Lecture Notes in Computer Science 2372
Edited by G. Goos, J. Hartmanis, and J. van Leeuwen

Springer
Berlin
Heidelberg
New York
Barcelona
Hong Kong
London
Milan
Paris
Tokyo

Alberto Pettorossi (Ed.)

Logic Based Program Synthesis and Transformation

11th International Workshop, LOPSTR 2001
Paphos, Cyprus, November 28-30, 2001
Selected Papers

Springer

Series Editors

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

Volume Editor

Alberto Pettorossi
University of Rome Tor Vergata
Via del Politecnico 1, 00133 Rome, Italy
E-mail: adp@iasi.rm.cnr.it

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Logic based program synthesis and transformation : 11th international workshop ; selected papers / LOPSTR 2001, Paphos, Cyprus, November 28 - 30, 2001. Alberto Pettorossi (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Hong Kong ; London ; Milan ; Paris ; Tokyo : Springer, 2002
(Lecture notes in computer science ; Vol. 2372)
ISBN 3-540-43915-3

CR Subject Classification (1998): F.3.1, D.1.1, D.1.6, I.2.2, F.4.1

ISSN 0302-9743
ISBN 3-540-43915-3 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 New York
a member of BertelsmannSpringer Science+Business Media GmbH

http://www.springer.de

© Springer-Verlag Berlin Heidelberg 2002
Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Stefan Sossna e.K.
Printed on acid-free paper SPIN: 10883696 06/3142 5 4 3 2 1 0

Preface

This volume contains the papers from LOPSTR 2001, the 11th International Workshop on Logic-based Program Synthesis and Transformation. Topics of interest to LOPSTR cover all aspects of logic-based program development and, in particular, specification, synthesis, verification, transformation, specialization, analysis, optimization, composition, reuse, component-based software development, and software architectures.

LOPSTR 2001 took place in the Coral Beach Hotel in Paphos (Cyprus) from November 28–30, 2001. Past LOPSTR workshops were held in Manchester, UK (1991, 1992, 1998), Louvain-la-Neuve, Belgium (1993), Pisa, Italy (1994), Arnhem, The Netherlands (1995), Stockholm, Sweden (1996), Leuven, Belgium (1997), Venice, Italy (1999), and London, UK (2000).

LOPSTR 2001 was co-located with the 17th International Conference on Logic Programming (ICLP 2001)[1] and the 7th International Conference on Principles and Practice of Constraint Programming (CP 2001)[2]. The LOPSTR community profited a lot from the scientific discussions, the lectures of the invited speakers, and the various sessions of ICLP and CP.

I would like to express my gratitude to all the authors of the submitted papers and all the attendees for their commitment and cooperation. Among the submitted papers, the Program Committee selected 13 papers for presentation. After the workshop, the authors were asked to submit improved versions of their papers which were then reviewed by the Program Committee. The final versions have been collected in this volume, which also includes the paper by our invited speaker, Natarajan Shankar (Stanford Research Institute, Menlo Park, USA), on the generation of efficient programs from logic.

My warmest thanks also go to all the members of the Program Committee and the additional reviewers for their diligent work and invaluable help. I would like to thank Fabio Fioravanti (IASI-CNR of Rome, Italy), Maurizio Proietti (IASI-CNR of Rome, Italy), and Antonis Kakas (University of Cyprus, Cyprus), who worked with me with great enthusiasm and dedication as members of the Organizing Committee.

The pre-proceedings of LOPSTR 2001 were printed by the IASI Institute of the National Research Council of Rome, Italy, and the Department of Computer Science of the University of Cyprus in Nicosia. I also thank Springer for accepting to publish these final proceedings in the LNCS series. The LOPSTR 2001 home page is: `http://www.iasi.rm.cnr.it/~adp/lopstr01_cfp.html`.

April 2002 Alberto Pettorossi

[1] Codognet, Ph., editor, *Logic Programming — ICLP 2001*, *Lecture Notes in Computer Science* 2237, Springer-Verlag, 2001.

[2] Walsh, T., editor, *Principles and Practice of Constraint Programming — CP 2001*, *Lecture Notes in Computer Science* 2239, Springer-Verlag, 2001.

Program Chair

Alberto Pettorossi	Università degli Studi di Roma 'Tor Vergata', Italy

Program Committee

David Basin	Albert-Ludwigs-Universität Freiburg, Germany
Antonio Brogi	Università di Pisa, Italy
Maurice Bruynooghe	Katholieke Universiteit Leuven, Belgium
Nicoletta Cocco	Università Ca' Foscari di Venezia, Italy
Mireille Ducassé	IRISA/INSA, France
Sandro Etalle	Twente University & CWI, The Netherlands
John Gallagher	University of Bristol, UK
Robert Glück	Waseda University, Japan
Michael Hanus	Christian-Albrechts-Universität zu Kiel, Germany
Manuel Hermenegildo	Universidad Politécnica de Madrid, Spain
Patricia Hill	University of Leeds, UK
Kung-Kiu Lau	University of Manchester, UK
Michael Leuschel	University of Southampton, UK
Torben Mogensen	University of Copenhagen, Denmark
Alberto Pettorossi	Università degli Studi di Roma 'Tor Vergata', Italy
I. V. Ramakrishnan	State University of New York at Stony Brook, USA
Don Sannella	University of Edinburgh, UK
Zoltan Somogyi	University of Melbourne, Australia

Additional Referees

José Alferes	Stefan Gruner	Sabina Rossi
Annalisa Bossi	Paul Jackson	Fausto Spoto
Luís Fernando Castro	Francis Klay	Mathieu Turuani
Alessandra Di Pierro	Giridhar Pemmasani	Wim Vanhoof
Yifei Dong	Maurizio Proietti	
Fabio Fioravanti	Germán Puebla	

Sponsoring Institutions

The Association for Logic Programming
The COLOG Net
The International Federation for Computational Logic
The IASI Institute of CNR (Italy)
Università degli Studi di Roma 'Tor Vergata' (Italy)

Table of Contents

Invited Speaker

Static Analysis for Safe Destructive Updates in a Functional Language 1
Natarajan Shankar (SRI International, Menlo Park, USA)

Program Transformation and Equivalence

A Transformation Technique for Datalog Programs Based on Non-deterministic Constructs 25
Petros Potikas, Panos Rondogiannis (University of Athens, Greece), Manolis Gergatsoulis (Institute of Informatics & Telecommunications, Aghia Paraskevi Attikis, Greece)

On Deforesting Parameters of Accumulating Maps 46
Kazuhiko Kakehi, Robert Glück, Yoshihiko Futamura (Waseda University, Tokyo, Japan)

Equivalence in Answer Set Programming 57
Mauricio Osorio, Juan A. Navarro, José Arrazola (Universidad de las Américas, Puebla, México)

Program Verificaion

Proof Theory, Transformations, and Logic Programming for Debugging Security Protocols 76
Giorgio Delzanno (University of Genova, Italy), Sandro Etalle (CWI and University of Twente, The Netherlands)

Abstract Conjunctive Partial Deduction Using Regular Types and Its Application to Model Checking 91
Michael Leuschel, Stefan Gruner (University of Southampton, United Kingdom)

Verification of Sets of Infinite State Processes Using Program Transformation 111
Fabio Fioravanti (IASI-CNR, Rome, Italy)*, Alberto Pettorossi (University of Rome Tor Vergata, Italy), Maurizio Proietti (IASI-CNR, Rome, Italy)*

Program Analysis

When Size Does Matter (Termination Analysis for Typed Logic Programs) 129
Wim Vanhoof, Maurice Bruynooghe (Katholieke Universiteit Leuven, Belgium)

Symbolic Profiling for Multi-paradigm Declarative Languages 148
Elvira Albert, Germán Vidal (Universidad Politécnica de Valencia, Spain)

Program Development

Correct Object-Oriented Systems in Computational Logic 168
Kung-Kiu Lau (University of Manchester, United Kingdom), Mario Ornaghi (University of Milan, Italy)

A Framework for Developing Embeddable Customized Logics 191
Sébastien Ferré (IRISA/CNRS, Rennes, France), Olivier Ridoux (IRISA/Université de Rennes 1, France)

Computing Environment-Aware Agent Behaviours with Logic Program Updates 216
José J. Alferes (Universidade Nova de Lisboa, Portugal), Antonio Brogi (University of Pisa, Italy, Portugal), João A. Leite, Luís M. Pereira (Universidade Nova de Lisboa, Portugal)

Program Synthesis

Extracting General Recursive Program Schemes in Nuprl's Type Theory 233
James L. Caldwell (University of Wyoming, Laramie, USA)

Extracting Exact Time Bounds from Logical Proofs 245
Mauro Ferrari, Camillo Fiorentini, Mario Ornaghi (University of Milan, Italy)

Author Index 267