# Contents

Foreword v
Foreword vii
Preface xv

---

Chapter 1. Introduction 1
1.1 Conceptual Models 1
1.2 The World of Patterns 4
1.3 The Patterns in this Book 8
1.4 Conceptual Models and Business Process Reengineering 10
1.5 Patterns and Frameworks 11
1.6 Using the Patterns 11

References 14

---

Part 1. Analysis Patterns 15

Chapter 2. Accountability 17
2.1 Party 18
2.2 Organization Hierarchies 19
2.3 Organization Structure 21
2.4 Accountability 22
2.5 Accountability Knowledge Level 24
2.6 Party Type Generalizations 27
2.7 Hierarchic Accountability 28
2.8 Operating Scopes 30
2.9 Post 32

References 33

---

Chapter 3. Observations and Measurements 35
3.1 Quantity 36
3.2 Conversion Ratio 38
3.3 Compound Units 39
3.4 Measurement 41
3.5 Observation 42
3.6 Subtyping Observation Concepts 46
3.7 Protocol 46
3.8 Dual Time Record 47
Chapter 7. Using the Accounting Models 133
  7.1 Structural Models 134
  7.2 Implementing the Structure 137
  7.3 Setting Up New Phone Services 138
  7.4 Setting Up Calls 142
  7.5 Implementing Account-based Firing 143
  7.6 Separating Calls into Day and Evening 143
  7.7 Charging for Time 145
  7.8 Calculating the Tax 148
  7.9 Concluding Thoughts 150

References 155

Chapter 8. Planning 157
  8.1 Proposed and Implemented Action 158
  8.2 Completed and Abandoned Actions 160
  8.3 Suspension 161
  8.4 Plan 162
  8.5 Protocol 165
  8.6 Resource Allocation 168
  8.7 Outcome and Start Functions 172

References 174

Chapter 9. Trading 175
  9.1 Contract 176
  9.2 Portfolio 180
  9.3 Quote 185
  9.4 Scenario 188

References 196

Chapter 10. Derivative Contracts 197
  10.1 Forward Contracts 198
  10.2 Options 200
  10.3 Product 205
  10.4 Subtype State Machines 211
  10.5 Parallel Application and Domain Hierarchies 216

References 223
Chapter 11. Trading Packages 225
  11.1 Multiple Access Levels to a Package 226
  11.2 Mutual Visibility 230
  11.3 Subtyping Packages 233
  11.4 Concluding Thoughts 234
References 235

Part 2. Support Patterns 237

Chapter 12. Layered Architecture for Information Systems 239
  12.1 Two-Tier Architecture 240
  12.2 Three-Tier Architecture 242
  12.3 Presentation and Application Logic 245
  12.4 Database Interaction 251
  12.5 Concluding Thoughts 255
References 256

Chapter 13. Application Facades 257
  13.1 A Health Care Example 258
  13.2 Contents of a Facade 259
  13.3 Common Methods 262
  13.4 Operations 264
  13.5 Type Conversions 265
  13.6 Multiple Facades 267
References 269

Chapter 14. Patterns for Type Model
  Design Templates 271
  14.1 Implementing Associations 274
  14.2 Implementing Generalization 281
  14.3 Object Creation 289
  14.4 Object Destruction 290
  14.5 Entry Point 291
  14.6 Implementing Constraints 294
  14.7 Design Templates for Other Techniques 295
References 295
## Chapter 15. Association Patterns 297

15.1 Associative Type 298
15.2 Keyed Mapping 301
15.3 Historic Mapping 303

References 307

## Chapter 16. Afterword 309

References 310

## Part 3. Appendix 311

### Appendix A. Techniques and Notations 313

A.1 Type Diagrams 313
A.2 Interaction Diagrams 325
A.3 Event Diagrams 326
A.4 State Diagrams 327
A.5 Package Diagrams 328

References 330

### Appendix B. Table of Patterns 331

### Index 343