## **C**AMBRIDGE

#### Introduction to HOL

A Theorem-Proving Environment for Higher-Order Logic

Edited by MIKE GORDON and T. F. MELHAM

This book provides a coherent and self-contained introduction to HOL. It succeeds in extracting and compressing from various sources most of the material that is needed for day-to-day work with the system.

£27.95 net Spiral Bound 0 521 44189 7 496 pp. 1993

#### **Logic Programming**

Operational Semantics and Proof Theory
J. ANDREWS

Dr Andrews here provides a homogeneous treatment of the semantics of both theoretical and practical logic programming languages. Researchers interested in logic programming or semantics, as well as artificial intelligence search strategies will want to consult this book as the only source for some essential and new ideas in the area.

£25.00 net HB 0 521 43219 7 116 pp. 1992 Distinguished Dissertations in Computer Science 4

## **Deduction and Declarative Programming**

P. PADAWITZ

Here Dr Padawitz emphasises verification based on logical inference rules, i.e. deduction (in contrast to model-theoretic approaches, deductive methods can be automated). His unique treatment captures the actual styles and applications of programming; neither too general with respect to the underlying logic nor too restrictive for the practice of programming.

£27.95 net HB 0 521 41723 6 288 pp. 1992 Cambridge Tracts in Theoretical Computer Science 28

#### **Boolean Function Complexity**

Edited by M. S. PATERSON

The papers in this book stem from the London Mathematical Society Symposium held at Durham University. The range of topics covered will be of interest to the newcomer to the field as well as the expert, and overall the papers are representative of the research presented at the Symposium. £22.95 net PB 0 521 40826 1 216 pp. 1992 London Mathematical Society Lecture Note Series 169

#### **Lectures on Parallel Computation**

Edited by A. GIBBONS and P. SPIRAKIS

The foundations of parallel computation are the concern of this book. Distinguished international researchers have contributed fifteen chapters which together form a coherent stream taking the reader who has little prior knowledge of the field to a position of being familiar with leading edge issues. The book may also function as a source of teaching material or reference for researchers.

£25.00 net HB 0 521 41556 X 448 pp. 1993 Cambridge International Series on Parallel Computation

## Information Dispersal and Parallel Computation

Y-D. LYUU

In 1989, Michael Rabin proposed a fundamentally new approach to the problems of fault-tolerant routing and memory management in parallel computation, based on the idea of information dispersal. Yuh-Dauh Lyuu develops this idea in a number of new and exciting ways in this extended and updated printing of this PhD thesis.

£22.95 net HB 0 521 43226 X 200 pp. 1993 Cambridge International Series on Parallel Computation

### Specification and Proof in Real Time CSP

JIM DAVIES

The research contained here represents the very latest work on the specification and verification of real-time systems.

£27.95 net HB 0 521 45055 1 196 pp. 1993 Distinguished Dissertations in Computer Science 6

#### An Introduction to Functional Programming Systems Using Haskell

ANTONY J. T. DAVIE

This book serves as an introduction both to functional programming and Haskell. An especially valuable feature are the chapters on programming and implementation, along with large numbers of exercises.

£42.50 net HB 0 521 25830 8 308 pp. 1992 £14.95 net PB 0 521 27724 8 Cambridge Computer Science Texts 27

To order or get further information 'phone Tom Peacock on 0223 325782, fax 0223 315052, E mail TW10002@PHX.CAM.AC.UK, or write to the address below.



The Edinburgh Building, Cambridge CB2 2RU

## MIT's Functional Programming

## THE STRUCTURE OF TYPED PROGRAMMING LANGUAGES

David A. Schmidt

The Structure of Typed Programming Languages describes the fundamental syntactic and semantic features of modern programming languages, carefully spelling out their impacts on language design.

Foundations of Computing series 352 pp., 225 illus. \$37.50 (March)

Now Available in Paperback:

#### SIMPLY SCHEME Introducing Computer Science

Brian Harvey and Matthew Wright

Simply Scheme differs from other Scheme-based books in its detailed exploration of the beginning steps in computer science. In addition to its emphasis on recursion, it also explores higher-order procedures and trees in depth, leaving object-oriented programming and the more difficult environment model for a later course.

624 pp., 32 illus. \$49.95

#### HANDBOOK OF THEORETICAL COMPUTER SCIENCE Volume A: Algorithms and Complexity Volume B: Formal Models and Semantics

J. van Leeuwen, University of Utrecht, Managing Editor "... The books can be used by anyone wanting simply to gain an understanding of one of these areas, or by someone desiring to be in research in a topic, or by instructors wishing to find timely information on a subject they are teaching outside their major areas of expertise." — Rocky Ross, SIGACT News Volume A 1,008 pp., \$50.00 Volume B 1,288 pp. \$60.00 \$95.00 Two-volume set

To order call toll-free 1-800-356-0343 (US & Canada) or (617) 625-8569. MasterCard & VISA accepted. Prices will be higher outside the U.S and are subject to change without notice.

The MIT Press 55 Hayward Street Cambridge, MA 02142

#### INSTRUCTIONS TO AUTHORS

#### Scope

Papers may describe original technical work, survey an area, or present a tutorial; and may be either short or long. Anything related to functional programming is of interest, including: foundations (semantics, abstract interpretation, lambda calculi, rewriting, logic, type theory, category theory); implementation (compilation, architectures, parallelism, garbage collection, I/O, debugging, profiling); linguistics (pure and impure language features, non-determinism, side effects, logical variables, relation to other programming paradigms, proofs about programs, program transformation, program synthesis, partial evaluation); applications (applications programs, practical experience, programming techniques, prototyping).

#### Book Reviews

Books for review, or suggestions for reviews, should be sent to the reviews editor, Philip Wadler (address on inside front cover).

#### Capsule reviews

Every published paper is accompanied by a capsule review written by one of the referees. A capsule review differs from an abstract in that it is more free to reflect value judgements, helping to set the context or emphasise the importance of a contribution.

#### Submission of manuscripts

Papers may be submitted to any of the editors. E-mail and postal addresses for the editors appear on the inside front cover. Electronic submission is encouraged: send e-mail containing a copy of the paper in Postscript form. Any method of producing Postscript is fine, but TeX is recommended as it can also be used for typesetting the final paper; see below. Alternatively, post four hard copies of the paper. Submissions should be accompanied by the author's mailing address, telephone number, and, if possible, an electronic mailing address. Papers in the same form should not be submitted or published elsewhere, and authors should inform the editor of any related papers submitted or published elsewhere. Upon acceptance of a paper, the author will be asked to transfer copyright to the publisher.

#### Electronic manuscripts

The publisher would like to encourage the submission of manuscripts written in LaTeX which can be used for direct typesetting. Authors using LaTeX may wish to use the JFP style file which can be obtained using anonymous FTP from the Internet address cus.cam.ac.uk (Cambridge Unix Service). Retrieve from directory /pub/cupress/journals/latex/jfp the style file jfp.sty and the user guide jfpguide.tex. In case of difficulties, there is a help-line available via e-mail, please contact texline@cup.cam.ac.uk. Alternatively, authors may se 'article style'. The publisher may be able to use Plain TeX and AMSTeX for typesetting if submitted by authors. On final acceptance of a paper, send the TeX source code to the editor by e-mail, or by posting a disc. Discs should be in Apple Mac or PC format and will not be returned. The publisher reserves the right to typeset any article by conventional means if the author's TeX code presents problems in production.

#### Layout of manuscripts

Manuscripts should begin with an abstract of not more than 300 words. Please avoid footnotes whenever posssible. Papers should conform to a good standard of English prose; please consult a style guide such as 'The Elements of Style' by Strunk and White, Macmillan, New York. It is encouraged to present programs in one of two styles: either with identifiers in italic and keywords in bold, or entirely in a fixed-width teletype font. Do not begin a sentence with a symbol or identifier name.

#### References

The Harvard system of references should be used. Citations are by author's surname and year of publication, and may stand either as a noun phrase (e.g., "Curry (1933)") or as a parenthetical note (e.g., "Curry 1933)"). List references at the end of the text in alphabetical order. A typical entry is: Curry, H. B. (1933) Apparent variables from the standpoint of mathematical logic, *Ann. of Math.*, 34 (2):381-404.

#### Illustrations

Figures should be drawn in indian ink on good quality white paper or produced by computer to comparable quality. Wherever possible they will be reproduced with the author's original lettering. Originals of figures should not be sent until the paper has been accepted. A list of captions for figures should be attached separately.

#### Proof reading

Please submit papers in their final form. Typographical or factual errors only may be changed at the proof stage. Authors may be charged for correction of non-typographical errors. No page charge is made.

#### Offprints

25 offprints of each article will be supplied free to each first named author. Extra offprints may be purchased from the publisher.

Please contact the editors for clarification of any of the above points.

#### COPYING

This journal is registered with the Copyright Clearance Center, 27 Congress Street, Salem, MA 01970. Organisations in the USA who are also registered with the C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per-copy fee of \$5.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0956-7968/94 \$5.00+.00.

Organisations authorised by the Copyright Licensing Agency may also copy material subject to the usual conditions. *ISI Tear Service*, 3501 Market Street, Philadelphia, Pennsylvania 19104, USA, is authorised to supply single copies of separate articles for private use only.

For all other use, permission should be sought from Cambridge or the American branch of Cambridge University Press.

# JOURNAL OF Functional Programming

VOLUME 4 PART 1 JANUARY 1994

#### CONTENTS

A functional animation starter-kit	
KAVI ARYA	1
An overview of the Flagship system JOHN A. KEANE	19
On the equivalence between CMC and TIM	
RAFAEL D. LINS, SIMON J. THOMPSON AND SIMON PEYTON JONES	47
Worst case scheduling for parallel functional programs	
F. WARREN BURTON AND V. J. RAYWARD-SMITH	65
A-translation and looping combinators in pure type systems THIERRY COQUAND AND HUGO HERBELIN	77
How powerful are folding/unfolding transformations?	89
Theoretical Pearl: Yet yet a counterexample for $\lambda$ +SP pierre-Louis curien and thérèse hardin	113
Functional Pearl: On generating unique names	
LENNART AUGUSTSSON, MIKAEL RITTRI AND DAN SYNEK	117
Printed in Creat Britain by the University Press Combridge	

**CAMBRIDGE** UNIVERSITY PRESS



0956-7968(199401)4:1:1-