

Jose Luiz Fiadeiro

Categories for Software Engineering

4y Springer

Contents

1	Introduction.....	1
1.1	The Social Life of Objects.....	1
1.2	Categories Versus Sets.....	3
1.3	Overview of Typical Application Areas.....	5
1.4	What Can Be Found in This Book.....	9

Part I Basics

2	Introducing Categories.....	15
2.1	Graphs.....	15
2.2	Categories.....	20
2.3	Distinguished Kinds of Morphisms.....	27
3	Building Categories.....	31
3.1	Some Elementary Operations.....	31
3.2	"Adding Structure".....	33
3.3	Subcategories.....	37
3.4	Eiffel Class Specifications.....	43
3.5	Temporal Specifications.....	46
3.6	Closure Systems.....	53
4	Universal Constructions.....	57
4.1	Initial and Terminal Objects.....	58
4.2	Sums and Products.....	61
4.3	Pushouts and Pullbacks.....	67
4.4	Limits and Colimits.....	75
5	Functors.....	83
5.1	The Social Life of Categories.....	83
5.2	Universal Constructions Versus Functors.....	89

Part II Advanced Topics

6	Functor-Based Constructions.....	95
6.1	Functor-Distinguished Kinds of Categories.....	95
6.2	Structured Objects and Morphisms.....	110
6.3	Functor-Structured Categories.....	117
6.4	The Grothendieck Construction.....	124
6.5	Institutions.....	128
7	Adjunctions.....	141
7.1	The Social Life of Functors.....	141
7.2	Reflective Functors.....	145
7.3	Adjunctions.....	151
7.4	Adjunctions in Institutions.....	160
7.5	Coordinated Categories.....	167

Part III Applications

8	Community.....	177
8.1	A Language for Program Design.....	177
8.2	Interconnecting Designs.....	182
8.3	Refining Designs.....	191
9	Architectural Description.....	197
9.1	Motivation.....	197
9.2	Connectors in Community.....	199
9.3	Examples.....	204
9.4	An ADL-Independent Notion of Connector.....	211
9.5	Adding Abstraction to Connectors.....	214
10	An Algebra of Connectors.....	221
10.1	Three Operations on Connectors.....	223
10.2	Higher-Order Connectors.....	227

References.....	237
------------------------	------------

Index.....	245
-------------------	------------