
Contents

Part I Background

| | | |
|----------|------------------------------------|----|
| 1 | Introduction | 3 |
| 1.1 | CoFI | 3 |
| 1.2 | CASL | 7 |
| 2 | Underlying Concepts | 11 |
| 2.1 | Basic Specifications | 11 |
| 2.2 | Structured Specifications | 15 |
| 2.3 | Architectural Specifications | 19 |
| 2.4 | Libraries of Specifications | 20 |

Part II CASL Specifications

| | | |
|----------|--|----|
| 3 | Getting Started | 23 |
| 3.1 | Loose Specifications | 24 |
| 3.2 | Generated Specifications | 33 |
| 3.3 | Free Specifications | 36 |
| 4 | Partial Functions | 47 |
| 4.1 | Declaring Partial Functions | 47 |
| 4.2 | Specifying Domains of Definition | 50 |
| 4.3 | Partial Selectors and Constructors | 54 |
| 4.4 | Existential Equality | 55 |
| 5 | Subsorting | 57 |
| 5.1 | Subsort Declarations and Definitions | 57 |
| 5.2 | Subsorts and Overloading | 61 |
| 5.3 | Subsorts and Partiality | 62 |

| | | |
|----------|---|-----|
| 6 | Structuring Specifications | 67 |
| 6.1 | Union and Extension | 67 |
| 6.2 | Renaming | 69 |
| 6.3 | Hiding | 71 |
| 6.4 | Local Specifications | 73 |
| 6.5 | Named Specifications | 75 |
| 7 | Generic Specifications | 77 |
| 7.1 | Parameters and Instantiation | 78 |
| 7.2 | Compound Symbols | 85 |
| 7.3 | Generic Specifications with Imports | 88 |
| 7.4 | Views | 90 |
| 8 | Specifying the Architecture of Implementations | 93 |
| 8.1 | Architectural Specifications | 95 |
| 8.2 | Generic Components | 100 |
| 8.3 | Writing Meaningful Architectural Specifications | 106 |
| 9 | Libraries | 111 |
| 9.1 | Local Libraries | 112 |
| 9.2 | Distributed Libraries | 116 |
| 9.3 | Version Control | 120 |

Part III Carrying On

| | | |
|-----------|--|-----|
| 10 | Foundations | 125 |
| 11 | Tools | 131 |
| 11.1 | The Heterogeneous Tool Set (HETS) | 132 |
| 11.2 | HOL-CASL | 138 |
| 11.3 | ASF+SDF Parser and Syntax-Directed Editor | 139 |
| 11.4 | Other Tools | 140 |
| 12 | Basic Libraries | 143 |
| 12.1 | Library BASIC/NUMBERS | 144 |
| 12.2 | Library BASIC/STRUCTURED DATATYPES | 147 |
| 13 | Case Study: The Steam-Boiler Control System | 155 |
| 13.1 | Introduction | 156 |
| 13.2 | Getting Started | 157 |
| 13.3 | Carrying On | 161 |
| 13.4 | Specifying the Mode of Operation | 163 |
| 13.5 | Specifying the Detection of Equipment Failures | 167 |
| 13.6 | Predicting the Behavior of the Steam-Boiler | 176 |
| 13.7 | Specifying the Messages to Send | 182 |

13.8 The Steam-Boiler Control System Specification 183
 13.9 Validation of the CASL Requirements Specification 184
 13.10 Designing the Architecture 186

Appendices

A CASL Quick Reference 193
 A.1 Basic Specifications 194
 A.2 Structured Specifications 199
 A.3 Architectural Specifications 200
 A.4 Libraries 201

B Points to Bear in Mind 203
 B.1 Introduction 203
 B.2 Underlying Concepts 203
 B.3 Getting Started 204
 B.4 Partial Functions 205
 B.5 Subsorting 206
 B.6 Structuring Specifications 206
 B.7 Generic Specifications 207
 B.8 Specifying the Architecture of Implementations 207
 B.9 Libraries 208
 B.10 Foundations 209
 B.11 Tools 209
 B.12 Basic Libraries 210

C The Steam-Boiler Control Specification Problem 211
 C.1 Introduction 211
 C.2 Physical Environment 212
 C.3 The Overall Operation of the Program 214
 C.4 Operation Modes of the Program 214
 C.5 Messages Sent by the Program 216
 C.6 Messages Received by the Program 217
 C.7 Detection of Equipment Failures 219

References 221

List of Named Specifications 225

Index of Library and Specification Names 231

Concept Index 235



<http://www.springer.com/978-3-540-20766-5>

CASL User Manual
Introduction to Using the Common Algebraic
Specification Language
Bidoit, M.; Mosses, P.D.
2004, XIV, 246 p., Softcover
ISBN: 978-3-540-20766-5