17: Using Message-Driven Beans . . . . . 565**

Understanding the Need for MDB . . . . .	565
Reviewing MDB Lifecycle Methods . . . . .	569
Examining MDB Deployment Descriptors . . . . .	570
Deployment descriptors as per EJB 2.0 . . . . .	570
Changes in MDB 2.1 deployment descriptors . . . . .	572
Internal messaging within EJB applications . . . . .	573
Understanding Clients and MDB . . . . .	575
Working with EJBs Asynchronously . . . . .	576
Summary . . . . .	577

**Part V: The Data Tier 579****Chapter 18: Reviewing Java Database Connectivity . . . . . 581**

Introducing JDBC Driver Types . . . . .	582
Creating Your First JDBC Program . . . . .	583
Retrieving data . . . . .	585
Database-error processing . . . . .	587
Processing result sets . . . . .	587
The ResultSetMetaData class . . . . .	589
Scrollable result sets . . . . .	591
The PreparedStatement class . . . . .	592
The CallableStatement class . . . . .	592
Performing Batch Updates . . . . .	593
Using Savepoints . . . . .	594
Configuring the JDBC-ODBC Bridge . . . . .	594
Explaining Database Connection Pools and Data Sources . . . . .	596
Configuring connection pools . . . . .	597
Creating Data Source objects . . . . .	597
Revisiting DBProcessor . . . . .	599
Using the RowSet Interface . . . . .	601
Working with CachedRowSet . . . . .	602
The WebRowSet class . . . . .	606
Summary . . . . .	606

**Chapter 19: Understanding the J2EE Connector Architecture . . . . . 607**

Examining the Contracts . . . . .	608
The lifecycle-management contract . . . . .	610
Work management contract . . . . .	612
Outbound communication . . . . .	616
Inbound communication . . . . .	631
The Common Client Interface (CCI) . . . . .	633
Connection interfaces . . . . .	634
Interaction interfaces . . . . .	635
Data interfaces . . . . .	635

Metadata interfaces . . . . .	636
Using the CCI . . . . .	636
Packaging and Deployment . . . . .	640
Summary . . . . .	643

## Part VI: Web Services 645

### Chapter 20: Introducing Web Services . . . . . 647

Defining Web Services . . . . .	648
Universal Resource Identifiers . . . . .	648
XML-based technologies . . . . .	648
Why Do We Need Web Services? . . . . .	649
Remote Method Invocation . . . . .	649
DCOM . . . . .	650
CORBA . . . . .	650
Web-service architecture . . . . .	650
Advantages of Web services . . . . .	652
Examining Some Web-Service Scenarios . . . . .	653
Enterprise-application integration (EAI) . . . . .	654
Understanding the Technologies behind Web Services . . . . .	656
SOAP . . . . .	657
WSDL . . . . .	657
UDDI . . . . .	658
Web services in a service-oriented architecture . . . . .	659
Summary . . . . .	663

### Chapter 21: Digging Deeper into SOAP, WSDL, and UDDI . . . . . 665

Understanding the SOAP Message Architecture . . . . .	666
The header . . . . .	666
The body . . . . .	667
XML schemas and SOAP data types . . . . .	668
Arrays . . . . .	670
SOAP RPC . . . . .	672
SOAP messaging . . . . .	675
SOAP and Java . . . . .	676
Explaining WSDL . . . . .	681
SOAP binding . . . . .	686
HTTP GET and POST binding . . . . .	687
MIME binding . . . . .	688
WSDL and Java . . . . .	689
Examining UDDI . . . . .	689
UDDI versions 1, 2, and 3 . . . . .	689
Searching with UDDI . . . . .	698
Publishing with UDDI . . . . .	700
Subscribing with UDDI . . . . .	703
UDDI and Java . . . . .	704
Summary . . . . .	709

**Chapter 22: Understanding J2EE Web Services . . . . . 711**

Integrating J2EE and Web Services . . . . .	711
Using Java servlets in a Web-services architecture . . . . .	712
Exposing EJBs as Web services . . . . .	713
Using JMS as a transport layer . . . . .	714
Exploring Products and Tools for Web Services . . . . .	715
JSR 109—J2EE Web Services . . . . .	717
The client-side programming model . . . . .	719
The server-side programming model . . . . .	721
Web-service deployment descriptors . . . . .	725
Summary . . . . .	725

**Part VII: Patterns 727****Chapter 23: Reviewing Presentation-Tier Patterns . . . . . 729**

Providing an Overview of Patterns . . . . .	729
Explaining the Session Pattern . . . . .	731
Forces . . . . .	732
Implementation . . . . .	732
Strategies . . . . .	734
Results . . . . .	735
Session pattern—UML diagram and sample code . . . . .	735
Related patterns . . . . .	735
Understanding the Router Pattern . . . . .	736
Forces . . . . .	736
Implementation . . . . .	736
Strategies . . . . .	738
Results . . . . .	738
The router pattern—sample code . . . . .	738
Related patterns . . . . .	740
Reviewing the Model-View-Controller Pattern . . . . .	740
Forces . . . . .	741
Implementation . . . . .	742
Strategies . . . . .	743
Results . . . . .	743
The model-view-controller pattern—sample code . . . . .	744
Related patterns . . . . .	745
Using the Front-Controller Pattern . . . . .	746
Forces . . . . .	746
Implementation . . . . .	746
Strategies . . . . .	748
Results . . . . .	749
The front-controller pattern—sample code . . . . .	749
Related patterns . . . . .	750

Working with the View-Helper Pattern . . . . .	750
Forces . . . . .	750
Implementation . . . . .	751
Strategies . . . . .	752
Results . . . . .	753
The view-helper pattern—sample code . . . . .	753
Related patterns . . . . .	753
Using the Composite-View Pattern . . . . .	754
Forces . . . . .	754
Implementation . . . . .	754
Strategies . . . . .	756
Results . . . . .	757
The composite-view pattern—sample code . . . . .	757
Related patterns . . . . .	757
Using the Intercepting-Filter Pattern . . . . .	758
Forces . . . . .	758
Implementation . . . . .	758
Strategies . . . . .	760
Results . . . . .	760
The intercepting-filter pattern—sample code . . . . .	761
Related patterns . . . . .	761
Summary . . . . .	762
<b>Chapter 24: Working with Service-Tier Patterns . . . . .</b>	<b>763</b>
Introducing Service-Tier Patterns . . . . .	763
Using the Business-Delegate Pattern . . . . .	765
Forces . . . . .	765
Implementation . . . . .	765
Structure . . . . .	765
Strategies . . . . .	767
Results . . . . .	767
Business-delegate pattern—sample code . . . . .	768
Related patterns . . . . .	769
Understanding the Value-Object Pattern . . . . .	769
Forces . . . . .	769
Implementation . . . . .	770
Strategies . . . . .	771
Results . . . . .	772
Value-object pattern—sample code . . . . .	772
Related patterns . . . . .	773
Exploring the Session-Facade Pattern . . . . .	774
Forces . . . . .	774
Implementation . . . . .	774
Structure . . . . .	774
Strategies . . . . .	776

Results . . . . .	776
Session-facade pattern—sample code . . . . .	776
Related patterns . . . . .	777
Explaining the Composite-Entity Pattern . . . . .	777
Forces . . . . .	778
Implementation . . . . .	778
Strategies . . . . .	779
Results . . . . .	780
Composite-entity pattern—sample code . . . . .	780
Related patterns . . . . .	781
Using the Service-Locator Pattern . . . . .	781
Forces . . . . .	782
Implementation . . . . .	782
Strategies . . . . .	783
Results . . . . .	784
Service-locator pattern—sample code . . . . .	784
Related patterns . . . . .	785
Working with the Half-Object-Plus-Protocol Pattern . . . . .	785
Forces . . . . .	786
Implementation . . . . .	786
Strategies . . . . .	787
Results . . . . .	788
Half-object-plus-protocol pattern—sample code . . . . .	788
Related patterns . . . . .	788
Summary . . . . .	796
<b>Chapter 25: Using Data-Tier Patterns . . . . .</b>	<b>797</b>
Introducing the Data-Access-Object Pattern . . . . .	797
Implementation . . . . .	799
Implementing the Data-Access-Object Pattern . . . . .	801
Applying the data-access-object pattern . . . . .	803
Applying related patterns . . . . .	805
Using the Service-Activator Pattern . . . . .	805
Implementation . . . . .	806
Implementing the Service-Activator Pattern . . . . .	809
The service-activator-server strategy . . . . .	809
The EJB-server strategy . . . . .	809
The EJB-client strategy . . . . .	809
Applying the service-activator pattern . . . . .	810
Applying related patterns . . . . .	810
Examining the Transfer-Object Pattern . . . . .	811
Implementation . . . . .	812
Implementing the transfer-object pattern . . . . .	813
Applying the transfer-object pattern . . . . .	814
Applying related patterns . . . . .	815
Summary . . . . .	816

**Part VIII: Advanced Topics****817**

<b>Chapter 26: Exploring Frameworks and Application Architecture . . . . .</b>	<b>819</b>
What are Frameworks? . . . . .	820
Frameworks versus class libraries . . . . .	821
The pains of J2EE . . . . .	821
Understanding Framework Principles . . . . .	823
Inversion of control . . . . .	823
Separation of concerns . . . . .	823
Loose coupling . . . . .	824
Extensibility . . . . .	824
Configurability . . . . .	824
Alignment . . . . .	825
Design patterns . . . . .	826
Examining the Struts framework example . . . . .	827
Understanding Framework Objectives and Benefits . . . . .	835
Design . . . . .	835
Development and testing . . . . .	836
Production and maintenance . . . . .	836
Application portfolios . . . . .	837
Reviewing Application Architecture beyond Frameworks . . . . .	837
Overview of architectures . . . . .	837
Traditional application architecture . . . . .	838
Services-oriented architecture . . . . .	839
Application architecture versus frameworks . . . . .	841
Building Your Own Framework . . . . .	841
Building versus buying . . . . .	841
Open source . . . . .	842
Software vendor . . . . .	843
System Integrators (SIs) . . . . .	844
Predicting the Future of Frameworks . . . . .	845
Alternatives to Frameworks . . . . .	846
All-in-one proprietary environments . . . . .	846
Model-driven architecture . . . . .	847
Minimal J2EE . . . . .	848
Advanced Integrated Development Environments . . . . .	848
Evaluating Frameworks . . . . .	850
Requirements . . . . .	850
Cost . . . . .	850
Framework checklist . . . . .	851
Vendor questions . . . . .	853
Summary . . . . .	854

<b>Chapter 27: Using ANT to Build and Deploy Applications . . . . .</b>	<b>857</b>
Introducing ANT . . . . .	857
Getting Comfortable with ANT Vocabulary . . . . .	863
Projects . . . . .	864
Properties . . . . .	864
Targets . . . . .	865
File matching . . . . .	867
Tasks . . . . .	868
Putting It All Together . . . . .	877
Summary . . . . .	879
<b>Chapter 28: Creating High-Performance Java Applications . . . . .</b>	<b>881</b>
Understanding Different Types of Problems . . . . .	881
Functional problems . . . . .	882
Performance problems . . . . .	882
Isolating Problems . . . . .	886
Critical-path analysis . . . . .	886
Load testing . . . . .	886
Benchmarking . . . . .	887
Tunable parameters . . . . .	889
Profiling . . . . .	892
Logging . . . . .	893
Logging APIs . . . . .	894
Managing Memory-Usage Problems . . . . .	906
Loiterers . . . . .	908
Loiterer anti-patterns . . . . .	910
Summary . . . . .	914
<b>Appendix A: Airline Reservations Business Case . . . . .</b>	<b>915</b>
<b>Appendix B: Magazine Publisher Business Case . . . . .</b>	<b>923</b>
<b>Appendix C: Additional Reading and References . . . . .</b>	<b>927</b>
<b>Index . . . . .</b>	<b>935</b>