ABRAMSKY, GABBAY, and MAIBAUM

Handbook of Logic in Computer Science

VOLUME 1

Handbook of Logic in Computer Science

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HANDBOOK OF LOGIC IN COMPUTER SCIENCE

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S. Abramsky, Dov M. Gabbay, and T. S. E. Maibaum

HANDBOOKS OF LOGIC IN COMPUTER SCIENCE
and
ARTIFICIAL INTELLIGENCE AND LOGIC PROGRAMMING

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Handbook of Logic in Computer Science

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Handbook of Logic in Artificial Intelligence and Logic Programming

Volume 1 Logical foundations
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Volume 3 Nonmonotonic reasoning and uncertain reasoning
Volume 4 Epistemic and temporal reasoning
Volume 5 Logic programming

Handbook of Logic in Computer Science

Volume 1
Background: Mathematical Structures

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Preface

We are happy to present the first volumes of the *Handbook of Logic in Computer Science*. Logic is now widely recognized to be one of the foundational disciplines of computing and has found applications in virtually all aspects of the subject, from software engineering and hardware to programming language and artificial intelligence. There is a growing need for an in-depth survey of the application of logic in computer science and AI. The *Handbook of Logic in Computer Science* and its companion, the *Handbook of Logic in Artificial Intelligence and Logic Programming* have been created in response to this need.

We see the creation of the Handbook as a combination of authoritative exposition, comprehensive survey, and fundamental research exploring the underlying unifying themes in the various areas. The intended audience is graduate students and researchers in the areas of computing and logic, as well as other people interested in the subject. We assume as background some mathematical sophistication. Much of the material will also be of interest to logicians and mathematicians.

The tables of contents of the volumes were finalized after extensive discussions between handbook authors and second readers. The first two volumes present the background logic and mathematics extensively used in computer science. The point of view is application oriented. The other four volumes present major areas in which the methods are used. These include Volume 3 — Semantic Structures; Volume 4 — Semantic Modelling; Volume 5 — Specification and Verification; and Volume 6 — Logical Methods.

The chapters, which in many cases are of monographic length and scope, are written with emphasis on possible unifying themes. The chapters have an overview, introduction, and a main body. A final part is dedicated to more specialized topics.

Chapters are written by internationally renowned researchers in the respective areas. The chapters are co-ordinated and their contents were discussed in joint meetings.

Each chapter has been written using the following procedures:

1. A very detailed table of contents was discussed and co-ordinated at several meetings between authors and editors of related chapters. The discussion was in the form of a series of lectures by the authors to everyone present. Once an agreement was reached on the detailed table of contents the authors wrote a draft and sent it to the editors and to other related authors. For each chapter there is a second reader (the first reader is the author) whose job it has been to scrutinize the

chapter together with the editors. The second reader's role is very important and has required effort and serious involvement with the authors.
Second readers for this volume are:

Chapter 1: Valuation Systems and Consequence Relations — M. Fourman
Chapter 2: Recursion Theory — M. Hennessy and J. Tucker
Chapter 3: Universal Algebra — A. Poigne and M. Fourman
Chapter 4: Category Theory — E. Wagner and M. Fourman
Chapter 5: Topology — H. Barendregt
Chapter 6: Model Theory — I. Hodkinson and D. Gabbay.

2. Once this process was completed (i.e. drafts seen and read by a large enough group of authors), there were other meetings on several chapters in which authors lectured on their chapters and faced the criticism of the editors and audience. The final drafts were prepared after these meetings.

3. We attached great importance to group effort and co-ordination in the writing of chapters. The first two parts of each chapter, namely the Introduction–Overview and Main Body, are not completely under the discretion of the author, as he/she had to face the general criticism of all the other authors. Only the third part of the chapter is entirely for the authors' own tastes and preferences.

The Handbook meetings were generously financed by OUP, by SERC contract SO/809/86, by the Department of Computing at Imperial College, and by several anonymous private donations.

We would like to thank our colleagues, authors, second readers, and students for their effort and professionalism in producing the manuscripts for the Handbook. We would particularly like to thank the staff of OUP for their continued and enthusiastic support, and Mrs Jane Spurr, our OUP Administrator for her dedication and efficiency.

The Editors

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Mark Ryan and Martin Sadler

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