

Table of Contents

Introduction	1
Who is this Book For?	2
What's Covered in this Book	2
What You Need to Use this Book	3
Conventions	4
Customer Support	4
SECTION 1 – THE E-COMMERCE LANDSCAPE	
Chapter 1: Defining E-Commerce	11
Defining E-Commerce in the Shadow of E-Business	12
Developing an E-Business Strategy	13
The Basics of E-Commerce	14
The Growth of E-Commerce	14
Which Came First – the Technology or the Uses?	15
Understanding the Audience	16
Considering the Six Webs	17
The Future of E-Commerce	18
Realization of E-Commerce	18
Business to Consumer (B2C)	18
Business to Business (B2B()	19
Business to Business to Consumer (B2B2C)	20
Consumer to Consumer and Consumer to Business to Consumer (C2C and C2B2C)	20
Mobile Commerce (M-Commerce)	21
Benefits of E-Commerce	21
B2C	22
B2B	22
B2B2C	22
C2C and C2B2C	23
M-Commerce	23
Pitfalls of E-Commerce	23
Java's role in the E-Commerce World	24
Java 2 Enterprise Edition	25
XML	26
Summary	26

Chapter 2: Requirements for E-Commerce Systems	29
The People Involved in the Process of Gathering Requirements	30
Differences Between E-Commerce Systems and Other Applications	32
For Developers	32
For Business Users	33
For Users	34
For the Requirements Gatherer	35
Business Requirements	35
Setting Goals for an E-Commerce Initiative	35
Meeting Stated Goals: The Process of Gathering Requirements	36
Important Considerations	39
Privacy and Security	39
Bridging the Gaps Between Countries	40
Payment Considerations	40
Customer Service	41
Technology Decisions	42
Scalability	42
Fault Tolerance	43
Integration	44
User Interface Design	44
Business Considerations	45
Considering the Package	45
Reporting	45
Summary	46
Chapter 3: Planning the Project	49
Understanding the Players	50
Developers	50
Other Team Members' Needs and Responsibilities	51
Project Ownership	52
Do it Yourself	52
Outsource	53
Spin Off a Separate Division or Company	54
Making the Ultimate Decision	55
Methodologies	55
Traditional Methodologies	56
Example – Waterfall	56
Example – Rational Unified Process	57
Non-Traditional Methodologies	59
Example – Extreme Programming	60
Learn from Experience	61

Creating the Plan for the Project	62
Managing Requirements	62
Using Tools	62
Hosting Options	64
Other Considerations	65
Now What? Getting Started	66
Summary	67
<hr/> SECTION 2 – ARCHITECTING JAVA BASED E-COMMERCE SYSTEMS <hr/>	
Chapter 4: Architecting E-Commerce Applications	71
Successful E-Commerce Applications	72
Flexibility	73
Multi-Channel Interfaces	74
Security	76
Integration	76
Technical Requirements and Approaches	79
Dynamic, Personalized User Interfaces	79
Channel Specific User Interfaces	80
Layered Implementation of Business Processes	80
Two-Tier Architecture	80
Multi-Tier Architecture and Layering	81
The Key Features	84
Application Integration	86
Service Level Integration	87
Facilitating Integration	87
Transactions	88
Summary of Technical Requirements	90
The Evolution of Technology Requirements	90
Web Technologies	91
Web Application Servers	91
Middleware Technologies	92
Integrated Paradigm	92
Summary	93

Chapter 5: J2EE for E-Commerce Applications	97
J2EE Architecture	99
The J2EE Runtime	100
J2EE Applications and Components	102
J2EE Services	103
J2EE Clients	104
Declarative Services	104
J2EE Components	105
Java Servlets	105
JavaServer Pages	106
Enterprise JavaBeans	107
Types of EJBs	109
J2EE Services	111
JNDI	111
JTA	112
JDBC	112
JMS	113
JavaMail	113
JAXP	114
Connector	114
JAAS	115
Declarative Services	116
J2EE Applications, Packaging, and Deployment	117
Summary	120
Chapter 6: Approaches for E-Commerce Architectures	123
Component Granularity	124
Abstraction	124
CORBA and EJB	127
The Effect of Evolution on Granularity	128
Component Interfaces	129
Client Contract	129
Knowledge of Context	130
Clients and Interfaces	130
Layers and Interfaces	130
The Façade Pattern	131
Transactions in E-Commerce Applications	134
Transaction Duration	134
Transaction Distribution	136
Modes of Connectivity	137
Scenario 1 – Availability	137
Scenario 2 – Responsiveness	139
Scenario 3 – Resource Constraints	140
Asynchronous Communication	141
Summary	143

Chapter 7: Delivering Data and Data Transformation – XML/XSLT	145
Commerce XML	146
Catalogs	147
Purchase Orders	148
Java XML APIs	151
XML Parsers	151
Processing XML Documents with SAX 2.0	151
The Role of SAX	152
SAX API and the Xerces Parser	152
Handling SAX Events	154
Echoing the Contents of an XML Document	156
Integrating SAX and JavaMail	158
Processing XML Documents with DOM	163
The Role of DOM	163
Exploring the DOM API	164
Creating a DOM Parser with Apache Xerces	164
Traversing the DOM Tree	165
Validating with DOM	168
Creating New XML Documents Using DOM	169
Java API for XML Parsing (JAXP)	178
Using SAX with JAXP	179
Using DOM with JAXP	181
Generating XML with JSP and Servlets	182
Simple JSP Example	184
Generating cXML with Servlets, JSP and JDBC	186
Transforming XML Data with XSLT	195
Running the Example	199
Summary	200
Chapter 8: Security	203
Considering Security Concepts	204
Security Attacks	204
Defending Against Attacks	206
Basic Cryptographic Concepts	208
Ciphers	209
Certificates	211
Shared Key Authentication	213
Secure Socket Layer (SSL)	214
Security in Java	215
The Sandbox	216
Core Java Security	217
The Java Cryptography Architecture (JCA) and Java Cryptography Extension (JCE)	220
Java Secure Socket Extension	221
Java Authentication and Authorization Service	224

Secure Electronic Transactions	226
More Authentication and Authorization	228
HTTP Authentication	228
Access Control Lists	228
Base64 Encoding	231
Kerberos Authentication	233
Cookies	233
Server-side Security Issues	234
Data Security	234
Database Connections	235
Security Management in Enterprise JavaBeans	235
Firewalls	246
Firewall Types	246
Summary	248

SECTION 3 – B2C E-COMMERCE SOLUTIONS

Chapter 9: B2C E-Commerce: Simple Site to Sell Goods Online	253
Requirements for an Online Store	253
The Online Shopping Experience	254
Security	254
Server Security – Firewalls	255
Data Transmission Security	256
Web Store Application Architecture	257
The Sample Store	258
Software Used	260
Implementing the Solution:	260
Setting up the Web Store	260
Setting up the Database	260
Database Access	263
Web Store Home Page	264
Creating the Catalog	269
The Shopping Cart	276
Maintaining State	277
Displaying the Cart	277
Displaying the Shipping Options	286
Displaying the Order Form	290
Member Login	293
The Login Screen	293
Displaying Customer Information	295
The Checkout	300
Confirming the Order	304
Credit Card Authorization	305
Creating and Deploying the Application	305
Testing	314
Summary	314

Chapter 10: B2C E-Commerce: Site Usability	317
Customer Friendly Sites	318
Improving Speed	318
Accessibility and Availability	318
Organization	318
Relating to the Customer	319
JSP Taglibs	319
CustomerInfoTag.java	325
Searching	328
The SearchInfo Bean	331
Providing Feedback	332
Custom Tag For Mail Message	333
Membership	337
Displaying Member Records	338
Member Modifications	347
Helping Members with Forgotten Passwords	349
New Member Registration	353
Internationalization	360
Changing the Language of our Site	361
Summary	365
Chapter 11: B2C E-Commerce: Client Issues	367
Validating User Input	368
Client-side Validation	368
Cross-browser Design	379
Validating on the Server	379
The Server-side Validation Code	382
Server-side Validation of Form Fields	385
Confirmation of Validation	391
Java Applets and Plug-ins	393
Applet Requirements	393
Using Multimedia	394
Delivering Media	394
Delivering XML	395
Summary	399

Chapter 12: B2C E-Commerce: Extending the Simple Site	401
Scalability	402
Vertical Scalability	402
Horizontal Scalability	402
Coding Implications	403
EJBs for Scalability	403
Developing a CMP Entity Bean	404
Developing a BMP Entity Bean	405
Developing a Session Bean	408
Developing JSP	412
Deploying The New Application	416
Creating a JAR for a CMP Entity Bean	416
Creating a JAR for a BMP Entity Bean	419
Creating a JAR for a Session Bean	420
Deploying the Application	420
Data Design and Access Strategies	421
Choice of Storage	421
Methods of Data Access	422
Integration with Existing Systems	423
Summary	430
Chapter 13: In the Marketplace A – B2C with WebLogic and WLCS	433
Site Requirements	434
How We Went About the Project	435
Login	437
Project Organization	438
Class Diagram	441
The EJBs	443
The Login Screen	445
Login Summary	450
Coupons	451
Implementing Coupons	453
Managing Coupons	458
Automated Sales Help	461
Basics for an Intelligent Assistant	463
Motivation for Automating Sales Help	466
Sales Scripts	467
Our Own Sales Scripts	467
What this Means for Our Application	470
Overview of CONVERSE	470
What Else Do We Need	471
Scripts	472
Parsing	475
MicroQueries	476
Areas for Improvement	477

What is in the Project Code	482
WebLogic and WLCS Versions	482
Summary	483
Chapter 14: B2C E-Commerce: Portal Sites	485
What is a Portal?	486
Context Driven Decision Making	486
What Types of Portals are There?	487
Implementations of Portals	488
Portal Categories	488
Managing Information	489
Portal Components Summarized	492
Building Your Portal	493
Build vs. Buy	493
A Simple Portal	494
Portal Storage Framework	496
JavaBeans	501
JSPs	508
Additional Features	515
Making Money with Your Portal	517
Summary	518
Chapter 15: In the Marketplace B – A Customizable Portal Architecture	521
Portal Components	522
Laying the Foundations	522
Requirements for our Portal	523
Framework Design	525
The Backend	528
Available Technologies	530
Design for our Portal	532
The Framework Object Model	533
Web Gotchas – State and Sequence	542
Dynamic HTML (DHTML)	548
Logging	550
Implementation Details	550
Development Environment	551
Framework Sample	560
J2EE Demonstration Installation Instructions	561
Sample Walkthrough	561
Post-mortem	562
What Would I Keep?	562
What Would I Change?	563
Summary	563

SECTION 4 – B2B E-COMMERCE SOLUTIONS

Chapter 16: B2B E-Commerce: B2B Foundations **565**

B2B E-commerce – An Overview	566
Why Business-to-Business Integration?	567
B2B – Problems and Challenges	568
Business Process and System Integration	570
Technologies for B2B	573
J2EE for B2B	573
XML	579
Application Transport Technologies (B2B)	584
Organizations and Standards	586
Electronic Business XML (ebXML)	586
BizTalk	587
UDDI.org	588
XML Vocabularies	588
XML Common Business Library xCBL	589
RosettaNet	590
Internet Open Trading Protocol	590
OBI	590
Future Directions	591
Summary	591

Chapter 17: B2B E-Commerce: Integrating Supply Chains **595**

What is a Supply Chain?	596
Supply Chain Requirements	596
Data Representation – Traditional Solution: EDI	597
Security Requirements	597
Transport Bindings	598
Automation and Integration of Data Exchange	598
Supply Chain Trading Partner Collaboration	598
Defining Business Processes	599
The Manufacturer-Supplier Chain Simulator	600
Partner Discovery	601
Defining XML Messages	602
J2EE as a Supporting Supply Chain Platform	604
The Web tier	605
The Client	617
Building our XML Broker Framework	620
Software Requirements	621
Deployment	621
Summary	622

Chapter 18: B2B E-Commerce: Transformation	625
XML Diversity	625
The New Tower of Babel?	627
Transformation as a Solution to Diversity	628
Where do Transformations Occur?	629
The Components of XSL Transformations (XSLT)	630
XSL	630
XPath	630
XPointer	631
XML Namespace	631
An Example Transformation	631
XSLT Processors	633
Processing XML and XSL Files – An Example	634
Implications for our Supply-Chain Integration	635
Implementation	637
Illustrations of the Mappings	639
Further Examples	642
Filtering Data	642
Merging Data	643
Writing Multiple Output Files	644
Summary	644
Chapter 19: B2B E-Commerce: Mass Integration	647
Message Oriented Middleware (MOM)	649
Java Messaging Service (JMS)	649
JMS Concepts	651
Supply Chain Integration – Enhancing the XML Broker	654
The Web Tier Controller	655
The EJB Tier	658
JMS Enhancements	665
The Enterprise Information System Tier	668
Building the Application	668
Deploying the Application	669
Emerging Technologies and Future Directions	674
The Connector Architecture	674
Overview of Java API for XML Messaging (JAXM)	675
The M Project	676
Future Directions	677
Summary	678

Chapter 20: In the Marketplace C – Supply Chain Integration	681
Components	682
Critical Success Factors	682
Compliance	682
Time to Market	683
Secure and Reliable	683
Cost Effective	684
The Solution	684
Order Collection System	685
Order Processing Module	696
Results	708
Summary	709
Chapter 21: B2B E-Commerce: Internet Application Service Providers	711
Outsourcing	712
When Does Using an ASP Make Sense?	714
ASP Architecture	715
Programming Guidelines	716
Business Architectures	717
System Redundancy	717
Building a Network System	718
Choosing an ASP	722
What is Involved in Selecting an ASP?	722
The Future of ASPs	724
Summary	724
Chapter 22: B2B E-Commerce: Inter-Company Workflow	727
Case Study: Willie’s Widget Factory	728
A Spiral Methodology for Willie	728
Inception	728
Elaboration	729
Analysis	730
Construction	730
Transition	731
Applying the Design Methodology to the Case Study	731
Inception	732
Elaboration	734
Analysis	737
Construction	738
Transition	751
Summary	753

Chapter 23: In the Marketplace D – Corporate Purchasing	755
Characteristics of Corporate Purchasing Systems	756
Corporate Purchasing as a B2C Activity	756
The Role of Workflow	757
Corporate Purchasing as a B2B Activity	758
The Headaches of Having More Than One Partner	759
Workflow	760
Case Study 1 – Wrong Number!	762
The Problem	762
Solutions	763
Design Patterns	764
Order States	767
Saving and Restoring State	771
Message Mechanisms	777
The JavaMail API	777
Using SMTP	780
What Do We Send?	783
Beyond E-mail	783
Legacy Integration	794
Case Study 2 – Scraping the Bottom of the Barrel	795
Case Study 3 – It’s the Same System Except...	798
Designing with Integration in Mind	799
Allowing Data Reading	799
Allowing Data Writing	800
Multiple System Integration	800
The Development Process	802
Case Study 4: Putting it all Together – An E-Commerce Design Approach	803
The Business Case	804
The Initial System Requirements	804
The Coarse-Grain Architecture	806
The Use of Development Partners	807
The Evolving System Prototype	807
The Development Process	808
Artifacts	809
Deriving a Model from Source Code	810
Summary	811

SECTION 5 – M-COMMERCE

Chapter 24: Technologies for M-Commerce	815
The Importance of Being Wireless	816
Revolutionizing Retailing and Service Provision	816
Revolutionizing Information Exchange	817
Revolutionizing Entertainment	818

Enabling Technologies	819
Bearer Technologies	822
GSM	822
SMS	823
GPRS	823
EDGE	824
3G Technologies	824
Wireless Application Protocol	826
The WAP Programming Model	826
Wireless Datagram Protocol	828
Wireless Transaction Protocol	828
Wireless Transport Layer Security	829
Wireless Session Protocol	829
Application Development in the WAE	829
Tools for WAE Application Development	830
Wireless Markup Language	832
It's a Game of Cards	833
Formatting Content	834
Basic Navigation	837
Tasks	839
Events	841
Global Control	844
Variables and Information Input in WML	847
WMLScript	852
Executing WMLScript	853
WMLScript Basics	853
Functions	854
Pragmas	855
Operators	856
Statements	858
Libraries	860
WMLScript Example	860
WAP: Some Pending Issues	863
Alternatives to WAP	867
Wireless Devices and Java Technology	868
Java on the Server Side	869
Java on the Client Side	871
CLDC	873
Java Language Support in CLDC	873
Pre-Verification	876
Network Support in CLDC	877
MIDP	878
The Nature of MIDlets	879
Developing MIDlets	880
MIDlet User interface	887
Networking Support in MIDP	894
Persistent Storage Support	894
Microbrowsers and MIDlets – the Future	895
Summary	895

Chapter 25: Smart Cards	897
Why Smart Cards?	898
M-Commerce	898
Barriers to Success	899
Smart Card Architecture	900
Java Card Technology	902
Java Card Virtual Machine	903
Java Card Runtime Environment (JCRC)	904
Java Card API and Language Subset	904
Programming Example	905
Setting Up	907
Designing our Java Card Applet	907
Programming our Java Card Applet	910
Summary	920

SECTION 6 – APPENDICES

Appendix A: XML Primer	925
What is XML?	926
Our First XML Document	927
Elements	927
Attributes	928
Prolog	931
Comments	931
Document Type Definition	932
XML Schemas	932
Building DTDs	933
External DTDs	940
Standardizing DTDs	941
ebXML	941
Banking Industry Languages	941
Travel	942
Summary	943

Appendix B: XSLT Primer	947
StyleSheets	948
Document Structure	949
Yet Another Language – XPath	954
Templates	954
Looping Constructs	956

Table of Contents

Retrieving Data	957
Context	958
Patterns For Matching Nodes	958
Conditional Statements	962
Sorting Our Data	963
Using the <code>xsl:variable</code> Element	964
Using Multiple StyleSheets	965
Summary	966
<hr/> Appendix C: XML and XSL Files for Chapter 7	<hr/> 969
<hr/> Appendix D: Hexadecimal Conversion Charts	<hr/> 973
<hr/> Appendix E: Extract from the Loebner Competition Transcript	<hr/> 977
<hr/> Appendix F: Package Diagrams for the B2B XML-to-Object Broker Application	<hr/> 981
package com.wrox.broker	982
package ejbeans	983
<hr/> Index	<hr/> 985