



**Springer**

*Berlin*

*Heidelberg*

*New York*

*Barcelona*

*Budapest*

*Hong Kong*

*London*

*Milan*

*Paris*

*Singapore*

*Tokyo*

Norbert E. Fuchs (Ed.)

# Logic Program Synthesis and Transformation

7th International Workshop, LOPSTR'97  
Leuven, Belgium, July 10-12, 1997  
Proceedings



Springer

## Series Editors

Gerhard Goos, Karlsruhe University, Germany  
Juris Hartmanis, Cornell University, NY, USA  
Jan van Leeuwen, Utrecht University, The Netherlands

## Volume Editor

Norbert E. Fuchs  
University of Zurich, Department of Computer Science  
CH-8057 Zurich, Switzerland  
E-mail: fuchs@ifi.unizh.ch

Cataloging-in-Publication data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

**Logic program synthesis and transformation** : 7th international workshop ; proceedings / LOPSTR '97, Leuven, Belgium, July 10 - 12, 1997. Norbert E. Fuchs (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Budapest ; Hong Kong ; London ; Milan ; Paris ; Singapore ; Tokyo : Springer, 1998  
(Lecture notes in computer science ; Vol. 1463)  
ISBN 3-540-65074-1

CR Subject Classification (1991): D.1.2, I.2.2, D.1.6, F.4.1, F.3.1

ISSN 0302-9743

ISBN 3-540-65074-1 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

© Springer-Verlag Berlin Heidelberg 1998  
Printed in Germany

Typesetting: Camera-ready by author  
SPIN 10638423 06/3142 - 5 4 3 2 1 0 Printed on acid-free paper

## Preface

This volume contains the papers from the Seventh International Workshop on Logic Program Synthesis and Transformation, LOPSTR '97, that took place in Leuven, Belgium, on July 10–12, 1997, 'back-to-back' with the Fourteenth International Conference on Logic Programming, ICLP '97. Both ICLP and LOPSTR were organised by the K.U. Leuven Department of Computer Science. LOPSTR '97 was sponsored by Compulog Net and by the Flanders Research Network on Declarative Methods in Computer Science. LOPSTR '97 had 39 participants from 13 countries.

There were two invited talks by Wolfgang Bibel (Darmstadt) on 'A multi-level approach to program synthesis', and by Henning Christiansen (Roskilde) on 'Implicit program synthesis by a reversible metainterpreter'. Extended versions of both talks appear in this volume.

There were 19 technical papers accepted for presentation at LOPSTR '97, out of 33 submissions. Of these, 15 appear in extended versions in this volume. Their topics range over the fields of program synthesis, program transformation, program analysis, tabling, metaprogramming, and inductive logic programming.

My thanks go to the workshop co-chairs and local organisers, Bart Demoen and Gerda Janssens, and to their team for efficiently organising the event and for preparing the preliminary proceedings. I wish to thank the members of the LOPSTR '97 program committee and the referees for their prompt and thorough work. I am grateful to the program chairman of LOPSTR'96, John Gallagher, for his helpful advice. LOPSTR '97 received sponsorship from Compulog Net and from the Flanders Research Network on Declarative Methods in Computer Science which is gratefully acknowledged. Furthermore, I would like to thank Maurice Bruynooghe and David Pearce for their help. Finally, thanks to Uta Schwertel who assisted in preparing these proceedings.

June 1998

Norbert E. Fuchs

## Program Committee

Pierre Flener	(Bilkent, pf@cs.bilkent.edu.tr)
Norbert E. Fuchs (chair)	(Zurich, fuchs@ifi.unizh.ch)
Tim Gegg-Harrison	(Winona, TSG@VAX2.Winona.MSUS.EDU)
Andreas Hamfelt	(Uppsala, hamfelt@csd.uu.se)
Pat Hill	(Leeds, hill@scs.leeds.ac.uk)
Christoph Kreitz	(Cornell, kreitz@cs.cornell.edu)
Kung-Kiu Lau	(Manchester, kung-kiu@cs.man.ac.uk)
Bern Martens	(Leuven, bern@cs.kuleuven.ac.be)
Ulf Nilsson	(Linköping, ulfni@ida.liu.se)
Alberto Pettorossi	(Roma, adp@iasi.rm.cnr.it)
Leon Sterling	(Melbourne, leon@cs.mu.oz.au)

## Workshop Co-Chairs and Local Organizers

Bart Demoen	(Leuven, bmd@cs.kuleuven.ac.be)
Gerda Janssens	(Leuven, gerda@cs.kuleuven.ac.be)

## Sponsors of LOPSTR'97

European Commission – Compulog Net  
Flanders Research Network on Declarative Methods in Computer Science

## List of Referees

The following people helped the Program Committee to referee the invited and submitted papers:

Roberto Bagnara, Hendrik Blockeel, Antony Bowers, Halime Büyükyıldız, Baudouin Le Charlier, Nicoletta Cocco, Stefaan Decorte, Dirk Dussart, Laurent Fribourg, Andrew Heaton, Andy King, Michael Leuschel, Jonathan Martin, Maurizio Proietti, Luc De Raedt, Sophie Renault, Jacques Riche, Konstantinos Sagonas, Aida Vitoria, Geraint Wiggins, Serap Yilmaz

# Contents

A Multi-level Approach to Program Synthesis <i>W. Bibel, D. Korn, C. Kreitz, F. Kurucz, J. Otten, S. Schmitt, G. Stolpmann</i>	1
Programs Without Failures <i>A. Bossi, N. Cocco</i>	28
Generalised Logic Program Transformation Schemas <i>H. Büyükyıldız, P. Flener</i>	49
Logic Program Schemas, Constraints and Semi-unification <i>E. Chasseur, Y. Deville</i>	69
Implicit Program Synthesis by a Reversible Metainterpreter <i>H. Christiansen</i>	90
Termination Analysis for Tabled Logic Programming <i>S. Decorte, D. De Schreye, M. Leuschel, B. Martens, K. Sagonas</i>	111
On Correct Program Schemas <i>P. Flener, K.-K. Lau, M. Ornaghi</i>	128
Analysis of Logic Programs with Delay <i>A. Heaton, P. Hill, A. King</i>	148
Constraint-Based Partial Evaluation of Rewriting-Based Functional Logic Programs <i>L. Lafave, J. P. Gallagher</i>	168
Preserving Termination of Tabled Logic Programs While Unfolding <i>M. Leuschel, B. Martens, K. Sagonas</i>	189
Unfolding the Mystery of <i>Mergesort</i> <i>N. Lindenstrauss, Y. Sagiv, A. Serebrenik</i>	206
Towards a Logic for Reasoning About Logic Programs Transformation <i>A. Momigliano, M. Ornaghi</i>	226
A Higher Order Reconstruction of Stepwise Enhancement <i>L. Naish, L. Sterling</i>	245
Development of Correct Transformation Schemata for Prolog Programs <i>J. Richardson, N. E. Fuchs</i>	263
Constrained Regular Approximation of Logic Programs <i>H. Saglam, J. P. Gallagher</i>	282

A Logic Framework for the Incremental Inductive Synthesis of Datalog Theories <i>G.Semeraro, F. Esposito, D. Malerba, N. Fanizzi, S. Ferilli</i>	300
To Parse or Not To Parse <i>W. Vanhoof, B. Martens</i>	322
Author Index	343