

Contents

Acknowledgments	xxiii
Introduction	xxv

Part I

J2EE Basics

1	Java 2 Enterprise Edition Overview	3
	The ABC of Programming Languages	4
	The B and C of Programming Languages	5
	Taking Programming Languages Up a Notch	7
	The Beginning of Java	8
	Java and C++	10
	Java Bytecode	11
	The Advantages of Java	12
	Applets	13
	Built for a Robust Environment	13
	Built-in Reliability	14

J2EE and J2SE	15
The Birth of J2EE	16
Databases	17
The Maturing of Java	17
Java Beans and Java Message Service	18
Why J2EE?	18
Looking Forward	21
2 J2EE Multi-Tier Architecture	23
Distributive Systems	24
Real-Time Transmission	25
Software Objects	26
Web Services	26
The Tier	27
Clients, Resources, and Components	29
Accessing Services	30
J2EE Multi-Tier Architecture	30
Client Tier Implementation	32
Classification of Clients	33
Web Tier Implementation	34
Enterprise JavaBeans Tier Implementation	35
Enterprise Information Systems Tier Implementation	36
Challenges	37
3 J2EE Best Practices	39
Enterprise Application Strategy	40
A New Strategy	41
The Enterprise Application	42
Clients	43
Client Presentation	43
Client Input Validation	45
Client Control	46
Duplicate Client Requests	48
Sessions Management	50
Client-Side Session State	50
Server-Side Session State	53
Web Tier and JavaServer Pages	54
Presentation and Processing	55
The Inclusion Strategy	56
Style Sheets	57
Simplify Error Handling	57
Enterprise JavaBeans Tier	58
Entity to Enterprise JavaBeans Relationship	59
Efficient Data Exchange	59

Enterprise JavaBeans Performance	60
Consider Purchasing Enterprise JavaBeans	60
The Model-View-Controller (MVC)	61
The Myth of Using Inheritance	62
Interfaces and Inheritance	63
Composition and Inheritance	63
Potential Problems with Inheritance	64
Maintainable Classes	65
Performance Enhancements	66
The Power of Interfaces	67
The Power of Threads	68
The Power of Notification	70
4 J2EE Design Patterns and Frameworks	73
The Pattern Concept	74
Pattern Catalog	75
Handle-Forward pattern	75
Translator Pattern	77
Distributor Pattern	79
Broadcaster Pattern	81
Zero Sum Pattern	82
Status Flag Pattern	84
Sequencer Pattern	85
Behavior Separation Pattern	87
Consolidator Pattern	89
Simplicity Pattern	91
Stealth Pattern	92

Part II

J2EE Databases

5 J2EE Database Concepts	97
Data	98
Database	98
Tables	99
Database Schema	99
Identifying Information	100
Decomposing Attributes to Data	104
Decomposing by Example	107
Defining Data	107
The Art of Choosing a Name	108
Normalizing Data	109
The Normalization Process	110
Grouping Data	110

Creating Primary Keys	111
Functional Dependency	113
Transitive Dependencies	114
Foreign Key	116
Referential Integrity	116
The Art of Indexing	116
An Index in Motion	118
Drawbacks Using an Index	119
Clustered Keys	120
Derived Keys	120
Selective Rows	121
Exact Matches and Partial Matches	121
Searching for Phonetic Matches	122
6 JDBC Objects	123
The Concept of JDBC	124
JDBC Driver Types	125
JDBC Packages	126
A Brief Overview of the JDBC Process	126
Loading the JDBC Driver	127
Connect to the DBMS	127
Create and Execute a SQL Statement	128
Process Data Returned by the DBMS	128
Terminate the Connection to the DBMS	129
Database Connection	130
The Connection	130
TimeOut	133
Associating the JDBC/ODBC Bridge with the Database	133
Connection Pool	134
Statement Objects	135
The Statement Object	135
PreparedStatement Object	138
CallableStatement	140
ResultSet	141
Reading The ResultSet	142
Scrollable ResultSet	144
Updatable ResultSet	148
Transaction Processing	151
ResultSet Holdability	156
RowSets	157
Auto-Generated Keys	157
Metadata	157
ResultSet Metadata	158

Data Types	158
Exceptions	160
Quick Reference Guide	160
7 JDBC and Embedded SQL	183
Model Programs	184
Model A Program	185
Model B Program	187
Tables	189
Creating a Table	189
Dropping a Table	191
Indexing	192
Creating an Index	192
Dropping an Index	194
Inserting Data into Tables	195
Inserting a Row	195
Inserting the System's Date into a Column	196
Inserting the System Time into a Column	196
Inserting a Timestamp into a Column	197
Selecting Data from a Table	197
Selecting All Data from a Table	198
Requesting One Column	200
Requesting Multiple Columns	200
Requesting Rows	201
Requesting Rows and Columns	201
AND, OR, and NOT Clauses	202
Joining Multiple Compound Expressions	204
Equal and Not Equal Operators	204
Less Than and Greater Than Operators	206
Less Than Equal To and Greater Than Equal To	207
BETWEEN	208
LIKE	209
IS NULL Operator	210
DISTINCT Modifier	210
IN Modifier	211
Metadata	212
Number of Columns in ResultSet	212
Data Type of a Column	213
Name of a Column	213
Column Size	214
Updating Tables	214
Updating a Row and Column	215
Updating Multiple Rows	216

Deleting Data from a Table	220
Deleting a Row from a Table	220
Joining Tables	221
Joining Two Tables	224
Parent/Child Join	225
Multiple Comparison Join	226
Multitable Join	227
Creating a Column Name Qualifier	228
Creating a Table Alias	230
Inner and Outer Joins	230
Calculating Data	234
Sum()	236
AVG()	236
MIN()	237
MAX()	237
COUNT()	238
Counting All Rows in a Table	238
Retrieving Multiple Counts	239
Calculating a Subset of Rows	239
NULLs and Duplicates	240
Calculating Without Using Built-In Functions	241
Grouping and Ordering Data	241
Group By	242
Grouping Multiple Columns	243
Conditional Grouping	244
Working with NULL Columns	245
Sorting Data	246
Sorting Using Derived Data	248
Subqueries	249
Creating a Subquery	250
Conditional Testing	251
The Existence Test	252
Membership Test	252
ANY Test	253
ALL Test	254
VIEW	255
Rules for Using VIEWS	255
Creating a VIEW	256
Selecting Columns to Appear in the VIEW	257
Creating a Horizontal VIEW	258
Creating a Multitable VIEW	258
Grouping and Sorting VIEW	259
Modifying a VIEW	259

Part III

J2EE Foundation

8	HTML, XML, and XHTML	265
	HTML	266
	Basic Concepts of HTML	267
	The Skeleton of a Web Page	268
	Creating a Form	268
	Tables	276
	XML	283
	Why Use XML?	284
	The XML Flow	284
	XML Parsers	285
	Browsers and XML	286
	The Design of an XML Document	286
	Nesting Elements	288
	Processing Instructions	289
	Attributes	290
	Create a Document Type Definition (DTD)	291
	Create an XML Schema	292
	Referencing an XML Schema	305
	Create an XSLT	305
	Planning an XML Database Program	307
	Concepts of an XML Database Program	308
	Objectives of an XML Database	309
	Types of XML Database Schemas	309
	XHTML	314
9	Java and XML	315
	Generating an XML Document	316
	Java Servlet	316
	JavaServer Pages	318
	Parsing XML	319
	Document Object Model (DOM)	320
	Simple API for XML (SAX)	327
	Quick Reference Guide	330
10	Java servlets	347
	Java servlets and Common Gateway Interface Programming	348
	Benefits of Using a Java servlet	350
	A Simple Java servlet	350
	Anatomy of a Java servlet	352
	Deployment Descriptor	353

Reading Data from a Client	354
Reading HTTP Request Headers	355
Sending Data to a Client and Writing the HTTP Response Header	359
Working with Cookies	364
Tracking Sessions	367
Quick Reference Guide	369
11 Java ServerPages	379
JSP	380
Installation	380
JSP Tags	381
Variables and Objects	382
Methods	384
Control Statements	385
Loops	387
Tomcat	389
Request String	390
Parsing Other Information	391
User Sessions	392
Cookies	392
Session Objects	394
Quick Reference Guide	396
12 Enterprise JavaBeans	405
Enterprise JavaBeans	406
The EJB Container	407
EJB Classes	407
EJB Interfaces	407
Deployment Descriptors	409
The Anatomy of a Deployment Descriptor	411
Environment Elements	417
Referencing EJB	418
Reference Other Resources	420
Sharing Resources	420
Security Elements	421
Query Element	421
Relationship Elements	423
Assembly Elements	424
Exclude List Element	431
Session Java Bean	431
Stateless vs. Stateful	432
Creating a Session Java Bean	432
Entity Java Bean	434

Container-Managed Persistence	435
Bean-Managed Persistence	439
Message-Driven Bean	440
Behind the Scenes	441
Creating an MDB	441
The JAR File	443
Quick Reference Guide	444

Part IV

J2EE Interconnectivity

13	JavaMail API	449
	JavaMail	450
	JavaMail API and Java Activation Framework	450
	Protocols	451
	Exceptions	451
	Send Email Message	452
	Retrieving Email Messages	453
	Deleting Email Messages	455
	Replying to and Forwarding an Email Message	456
	Forwarding an Email Message	458
	Sending Attachments	460
	Receiving Attachments	462
	Searching an Email Folder	463
	Quick Reference Guide	464
14	Java Interface Definition Language and CORBA	477
	The Concept of Object Request Brokerage	478
	Java IDL and CORBA	478
	The IDL Interface	479
	The Client Side	480
	The Server Side	482
	Running the Code	484
15	Java Remote Method Invocation	485
	Remote Method Invocation Concept	486
	Remote Interface	486
	Passing Objects	487
	The RMI Process	487
	Server Side	487
	Client Side	489
	Quick Reference Guide	491

16	Java Message Service	497
	Messaging Service	498
	Java Messaging Service	499
	JMS Fundamentals	499
	Flexibility	500
	Components of a JMS Program	500
	Sessions	502
	Acknowledgement Modes	502
	Message Transactions	503
	Message Producer	504
	Message Consumer	505
	Message Listener	505
	Messages	506
	Message Selector	508
	Sending Messages to a Queue	509
	Receiving Messages from a Queue	511
	Compiling and Running Queue Programs	512
	Creating a Publisher	514
	Creating a Subscriber	516
	Creating a Message Listener	518
	Compiling and Running the Publisher and Subscriber	519
	Quick Reference Guide	524
17	Security	525
	J2EE Security Concepts	526
	JVM Security	527
	Security Management	527
	Java API Security	528
	Browser Security	529
	Web Services Security	529
	Web Services Security Classifications	530
	Security Within a Web Services Tier	531
	Programmatic Security	532
18	Java Naming and Directory Interface API	553
	Naming and Directories	554
	Java Naming and Directory Interface	555
	Compile and Run the Listing	556
	Retrieving Attributes from an Object Using Directory Services	557
	Naming Operations	558
	Add Binding to a Directory Service	560
	Remove Binding to a Directory Service	561

Replace Binding to a Directory Service	562
Renaming a Name in the Directory Service	563
Quick Reference Guide	564

Part V

Web Services

19	SOAP	575
	SOAP Basics	576
	SOAP Functionality	577
	The SOAP Message and Delivery Structure	577
	Java API for XML Messaging	578
	The Connection	579
	Create, Send, and Receive a Point-to-Point SOAP Message	580
	Create and Send a SOAP Message Using a Messaging Provider ..	582
	Creating a SOAP Attachment	585
	Accessing a SOAP Attachment	585
	Quick Reference Guide	586
20	Universal Description, Discovery, and Integration (UDDI)	597
	Inside the Universal Description, Discovery, and Integration	598
	A Look at tModels	599
	UDDI Architecture	600
	UDDI Application Programming Interface	602
	Inquiry Application Programming Interface	602
	Search Qualifiers	611
	Response Messages	612
	Publishing Application Programming Interface	614
21	Electronic Business XML	625
	Electronic Data Interchange	626
	Electronic Business XML	627
	Extensible Markup Language Arrives	627
	Electronic Business XML Arrives	628
	The Technology of ebXML	629
	The Inner Workings of ebXML	631
	Message Service	631
	Business Processes	632
	CPP	634
	CPA	642
	Quick Reference Guide	644

■ ■ ■	22	The Java API for XML Registries (JAXR)	653
		Inside JAXR	654
		JAXR Client	654
		The Process	655
		Making a Query	656
		Publishing a Service to an XML Registry	660
		The connect() Method	660
		The publish() Method	661
		Removing a Published Service from an XML Registry	666
		The inquire() Method	667
		The delete() Method	668
		Quick Reference Guide	672
■ ■ ■	23	Web Services Description Language (WSDL)	683
		Inside WSDL	684
		The WSDL Document	685
		Type Element	687
		Message Element	688
		PortType Element	688
		Binding Element	689
		Port Element	690
		Service Element	690
		WSDL and SOAP	691
		SOAP One-Way Transmission Primitive	691
		SOAP Request-Response Transmission Primitive	693
		SOAP Binding Element	694
		SOAP Operation Element	695
		SOAP Body Element	695
		SOAP Fault Element	696
		SOAP Header Element	696
		SOAP Address Element	696
		WSDL and HTTP Binding	696
		WSDL and MIME Binding	699





Part VI

Appendixes

■ ■ ■	A	HTTP References	703
		HTTP Request Headers	704
		MIME Types	704
		HTTP 1.1 Status Codes	706
		HTTP 1.1 Response Headers	708
		Java Servlet Request	710

■ ■ ■	B	Cookie References	713
		Cookie Attributes	714
		Java Cookie	714
		716
■ ■ ■	C	Enterprise JavaBeans References	717
		Enterprise JavaBeans Subelements for the <ejb-jar> Element	718
		Enterprise JavaBeans Subelements for <session> and <entity> Subelements	719
		Enterprise JavaBeans Subelements for <session>, <entity> sub?- <message-driven> Elements	721
		Enterprise JavaBeans Subelements for <session>, <entity> Subelements for the <message-driven> Element Transaction	723
		Enterprise JavaBeans Session Bean	723
		Enterprise JavaBeans Entity Bean	724
		Enterprise JavaBeans Message-Driven Bean	725
		Enterprise JavaBeans Home	725
		Enterprise JavaBeans Metadata	725
■ ■ ■	D	JavaMail References	727
		JavaMail 1.3 Specifications	728
		JavaMail Multipart Data Source	729
		JavaMail Part	730
		JavaMail MIME Body Part	731
		JavaMail MIME Message	734
		JavaMail MIME Multipart	739
		JavaMail Search	739
■ ■ ■	E	Java Interface Definition Language and CORBA	743
		Mapping IDL to Java	744
■ ■ ■	F	Java Remote Method Invocation	745
		Java Remote Method Invocation Naming	746
		Java Remote Method Invocation Registry	747
		Java Remote Method Invocation Locate Registry	747
		Java Remote Method Invocation Remote Referencing	748
		Java Remote Method Invocation Client Sockets	748
		Java Remote Method Invocation Failure Handler	748
		Java Remote Method Invocation Server Sockets	749
		Java Remote Method Invocation Server References	749

	Java Remote Method Invocation Remote Object	749
	Java Remote Method Invocation Remote Server	750
	Java Remote Method Invocation Class Loader	750
	Java Remote Method Invocation Sockets	751
■ ■ ■	G Java Message Service	753
	Java Message Service Message	754
	Java Message Service Queue	756
	Java Message Service Queue Sender	757
	Java Message Service Topic Publisher	757
	Java Message Service Topic Subscriber	758
■ ■ ■	H Java Security	759
	Java Security Domain Combiner	760
	Java Security Guard	761
	Java Security Key	761
	Java Security Principal	767
	Java Security Privilege	767
	Java Security Access Control	768
	Java Security Algorithm Parameter	769
	Java Security Permissions	772
	Java Security Code Source	775
	Java Security Streams	775
	Java Security Message	776
	Java Security Domain Protection	778
	Java Security Provider	778
	Java Security Secure Class Loader	779
	Java Security Randomizer	779
	Java Security Signature	780
■ ■ ■	I Java Naming and Directory Interface	783
	Java Naming and Directory Context	784
	Java Naming and Directory Naming	786
	Java Naming and Directory Attributes	787
	Java Naming and Directory Directory Context	789
■ ■ ■	J Simple Object Access Protocol	793
	Simple Object Access Protocol Detail	794
	Simple Object Access Protocol Name	795
	Simple Object Access Protocol Node	795
	Simple Object Access Protocol Body	796
	Simple Object Access Protocol Constants	796

	Simple Object Access Protocol Element	797
	Simple Object Access Protocol Envelope	798
	Simple Object Access Protocol Fault	799
	Simple Object Access Protocol Header	800
	Simple Object Access Protocol Text	800
	Simple Object Access Protocol Attachment	801
	Simple Object Access Protocol Message	802
	Simple Object Access Protocol MIME Header	804
	Simple Object Access Protocol Connection	805
	Simple Object Access Protocol Part	805
	K Universal, Description, Discovery, Integration	807
	Universal, Description, Discovery, Integration SOAP Errors	808
	Universal, Description, Discovery, Integration Search Qualifier Values	810
	Universal, Description, Discovery, Integration Response Messages	811
	Universal, Description, Discovery, Integration Values for the completionStatus argument	813
	L Electronic Business XML	815
	Electronic Business XML Business Processes Element and UML Class Conversion Table	816
	Electronic Business XML Business Process Elements	817
	M The Java API for XML Registries	823
	Java API for XML Registries Public XML Registries	824
	Java API for XML Registries Responses	824
	Java API for XML Registries Business Life Cycle Manager	825
	Java API for XML Registries Query	828
	Java API for XML Registries Profile	831
	Java API for XML Registries Catalogue	832
	Java API for XML Registries Connection	832
	Java API for XML Registries Response	833
	Java API for XML Registries Service	833
	Index	437