

Table of Content

Table of Content	i
Copyright.....	v
Dedication	vi
Foreword.....	vi
References.....	viii
Preface.....	viii
Goals.....	viii
Audience.....	viii
Organization	ix
More Information	ix
Acknowledgments.....	x
Part I: Design Pattern Basics.....	1
Chapter 1. Introduction.....	2
1.1 Basic Modeling Concepts of the UML.....	2
1.2 Models.....	3
1.3 Structural Elements and Diagrams.....	4
1.4 Behavioral Elements and Diagrams.....	21
1.5 Use Case and Requirements Models	32
1.6 What Is a Design Pattern?	34
References.....	36
Chapter 2. Architecture and the UML.....	37
2.1 Architecture	37
2.2 Logical and Physical Architecture.....	38
2.3 The Five Views of Architecture.....	45
2.4 Implementing Architectures	57
References.....	63
Chapter 3. The Role of Design Patterns.....	65
3.1 Introduction.....	65
3.2 The ROPES Development Process.....	65
3.3 Design Pattern Basics	85
3.4 Using Design Patterns in Development.....	89
References.....	92
Part II: Architectural Design Patterns	93
References.....	94
Chapter 4. Subsystem and Component Architecture Patterns	95
4.1 Layered Pattern	95
4.2 Five-Layer Architecture Pattern	99
4.3 Microkernel Architecture Pattern.....	102
4.4 Channel Architecture Pattern	106
4.5 Recursive Containment Pattern	110
4.6 Hierarchical Control Pattern.....	115
4.7 Virtual Machine Pattern	118
4.8 Component-Based Architecture	124
4.9 ROOM Pattern	130
References.....	136
Chapter 5. Concurrency Patterns	137
5.1 Introduction.....	137
5.2 Concurrency Pattern	137
5.3 Message Queuing Pattern	139
5.4 Interrupt Pattern.....	143
5.5 Guarded Call Pattern	148
5.6 Rendezvous Pattern	153

5.7 Cyclic Executive Pattern.....	156
5.8 Round Robin Pattern	159
5.9 Static Priority Pattern	163
5.10 Dynamic Priority Pattern	170
References.....	174
Chapter 6. Memory Patterns.....	176
6.1 Memory Management Patterns.....	176
6.2 Static Allocation Pattern	176
6.3 Pool Allocation Pattern	180
6.4 Fixed Sized Buffer Pattern	185
6.5 Smart Pointer Pattern	189
6.6 Garbage Collection Pattern.....	194
6.7 Garbage Compactor Pattern.....	199
References.....	204
Chapter 7. Resource Patterns.....	205
7.1 Introduction.....	205
7.2 Critical Section Pattern	210
7.3 Priority Inheritance Pattern	214
7.4 Highest Locker Pattern	220
7.5 Priority Ceiling Pattern	225
7.6 Simultaneous Locking Pattern.....	231
7.7 Ordered Locking Pattern	236
References.....	241
Chapter 8. Distribution Patterns.....	242
8.1 Introduction.....	242
8.2 Shared Memory Pattern	243
8.3 Remote Method Call Pattern	248
8.4 Observer Pattern	253
8.5 Data Bus Pattern	258
8.6 Proxy Pattern	267
8.7 Broker Pattern	274
References.....	279
Chapter 9. Safety and Reliability Patterns.....	281
9.1 Introduction.....	281
9.2 Protected Single Channel Pattern	283
9.3 Homogeneous Redundancy Pattern	287
9.4 Triple Modular Redundancy Pattern.....	291
9.5 Heterogeneous Redundancy Pattern.....	295
9.6 Monitor-Actuator Pattern	299
9.7 Sanity Check Pattern	303
9.8 Watchdog Pattern.....	306
9.9 Safety Executive Pattern.....	311
References.....	315
Appendix A. Notational Summary.....	317
Class Diagram	317
Collaboration Diagram.....	321
Sequence Diagram	322
Use Cases.....	323
Implementation Diagrams.....	324
Package diagram	325
Statechart	326
Activity Diagrams	330
Appendix B. Pattern Index	332