

Table of Contents

System Architecture with XML.....	1
Foreword.....	3
Preface.....	4
About This Book.....	6
Acknowledgments.....	7
Chapter 1: Scenario.....	9
Overview.....	9
1.1 Megapolis Internet.....	9
1.1.1 The Nonplanned Settlement.....	9
1.1.2 Topology—Transactional, Relational, Navigational.....	11
1.1.3 Babel.....	12
1.1.4 Subcultures and Ontologies.....	13
1.1.5 Challenges.....	15
1.2 Implications.....	17
1.2.1 The Blurring of the Classical Application.....	17
1.2.2 Collaboration Instead of Integration.....	18
1.2.3 The Return of AI.....	18
1.2.4 Soft Logic.....	18
1.3 Architectural Patterns.....	19
1.3.1 Dwellings.....	19
1.3.2 Community Infrastructure.....	24
1.4 Best Practices.....	27
Chapter 2: Groundwork.....	28
Overview.....	28
2.1 XML: A Language Factory.....	28
2.2 XML Basics.....	29
2.2.1 The Syntax.....	29
2.2.2 The XML Information Model.....	34
2.3 Schema Definition—Stage 1.....	36
2.3.1 The Document Type Definition (DTD).....	36
2.3.2 Advanced Topics.....	38
2.4 Schema Definition—Stage 2.....	39
2.4.1 DTD Deficiencies.....	39
2.4.2 XML Schema.....	40
2.5 Access and Composition.....	49
2.5.1 XPath.....	50
2.5.2 XPointer.....	53
2.5.3 XInclude.....	54
2.5.4 XML Base.....	55
2.6 Querying XML.....	55
2.6.1 Expression Types.....	56
2.6.2 Discussion.....	59
2.7 XSL (Extensible Stylesheet Language).....	59
2.8 XML APIs.....	60
2.8.1 SAX.....	60
2.8.2 DOM.....	61

Table of Contents

Chapter 2: Groundwork	
2.8.3 Binding.....	62
2.8.4 Which API?.....	62
2.9 Schema Definition—Stage 3.....	62
2.9.1 A Feather Duster for XML Schemata.....	63
2.9.2 Elements Versus Attributes.....	64
2.9.3 XML Design Patterns.....	67
2.9.4 Architectural Forms.....	69
2.10 Best practices.....	71
2.10.1 Always Use Namespaces.....	71
2.10.2 Do Not Reinvent the Wheel.....	71
2.10.3 Multipart Schemata?.....	71
2.10.4 Avoid External Entities.....	72
2.10.5 Never Change a Published Schema.....	72
2.10.6 Use Only Version–Controlled Schemata.....	72
2.10.7 Consider Equipping Each Document Element with a UUID Attribute.....	72
2.10.8 Adopt a Concise Style for Schema Design.....	72
2.10.9 Do Not Use Exotic Language Elements.....	73
2.11 XML Resources.....	74
Chapter 3: Structure	75
Overview.....	75
3.1 The Evolution of Data Models.....	75
3.1.1 CODASYL.....	76
3.1.2 Hierarchical Databases.....	78
3.1.3 Relational Databases.....	78
3.1.4 Navigational Architectures.....	82
3.2 Conceptual Modeling.....	86
3.2.1 The Entity Relationship Model.....	86
3.2.2 Asset–Oriented Modeling (AOM).....	93
3.2.3 A Document–Centered Step–by–Step Approach.....	97
3.2.4 Smash the Enterprise Data Model?.....	111
3.2.5 Best Practices.....	112
3.3 The Resource Description Framework and Conceptual Modeling.....	113
3.3.1 RDF Basics.....	113
3.3.2 From ERM to RDF.....	117
3.3.3 Advanced Modeling Techniques.....	120
3.3.4 Reification.....	125
3.3.5 RDF Schema.....	127
3.3.6 Reasoning with RDF.....	130
3.3.7 Best Practices.....	132
3.4 A U for an X.....	132
3.4.1 XML Modeling with UML.....	132
3.4.2 XML: Exchange Format for Model Data.....	137
Chapter 4: Meaning	140
Overview.....	140
4.1 Formal Semantics.....	140
4.1.1 Formal Semantics and Constraints.....	141
4.1.2 Constraints in Schema Definitions.....	142

Table of Contents

Chapter 4: Meaning	
4.2 Ontologies.....	143
4.2.1 Ontological Depth.....	144
4.2.2 Operational Ontologies: DAML and OIL.....	148
4.2.3 Best Practices.....	151
4.3 Philosophical Excursus.....	151
4.4 Context.....	152
4.4.1 Ontologies and Contexts.....	153
4.4.2 Binding to Contexts: Schema Adjunct.....	155
Chapter 5: Modeling Processes.....	158
5.1 Concepts of Business Process Modeling.....	158
5.1.1 Overview of Process Paradigms.....	158
5.1.2 Notion of Workflows and Modeling.....	159
5.1.3 Metamodeling Aspects.....	161
5.2 Business Process Modeling and Systems Development.....	162
5.2.1 Background.....	162
5.2.2 What Is a Business Process?.....	164
5.2.3 Employing Formal Modeling.....	167
5.2.4 A Business–Centered Modeling Approach.....	173
5.2.5 Process Design and Object Orientation.....	175
5.3 Communication and Cooperation: Toward Agent–Based Systems.....	175
5.3.1 The Notion of Agent–Based Systems.....	176
5.3.2 Typology and Applications of Agents.....	177
5.3.3 Agent–Oriented Concepts.....	178
5.3.4 ADEPT.....	180
5.4 Process Concepts and XML.....	182
5.4.1 Actor–Driven Processes.....	182
5.4.2 Open Communication Processes.....	183
5.4.3 Contract–Based Interaction with tpaML.....	184
5.4.4 Self–Modifying Processes.....	185
5.4.5 The Business Process Management Initiative (BPMI).....	186
5.4.6 Business Rules.....	188
5.5 Concluding Remarks.....	192
Chapter 6: Communication.....	194
6.1 History.....	194
6.2 Layers of Communication.....	195
6.3 Channels and Ports.....	197
6.4 Speech Acts.....	198
6.5 Messages.....	199
6.5.1 Simple and Complex Messages.....	199
6.5.2 SOAP.....	200
6.5.3 XML Protocol (SOAP 1.2).....	203
6.6 Transactions and Protocols.....	203
6.6.1 ACID Transactions.....	203
6.6.2 Transactional Web Services.....	204
6.6.3 The Web Services Description Language (WSDL).....	204
6.7 Semantics of Communication.....	208
6.7.1 Content–Based Routing.....	208

Table of Contents

Chapter 6: Communication	
6.7.2 Ontology Mapping.....	208
6.8 Security.....	208
6.8.1 Basics.....	209
6.8.2 XML Security.....	210
6.8.3 XML Signature.....	210
6.8.4 XML Encryption.....	211
Chapter 7: Navigation and Discovery.....	213
Overview.....	213
7.1 Hypermedia.....	213
7.1.1 A Short History of Hypermedia.....	213
7.1.2 Hypermedia Navigation.....	214
7.2 topic maps.....	225
7.2.1 A GPS for the Web.....	226
7.2.2 Another Philosophical Excursus.....	235
7.2.3 Topic Maps versus RDF.....	236
7.3 Directory Services (UDDI).....	237
7.4 Peer-to-Peer Architectures.....	240
Chapter 8: Presentation Formats.....	242
Overview.....	242
8.1 Presentation and representation.....	242
8.1.1 Results from Multimedia Research.....	242
8.1.2 Dimensions of Multimedia Composition.....	244
8.1.3 The Advantage of Audiovisual Information.....	247
8.1.4 Multimedia Data Models.....	247
8.2 Viewing XML Data on the Web.....	250
8.2.1 Overview of Viewing XML Data.....	250
8.2.2 HTML.....	251
8.2.3 XHTML.....	253
8.2.4 Formatting Objects with XSL.....	256
8.3 User Interaction with XForms.....	260
8.3.1 Concepts of XForms.....	260
8.3.2 Implementations.....	262
8.4 Exchanging Information through WAP Devices.....	263
8.4.1 What Is WAP?.....	263
8.4.2 WML.....	265
8.4.3 WMLScript.....	266
8.4.4 WBXML.....	266
8.4.5 Links to WAP Tools.....	267
8.5 Graphical and Multimedia Presentation with XML.....	267
8.5.1 SMIL.....	267
8.5.2 SVG.....	271
8.5.3 VoiceXML.....	272
8.6 Document-Based Type Setting.....	275
8.6.1 PDF.....	275
8.6.2 (La)TeX.....	276

Table of Contents

Chapter 9: Transformation.....	278
Overview.....	278
9.1 Procedural Transformation.....	279
9.2 Rule-Based Transformation.....	280
9.3 What XSLT Can Do.....	282
9.3.1 Variables.....	282
9.3.2 Keys.....	283
9.3.3 Multiple Input Files.....	283
9.3.4 Various Output Methods.....	283
9.3.5 Metatransformations.....	283
9.3.6 Modules.....	284
9.4 What XSLT Can't Do.....	284
9.5 Extensions.....	285
9.6 Authoring and Testing of XSL Style Sheets.....	287
9.7 Performance Aspects.....	287
9.8 Other Languages.....	288
9.8.1 Omnimark.....	289
9.8.2 Perl.....	289
9.8.3 XDuce.....	289
9.9 Generating Web Pages.....	290
Chapter 10: Infrastructure.....	292
Overview.....	292
10.1 Business Requirements.....	292
10.2 Web Services.....	293
10.2.1 Orchestration.....	294
10.2.2 Availability.....	294
10.2.3 Collaboration Instead of Integration.....	294
10.2.4 Transactions.....	295
10.2.5 Software Engineering.....	295
10.2.6 Service Localization.....	295
10.3 ebXML.....	296
10.3.1 Basic Concepts.....	296
10.3.2 Shared Repositories.....	297
10.3.3 Contracts in ebXML.....	302
10.3.4 The ebXML Process Model.....	303
10.3.5 How Context Is Handled.....	307
10.3.6 Future.....	310
10.4 Industry Vocabularies.....	310
10.4.1 Technical Vocabularies.....	310
10.4.2 Scientific Vocabularies.....	311
10.4.3 Horizontal Industry Vocabularies.....	311
10.4.4 Vertical Industry Vocabularies.....	311
Chapter 11: Solutions.....	313
Overview.....	313
11.1 Design Tools.....	313
11.1.1 Conceptual Design.....	313
11.1.2 Process Design.....	314
11.1.3 Schema Design.....	315

Table of Contents

Chapter 11: Solutions

11.2 Database Systems.....	316
11.2.1 Mapped Systems.....	317
11.2.2 Native Systems.....	319
11.2.3 Best Practices.....	320
11.3 Middleware.....	321
11.3.1 e–speak.....	321
11.3.2 RosettaNet.....	323
11.3.3 BizTalk.....	326
11.4 Application Servers.....	331
11.5 Authoring.....	331
11.5.1 Creating and Publishing Text–Based Content.....	331
11.5.2 WML Tools for Mobile Applications.....	333
11.5.3 Multimedia.....	333
11.5.4 Converters.....	335
11.6 Content Management.....	335
Glossary.....	336
Bibliography.....	343
 List of Figures.....	 351
 List of Tables.....	 355
 List of Database Tables.....	 356