## | Contents

1 Introduction	
1.1 Starting Position and Aims of the Book	
1.2 What is Software Architecture?	
1.3 Reader Guide	10
1.3.1 Book Structure	
1.3.2 Target Audience	
1.3.3 Chapter Overview	
1.3.4 Chapters in Detail	
1.4 Summary	
Further Reading	
2   Architecture Orientation Framework	2:
2.1 Motivation	
2.2 Overview of the Framework	26
2.3 Architectures and Architecture Disciplines (WHAT)	
2.4 Architecture Perspectives (WHERE)	
2.5 Architecture Requirements (WHY)	
2.6 Architecture Means (WITH WHAT)	32
2.7 Organizations and Individuals (WHO)	
2.8 Architecture Method (HOW)	
2.9 Summary	36
Further Reading	
<b>3</b> ···	
3   Architectures and Architecture Disciplines (WHAT)	39
3.1 Classic Architecture as Starting Point	
3.2 From Classic Architecture to Software Architecture	4:
3.3 Architecture and the System Concept	
3.4 Architecture and the Building Blocks of a System	57
3.5 Summary	6:
Further Reading	6:
Tuttler reduing	
4   Architecture Perspectives (WHERE)	6
4.1 Architecture Levels	66
4.1.1 Organizational Level	72
4.1.2 System Level	
4.1.3 Building Block Level	
4.2 Architecture Views	
4.2.1 Zachman Framework	80
4.2.2 Reference Model for Open Distributed Processing .	88
4.2.3 4+1 View Model	
4.2.4 The Open Group Architecture Framework	9
4.3 Summary	9:
Further Reading	

5 Architecture Requirements (WHY)	97
5.1 Requirements Characteristics and Types	98
5.2 Organizational Requirements	104
5.3 System Requirements	105
5.4 Building Block Requirements	106
5.5 Qualities and Constraints	107
5.6 Requirements in the Context of Architecture	110
5.7 Summary	
Further Reading	114
6   Architecture Means (WITH WHAT)	115
6.1 Architecture Principles	118
6.1.1 Principle of Loose Coupling	
6.1.2 Principle of High Cohesion	123
6.1.3 Principle of Design for Change	
6.1.4 Separation of Concerns Principle	
6.1.5 Information Hiding Principle	129
6.1.6 Abstraction Principles	131
6.1.7 Modularity Principle	
6.1.8 Principle of Traceability	136
6.1.9 Self-Documentation Principle	137
6.1.10 Incrementality Principle	137
6.1.11 Further Architecture Principles	138
Summary	139
6.2 Basic Architecture Concepts	140
6.2.1 Procedural Approaches	141
6.2.2 Object Orientation	143
6.2.3 Component Orientation	148
6.2.4 Metaprogramming	
6.2.5 Generative Creation of System Building Block	ks152
6.2.6 Model-Driven Software Development	156
6.2.7 Aspect Orientation	163
6.2.8 Scripting Languages and Dynamic Language	
6.2.8 Summary	170
6.3 Architecture Tactics, Styles, and Patterns	
6.3.1 Requirement Patterns	172
6.3.2 Architecture Tactics	174
6.3.3 Architecture Styles	
6.3.4 Architecture Patterns	
6.3.5 Pattern Languages	186
6.3.6 Summary	190
6.4 Basic Architectures	190
6.4.1 Layered Architectures	
6.4.2 Dataflow Architectures	
6.4.3 Repositories	194
6.4.4 Client/Server Architecture	
6.4.5 n-Tier Architecture	
6.4.6 Rich Client versus Thin Client	198

XIV Contents

6.4.7 Peer-To-Peer Architecture	
6.4.8 Publish/Subscribe Architecture	200
6.4.9 Middleware	200
6.4.10 Component Platforms	
6.4.11 Service-Oriented Architectures	
6.4.12 Security Architectures	
6.4.13 Cloud Computing Architectures	220
6.4.14 Summary	
6.5 Reference Architectures	
6.5.1 Definition and Elements	
6.5.2 Use and Advantages of Reference Architectures	
6.5.3 Requirements Placed on Reference Architectures	
6.5.4 Types of Reference Architectures	
6.5.5 Example of a Reference Architecture	
6.5.6 Summary	
6.6 Architecture Modeling Means	240
6.6.1 Basic Concepts of Modeling	
6.6.2 Unified Modeling Language	
6.6.3 Domain-Specific Languages	
6.6.4 Architecture Description Languages	
6.6.5 Unified Method Architecture	
6.6.6 Summary	263
6.7 Architecturally Relevant Technologies	264
6.7.1 Middleware Systems	
6.7.2 Databases and Persistence of Business Objects	
6.7.3 XML and Other X Standards	272
6.7.4 Dynamic Web Pages and Web Application Servers	
6.7.5 Component Platforms	
6.7.6 Web Services	
6.7.7 Summary	
Further Reading	280
Further Reading: 6.1 Architecture Principles	
Further Reading: 6.2 Basic Architecture Concepts	282
Further Reading: 6.3 Architecture Tactics, Styles, and Patterns	282
Further Reading: 6.4 Basic Architectures	283
Further Reading: 6.5 Reference Architectures	285
Further Reading: 6.6 Architecture Modeling Means	
Further Reading: 6.7 Architecturally Relevant Technologies	
, ,	
7   Organizations and Individuals (WHO)	297
7.1 General	200
7.1 General	
7.3 Individuals	295
7.4 Individuals and Groups	
7.5 Architect as Central Role	
7.6 Summary	
Further Reading	308

| Contents

8	Architecture Method (HOW)	311
_	8.1 Architecture and Development Processes	
	8.2 Overview of the Architecture Method	
	8.3 Creating the System Vision	
	8.4 Understanding the Requirements	
	8.5 Designing the Architecture	
	8.6 Implementing the Architecture	
	8.7 Communicating the Architecture	
	8.8 Maintaining the Architecture	
	8.9 Summary	
	Further Reading	
i	Summarizing Figures	405
I	Glossary	409
	List of Abbreviations	433
l	Bibliography	439
I	Index	463