
Contents

Preface xvii

Acknowledgments xxv

CHAPTER 1 *The Project Dilemma 1*

In This Chapter 1

Goals 2

The Sad Truth 2

The Project Dilemma 3

Iterative and Incremental Software Development 4

Risk-Based Software Development 6

The Iterative Software Process Model 6

Combining Iterative with Incremental:

Multidimensional View 10

The Synergy Process 10

The Unified Process 12

Other Processes: XP 16

Selling the Idea of a Software Process to the Business 16

The Unified Modeling Language 17

The Place of UML in a Software Process 18

The Essence of Modeling 19

The UML Diagrams 20

Checkpoint 24

Where We've Been 24

Where We're Going Next 25

CHAPTER 2 *Java, Object-Oriented Analysis and Design, and UML* 27

In This Chapter 27

Goals 28

Java as an Industrial-Strength Development Language 28

Java and Object-Oriented Programming 28

Java and Classes 29

Java and Complex Types (Java Reference Types) 33

Java and Message Passing 34

Java and Encapsulation 35

Java and Inheritance 36

Java and Polymorphism 41

Why UML and Java 43

Class Diagram 44

Sequence Diagram 46

Component Diagram 47

Deployment Diagram 47

Visual Modeling Tool Support 47

Checkpoint 48

Where We've Been 48

Where We're Going Next 48

CHAPTER 3 *Starting the Project* 49

In This Chapter 49

Goals 50

Establishing the Project Vision 50

The Process Model 51

Working Template of the Project Vision 52

Actors 52

Event List and Event Table 56

Identifying and Categorizing Business Rules 57

Event Capture Format 57

The Project Vision 60

Checkpoint 61

Where We've Been 61

Where We're Going Next 61

CHAPTER 4 *Use-Cases* 63

In This Chapter 63

Goals 64

The Sample Project 64

The Process Model	65
Use-Cases	66
Finding the Pathways through Use-Cases	71
Use-Case Template: Section 1	71
Use-Case Template: Section 2	73
Use-Case Template: Section 3	73
Use-Case Template: Section 4	75
Finding the Happy Path	76
Finding the Alternate Pathways	77
Finding the Exception Pathways	77
Common Use-Case Pitfalls	79
Shadow Use-Cases	80
Describing Details of the Happy Path	82
The Completed <i>Process Orders</i> Use-Case Template	83
Preparing the Preliminary Architecture	87
Project Charter: Increments and Estimates	89
Increments	89
Estimates: The Issues	90
Estimates: The Process	92
Checkpoint	96
<i>Where We've Been</i>	96
<i>Where We're Going Next</i>	97

CHAPTER 5 *Classes* 99

<i>In This Chapter</i>	99
<i>Goals</i>	100
The Elaboration Phase	100
Describing Details of Pathways	101
Identifying Classes	102
Role of the UML Class Diagram	102
What Makes a Good Class?	102
Applying Filter Rules	104
Types of Classes	105
Relationships	110
Establishing Associations	111
Establishing Roles	113
Establishing Multiplicity	114
Advanced Associations	115
Generalization	119
Creating the Class Diagram	120
Identifying Attributes and Operations	122
Attributes	122
Operations	123

Interfaces	124
Object Diagrams	126
Finishing Up: The Analysis Model	128
Checkpoint	128
<i>Where We've Been</i>	128
<i>Where We're Going Next</i>	129

CHAPTER 6 *Building a User Interface Prototype* 131

<i>In This Chapter</i>	131
Goals	131
Building an Early Prototype	132
The Prototype	133
Gathering Requirements	133
User Interface Prototype	133
Actor and Use-Case Boundaries	134
User Interface Artifacts	136
Use-Case Coupling	138
The First Pass	139
Screen Structure Charts	139
Creating the Prototype	141
Windowing Components	144
Collecting User Feedback by Using Screen Dialogs	148
Learning from the Prototype	150
Checkpoint	154
<i>Where We've Been</i>	154
<i>Where We're Going Next</i>	155

CHAPTER 7 *Dynamic Elements of the Application* 157

<i>In This Chapter</i>	157
Goals	157
Next Steps of the Elaboration Phase	158
Dynamic Modeling	159
Types of Dynamic Models	160
The Sequence Diagram	162
Sequence Diagram of the Happy Path	164
Use-Case Template	165
Class Coupling and Cohesion	171
Sequence Diagram for an Alternate Pathway	174
Transferring Knowledge to the Class Diagram	175
Walking through the Sequence Diagram	175
The Collaboration Diagram	176

The State Diagram	178
Modeling the State Diagram of the Remulak Order Class	180
Alternative View of State Diagrams	182
The Activity Diagram	183
Selecting the Right Diagram	184
Non-UML Extensions in the Design: Usage Matrices	185
Event/Frequency Matrix	185
Object/Location Matrix	187
Object/Volume Matrix	189
Checkpoint	190
Where We've Been	190
Where We're Going Next	191

CHAPTER 8 *The Technology Landscape* 193

<i>In This Chapter</i>	193
Goals	193
Next Steps of the Elaboration Phase	194
Separating Services	196
Logical versus Physical Tiers	198
Tier Strategy	200
Communication among the Six Layers	201
Interprocess Communication Architecture	202
Layer Communication Architecture	202
Managing Transaction Scope	202
Enterprise JavaBeans	204
Incorporating the Internet into the Solution	206
More about the Web Interface	207
Remulak Productions' Execution Architecture	210
Checkpoint	211
Where We've Been	211
Where We're Going Next	212

CHAPTER 9 *Data Persistence: Storing the Objects* 213

<i>In This Chapter</i>	213
Goals	213
Next Steps of the Elaboration Phase	214
Object-Oriented Concepts and Translating to the Physical Design	216
Mapping Classes to Tables	216
Mapping Simple Associations	218
Mapping Inheritance to the Relational Database	222

Mapping Aggregation and Composition to the Relational Database	226
Mapping Reflexive Associations to the Relational Database	227
Key Structures and Normalization	228
Using a Visual Modeling Tool to Generate the DDL	231
Stored Procedures and Triggers and the Object-Oriented Project	237
The Data Translation Services and Data Access Services Layers	239
JavaBeans with Native JDBC Support	239
JavaBeans and Native JDBC Data Management	239
Enterprise JavaBeans and Data Management	247
Commercial Persistence Layers	254
Checkpoint	254
Where We've Been	254
Where We're Going Next	255

CHAPTER 10 *Infrastructure and Architecture Review* 257

In This Chapter	257
Goals	257
Next Steps of the Elaboration Phase	258
Infrastructure Issues and Communicating with All Layers	259
The Presentation Services Layer	259
The Business Context Services Layer	264
The Business Rule Services Layer	265
Cooperating Classes: Boundary, Control, and Entity	266
Deployment Architecture View	268
Checkpoint	269
Where We've Been	269
Where We're Going Next	270

CHAPTER 11 *Constructing a Solution: Servlets, JSP, and JavaBeans* 271

In This Chapter	271
Goals	271
Next Steps of the Elaboration Phase	272
Building the Architectural Prototype: Part 1	273
Baselining the Environment	273
Setting Up the Environment	274
Invoking Servlets	276
The Servlet for Remulak: Broker Services	278
The Servlet for Remulak: Responding to an Action Request	280
JavaServer Pages for Remulak	286

Building the Architectural Prototype: Part 2	292
Remulak Controllers and Initial Operations	292
Remulak Transaction Management: Roll Your Own	294
Remulak Controllers and Subsequent Operations	299
Building the Architectural Prototype: Part 3	302
Entity Beans	302
Data Access Objects	308
Front to Back in One Package	315
Checkpoint	315
Where We've Been	315
Where We're Going Next	316

CHAPTER 12 *Constructing a Solution: Servlets, JSP, and Enterprise JavaBeans* 317

<i>In This Chapter</i>	317
Goals	318
Next Steps of the Elaboration Phase	318
Building the Architectural Prototype: Part 1	319
Baselining the Environment	319
Visual Modeling: Its Mission for the Project	320
Visual Modeling: Its Mission for Program Code Generation	321
Reviewing the Setup Issues	321
Modifying the Code Generation Parameters	322
A Final Pass at Attributes and Operations	324
Converting Classes to Enterprise JavaBeans	325
Generating Code	328
Building the Architectural Prototype: Part 2	332
A Primer on Enterprise JavaBeans	332
EJB Callback Mechanism	333
Working with an EJB	335
EJB Sequence Diagrams	335
EJB Transaction Management	335
Building the Architectural Prototype: Part 3	341
Adding Logic to the Generated Code	341
A Bit of Magic in Those Tags	345
Compiling the EJB Code	346
Building a Simple Client to Test the Beans	347
Enhancing the CMP Implementation	352
Adding More Use-Case Pathways	352
Changes to the JSPs	353
Adding an Address JSP	362

- Changes to the Servlet 365
- Changes to the Use-Case Controller 368
- Creating a BMP Implementation 372
- A Road Most Traveled 377
 - The Technology Decision 377
 - The Process of Getting There 378
- Checkpoint 378
 - Where We've Been 378

APPENDIX A *The Unified Process Project Plans* 381

- In This Appendix* 381
- The Plans 382

APPENDIX B *The Synergy Process Project Plan* 401

- In This Appendix* 401
- The Plan 402

APPENDIX C *Estimating Projects on the Basis of Use-Cases* 409

- In This Appendix* 409
- Weighting Actors 410
- Weighting Use-Cases 411
- Weighting Technical Factors 413
- Weighting Project Participants 414
- Use-Case Points 416
- The Project Estimate 416

APPENDIX D *Sample Project Output* 417

- In This Appendix* 417
- Use-Case Definitions 417
 - The Process Orders Use-Case 418
 - The Maintain Orders Use-Case 419
 - The Maintain Inventory Use-Case 420
 - The Shipping Use-Case 421
 - The Invoicing Use-Case 422
 - The Maintain Relationships Use-Case 423
 - The Decision Support Use-Case 424
- Happy Path Task Steps 425
 - The Process Orders Happy Path 425
 - The Maintain Orders Happy Path 425

The <i>Maintain Inventory</i> Happy Path	426
The <i>Shipping</i> Happy Path	426
The <i>Invoicing</i> Happy Path	427
The <i>Maintain Relationships</i> Happy Path	427
The <i>Decision Support</i> Happy Path	427
Database Support	427
Microsoft SQL Server 7.0	428
DDL for Oracle (Version 8.1.0)	433

APPENDIX E *BEA WebLogic Application Server* 439

In This Appendix 439

Bibliography 443

Index 447