Contents

Preface vii

1 Basic concepts 1
   1.1 Historical background 2
   1.2 What are object-oriented methods? 8
   1.3 Basic terminology and ideas 8
   1.4 Summary 27
   1.5 Bibliographical notes 28

2 The benefits of object-oriented programming and methods 31
   2.1 The benefits 31
   2.2 Some problems and pitfalls 46
   2.3 Summary 50
   2.4 Bibliographical notes 52

3 Object-oriented and object-based programming languages 53
   3.1 Object-oriented languages 53
   3.2 Functional and applicative languages 67
   3.3 AI-based systems 73
   3.4 Object libraries 78
   3.5 Selecting an object-oriented language 81
   3.6 Other developments 83
   3.7 Directions and trends 86
   3.8 Summary 89
   3.9 Bibliographical notes 90

4 Applications 93
   4.1 Windows, icons, mice and pointers 94
4.2 Hypertext, hypermedia and expertext 97
4.3 Artificial intelligence and real-time systems 101
4.4 Adding semantics to databases 115
4.5 DP and decision support 116
4.6 Other commercial systems 118
4.7 Choosing a language for an application 118
4.8 Project management issues 120
4.9 Summary 121
4.10 Bibliographical notes 122

5 Database technology 123
5.1 A potted history of data models 124
5.2 Weaknesses of early databases 126
5.3 The relational model and how it helps 129
5.4 Semantic data models and data analysis methods 142
5.5 Weaknesses in the relational model 150
5.6 Entity-relationship and deductive databases 154
5.7 Summary 159
5.8 Bibliographical notes 160

6 Object-oriented databases 163
6.1 What is an object-oriented database? 164
6.2 Survey of existing products 170
6.3 Benefits of object-oriented databases 177
6.4 Problems with object-oriented databases 181
6.5 Applications of object-oriented databases 184
6.6 Strategic considerations 186
6.7 Summary 187
6.8 Bibliographical notes 189

7 Object-oriented design and analysis 191
7.1 Programming, design or analysis? 192
7.2 Object-oriented design methods 195
7.3 Object-oriented analysis 222
7.4 Identifying objects 249
7.5 CASE tools and life-cycle models 263
7.6 Applying object-oriented analysis to business modelling — a case study 271
7.7 Summary 274
7.8 Bibliographical notes 276