



List of Figures	vii
List of Tables	ix
Acknowledgements	xi
CHAPTER 1: Introduction	1
Intended Audience	1
Scope	1
Organization of This Book	3
How to Use This Book	7
Terminology	8
Stylistic Conventions	9
And After Reading This Book?	10
Feedback	10
About the Author	10
CHAPTER 2: UML Modeling for Business Analysis	11
UML History	12
UML Diagram Categories	12
CHAPTER 3: General UML Diagram Guidelines	15
Guidelines	15
Diagram Notation	16
Diagram Tips	18
How-to-Model Tips	19
Naming Guidelines	20
CHAPTER 4: Example Model Introduction	21
Somestate Department of Motor Vehicles Glossary	21
Somestate Department of Motor Vehicles Business Rules	22
CHAPTER 5: Use Case Models	23
Purpose	23
Guidelines	24
Diagram Notation	25
Diagram Examples	30
Diagram Tips	33
Use Case Template	34
Use Case Text Example	37
Use Case Text Formats	40
How-to-Model Tips	42

ii UML Requirements Modeling

Naming Guidelines	48
Modeling Process Summary	50
Case Study Example Diagram	53
Relationship to Other UML Diagrams	54
CHAPTER 6: Activity Diagrams	55
Purpose	55
Guidelines	55
Diagram Notation	56
Diagram Examples	65
Diagram Tips	71
How-to-Model Tips	74
Naming Guidelines	74
Modeling Process Summary	75
Case Study Example Diagram	76
Relationship to Other UML Diagrams	78
CHAPTER 7: Interaction Overview Diagrams	79
Purpose	79
Guidelines	79
Diagram Notation	80
Diagram Example	86
Diagram Tips	88
How-to-Model Tips	88
Naming Guidelines	89
Modeling Process Summary	89
Case Study Example Diagram	90
Relationship to Other UML Diagrams	91
CHAPTER 8: Class Models	93
Purpose	94
Guidelines	95
Diagram Notation	95
Diagram Examples	100
Diagram Tips	102
Data Element List, Partial Example	105
Class Model, Partial Text Example	105
How-to-Model Tips	107
Naming Guidelines	111
Modeling Process Summary	112
Case Study Example Diagram	114
Relationship to Other UML Diagrams	115

CHAPTER 9: Object Diagrams	117
Purpose	117
Guidelines	117
Diagram Notation	118
Diagram Example	119
Diagram Tips	120
How-to-Model Tips	121
Naming Guidelines	121
Modeling Process Summary	121
Case Study Example Diagram	123
Relationship to Other UML Diagrams	124
CHAPTER 10: State Machine Models	125
Purpose	125
Guidelines	125
Diagram Notation	126
Diagram Examples	130
Diagram Tips	133
State Machine Table Example	134
How-to-Model Tips	134
Naming Guidelines	135
Modeling Process Summary	136
Case Study Example Diagram	137
Relationship to Other UML Diagrams	138
CHAPTER 11: Timing Diagrams	139
Purpose	139
Guidelines	139
Diagram Notation	139
Diagram Examples	143
Diagram Tips	145
How-to-Model Tips	146
Naming Guidelines	146
Modeling Process Summary	146
Case Study Example Diagram	147
Relationship to Other UML Diagrams	148
CHAPTER 12: Sequence Diagrams	149
Purpose	149
Guidelines	149
Diagram Notation	150
Diagram Examples	155
Diagram Tips	156

iv UML Requirements Modeling

How-to-Model Tips _____	157
Naming Guidelines _____	157
Modeling Process Summary _____	158
Case Study Example Diagram _____	159
Relationship to Other UML Diagrams _____	159
CHAPTER 13: Communication Diagrams _____	161
Purpose _____	161
Guidelines _____	161
Diagram Notation _____	162
Diagram Example _____	163
Diagram Tips _____	164
How-to-Model Tips _____	165
Naming Guidelines _____	165
Modeling Process Summary _____	166
Case Study Example Diagram _____	167
Relationship to Other UML Diagrams _____	167
CHAPTER 14: Composite Structure Diagrams _____	169
Purpose _____	169
Guidelines _____	169
Diagram Notation _____	169
Diagram Example _____	171
How-to-Model Tips _____	172
Naming Guidelines _____	172
Modeling Process Summary _____	173
Case Study Example Diagram _____	173
Relationship to Other UML Diagrams _____	174
CHAPTER 15: Component Diagrams _____	175
Purpose _____	175
Guidelines _____	175
Diagram Notation _____	175
Diagram Example _____	177
Diagram Tips _____	177
How-to-Model Tips _____	178
Naming Guidelines _____	178
Modeling Process Summary _____	178
Case Study Example Diagram _____	178
Relationship to Other UML Diagrams _____	179

CHAPTER 16: Deployment Diagrams	181
Purpose	181
Guidelines	181
Diagram Notation	181
Diagram Example	183
Diagram Tips	183
How-to-Model Tips	184
Naming Guidelines	184
Modeling Process Summary	185
Case Study Example Diagram	185
Relationship to Other UML Diagrams	186
CHAPTER 17: Package Diagrams	187
Purpose	187
Guidelines	187
Diagram Notation	187
Diagram Examples	188
Diagram Tips	191
How-to-Model Tips	191
Naming Guidelines	191
Modeling Process Summary	192
Case Study Example Diagram	192
Relationship to Other UML Diagrams	192
CHAPTER 18: Context Diagrams Using Communication Diagram Notation	193
Purpose	193
Guidelines	193
Diagram Notation	194
Diagram Example	195
Diagram Tips	196
How-to-Model Tips	197
Naming Guidelines	197
Modeling Process Summary	198
Case Study Example Diagram	199
Relationship to UML Diagrams	200
CHAPTER 19: Data Models Using Class Diagram Notation	201
Purpose	201
Guidelines	202
Diagram Notation	203
Diagram Example	206
Diagram Tips	206
How-to-Model Tips	207

Vi UML Requirements Modeling

Naming Guidelines _____	209
Modeling Process Summary _____	209
Case Study Example Diagram _____	210
Relationship to UML Diagrams _____	212
CHAPTER 20: Which Diagrams Do I Create and When? _____	213
CHAPTER 21: Case Study _____	217
Case Study Overview _____	217
Case Study Modeling Process _____	217
APPENDIX A: Glossary _____	231
APPENDIX B: Grammar Summary for Modelers _____	239
APPENDIX C: Analysis Datatypes _____	243
How-to-Model Tips _____	245
Naming Guidelines _____	245
Notes _____	245
Relationship to Other UML Diagrams _____	245
APPENDIX D: References _____	247
Index _____	249



Figure 2-1 UML diagram categories, UML Class diagram.....	13
Figure 2-2 UML structural diagrams, UML Class diagram.....	13
Figure 2-3 UML behavior diagrams, UML Class diagram	14
Figure 3-1 UML Note example	19
Figure 5-1 vehicle registration, UML Use Case diagram: system use case.....	31
Figure 5-2 Somestate Dept of Motor Vehicles System, UML Use Case diagram: business use case.....	32
Figure 5-3 messaging component, UML Use Case diagram: component use case	33
Figure 5-4 case study, UML Use Case diagram, Somecity Train System: system use case.....	54
Figure 6-1 renew vehicle registration, UML Activity diagram, overview level.....	66
Figure 6-2 renew vehicle registration, UML Activity diagram, main success scenario	67
Figure 6-3 typical workday, UML Activity diagram, containing activity.....	68
Figure 6-4 prepare for work, UML Activity diagram, actions within an activity.....	69
Figure 6-5 book editing, UML Activity diagram fragment, expansion region.....	70
Figure 6-6 prepare carrot cake, UML Activity diagram fragment, flow final node.....	70
Figure 6-7 merge node usage, UML Activity diagram fragment, incorrect usage of Action.....	72
Figure 6-8 merge node usage, UML Activity diagram fragment, correct usage of Merge and Action	73
Figure 6-9 case study, UML Activity diagram, purchase train pass	77
Figure 7-1 renew vehicle registration, UML Interaction Overview diagram	87
Figure 7-2 case study, UML Interaction Overview diagram, purchase train pass details.....	90
Figure 8-1 vehicle registration, UML Class diagram	101
Figure 8-2 arguments, UML Class diagram fragment, software implementation perspective ...	102
Figure 8-3 motor vehicle, UML Class diagram fragment, attribute plural form.....	103
Figure 8-4 motor vehicle, UML Class diagram fragment, attribute multiplicity specification ...	104
Figure 8-5 motor vehicle, UML Class diagram fragment, type code	109
Figure 8-6 motor vehicle, UML Class diagram fragment, generalization relationship.....	110
Figure 8-7 motor vehicle, UML Class diagram fragment, category class.....	111
Figure 8-8 case study, UML Class diagram, Somecity Train System	115
Figure 9-1 vehicle registration, UML Object diagram.....	120
Figure 9-2 case study, UML Object diagram, train run.....	123
Figure 10-1 vehicle registration, UML State Machine diagram.....	130
Figure 10-2 pedestrian light, UML State Machine diagram, superstate and substates	131
Figure 10-3 person, UML State Machine diagram, superstate with independent regions	132
Figure 10-4 case study, UML State Machine diagram, train operational status	137
Figure 11-1 pedestrian light, UML Timing diagram, state or condition timeline format	144
Figure 11-2 traffic light, UML Timing diagram, value lifeline format.....	144

Viii UML Requirements Modeling

Figure 11-3 traffic light and pedestrian light, UML Timing diagram, state or condition timeline format.....	145
Figure 11-4 case study, UML Timing diagram, train movement and door operation status, state or condition timeline format.....	148
Figure 12-1 issue vehicle registration, UML Sequence diagram, main success scenario.....	155
Figure 12-2 payment processing, UML Sequence diagram fragment, illustrating choice.....	156
Figure 12-3 case study, UML Sequence diagram, purchase train pass, main success scenario..	159
Figure 13-1 issue vehicle registration, UML Communication diagram.....	164
Figure 13-2 case study, UML Communication diagram, purchase train pass, main success scenario	167
Figure 14-1 data interface processing collaboration, UML Composite Structure diagram	172
Figure 14-2 case study, UML Composite Structure diagram, messaging component	174
Figure 15-1 messaging subsystem components, UML Component diagram	177
Figure 15-2 case study, UML Component diagram, messaging subsystem components.....	179
Figure 16-1 Somestate Dept of Motor Vehicles System, UML Deployment diagram.....	184
Figure 16-2 case study, UML Deployment diagram, Somecity Train System	185
Figure 17-1 Somestate Dept of Motor Vehicles System, UML Package diagram, not including package contents	189
Figure 17-2 Somestate Dept of Motor Vehicles System, UML Package diagram, including package contents	190
Figure 17-3 case study, UML Package diagram, Somecity Train System	192
Figure 18-1 vehicle registration, Context diagram	196
Figure 18-2 case study, Context diagram, Somecity Train System	199
Figure 19-1 vehicle registration, Data Model diagram	207
Figure 19-2 case study, Data Model diagram, Somecity Train System	211
Figure 20-1 modeling process, UML Activity diagram, overview	214
Figure 20-2 modeling process, UML Activity diagram, create overview diagrams	215
Figure 20-3 modeling process, UML Activity diagram, create detail diagrams	216
Figure 21-1 case study, UML Context diagram, Somecity Train System.....	218
Figure 21-2 case study, UML Use Case diagram, Somecity Train System: system use case	219
Figure 21-3 case study, UML Activity diagram, take trip overview	221
Figure 21-4 case study, UML Activity diagram, purchase train pass details.....	222
Figure 21-5 case study, UML Interaction Overview diagram, purchase train pass overview.....	223
Figure 21-6 case study, UML State Machine diagram, train operational status	224
Figure 21-7 case study, UML Timing diagram, train movement and door operation status	225
Figure 21-8 case study, UML Class diagram, Somecity Train System.....	226
Figure 21-9 case study, UML Object diagram, train run.....	228
Figure 21-10 case study, UML Sequence diagram, purchase train pass: main success scenario	229
Figure 21-11 case study, UML Package diagram, Somecity Train System	229



Table 3-1 UML Frame Kinds	17
Table 5-1 Use Case Diagram Notation.....	26
Table 6-1 Activity Diagram Notation	56
Table 7-1 Interaction Overview Diagram Notation.....	80
Table 8-1 Class Diagram Notation.....	96
Table 8-2 Data Element List, Somestate Dept of Motor Vehicles, partial text example	105
Table 8-3 Class Model Data Definitions, vehicle registration, partial text example	106
Table 9-1 Object Diagram Notation.....	118
Table 10-1 State Machine Diagram Notation	126
Table 10-2 State Machine table, vehicle registration	134
Table 11-1 Timing Diagram Notation.....	140
Table 12-1 Sequence Diagram Notation	150
Table 13-1 Communication Diagram Notation.....	162
Table 14-1 Composite Structure Diagram Notation.....	170
Table 15-1 Component Diagram Notation	176
Table 16-1 Deployment Diagram Notation	182
Table 17-1 Package Diagram Notation	188
Table 18-1 Context Diagram Notation.....	194
Table 19-1 Data Model Diagram Notation.....	204
Table 21-1 Data Element List, Case Study, partial text example.....	225
Table 21-2 Class Model Data Definitions, Case Study, partial text example	227
Table A-1 UML Keywords Used in Business Analysis	234
Table C-1 Analysis Datatypes	243