

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

1414

Mogens Nielsen Wolfgang Thomas (Eds.)

Computer Science Logic

11th International Workshop, CSL '97

Annual Conference of the EACSL

Aarhus, Denmark, August 23-29, 1997

Selected Papers



Springer

Series Editors

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

Volume Editors

Mogens Nielsen
University of Aarhus, Department of Computer Science
Ny Munkegade, DK-8000 Aarhus C, Denmark
E-mail: mnielsen@brics.dk

Wolfgang Thomas
Universität Kiel, Institut für Informatik und Praktische Mathematik
Olshausenstrasse 40, D-24098 Kiel, Germany
E-mail: wt@informatik.uni-kiel.de

Cataloging-in-Publication data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

**Computer science logic : 11th international workshop ; proceedings /
CSL '97, Aarhus, Denmark, August 23 - 29, 1997. Mogens Nielsen ;
Wolfgang Thomas (ed.). - Berlin ; Heidelberg ; New York ; Barcelona
; Budapest ; Hong Kong ; London ; Milan ; Paris ; Santa Clara ;
Singapore ; Tokyo : Springer, 1998
(Annual Conference of the EACSL ... ; 1997) (Lecture notes in
computer science ; Vol. 1414)
ISBN 3-540-64570-5**

CR Subject Classification (1991): F4, I.2.3-4, F3

ISSN 0302-9743

ISBN 3-540-64570-5 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 10637223 06/3142 - 5 4 3 2 1 0 Printed on acid-free paper

Preface

The 1997 *Annual Conference of the European Association for Computer Science Logic, CSL'97*, organized by the research center BRICS, was held at the University of Aarhus, Denmark, August 23–29, 1997.

CSL'97 was the 11th in a series of workshops and the 6th to be held as the Annual Conference of the EACSL.

The scientific program included a tutorial program (August 23–24), invited lectures, and contributed papers (August 25–29). The tutorial program *Games and Logic* consisted of lectures by S. Abramsky (Edinburgh) on “Game Semantics”, by A.E. Emerson (Austin, TX) on “Games, μ -calculus, and Program Verification”, and by I. Walukiewicz (Warsaw) and W. Thomas (Kiel) on “Determinacy, the Rabin Tree Theorem and Its Extensions”. The tutorials were attended by 70 participants.

A total of 114 participants from 17 countries attended the conference. Invited lectures were given by S.R. Buss, H. Comon, T. Coquand, M. Hyland, N. Immerman, N. Klarlund, Y.N. Moschovakis, and L. Pacholski. The local organization was in the hands of L. Cattani, U. Engberg, K. Møeller, and M. Nielsen.

The program committee selected 31 out of 92 submitted papers for the conference. The selection was made by the program committee consisting of K. Compton, J. Flum, F. Honsell, J.W. Klop, W. Marek, M. Nielsen (Vice-chair), P. Pudlak, E. Robinson, A. Tarlecki, W. Thomas (Chair), and I. Walukiewicz.

From the 31 papers selected for the conference, 26 have been accepted, following the standard refereeing procedure, for publication in the present proceedings. Four invited speakers submitted papers, that were likewise refereed and accepted.

We gratefully acknowledge the generous sponsorship by the following institutions:

The Danish National Research Foundation,
The Danish Natural Science Research Council,
The University of Aarhus.

These sponsorships enabled us amongst other things to offer a total of 12 grants to young scientists from various countries in Europe.

We are most grateful to the numerous referees for their work. Finally, a special thanks goes to Karen Møeller for her active part in the perfect organization of the conference.

February 1998

Mogens Nielsen, Wolfgang Thomas

Table of Contents

Call-by-Value Games	1
<i>S. Abramsky, G. McCusker</i>	
LISA: A Specification Language Based on WS2S	18
<i>A. Ayari, D. Basin, A. Podelski</i>	
Evolution as a Computational Engine	35
<i>R. Backofen, P. Clote</i>	
Timeless Games	56
<i>P. Baillo, V. Danos, Th. Erhard, L. Regnier</i>	
From Action Calculi to Linear Logic	78
<i>A. Barber, Ph. Gardner, M. Hasegawa, G. Plotkin</i>	
A Sequent Calculus for Circumscription	98
<i>P. A. Bonatti, N. Olivetti</i>	
Linear Lower Bounds and Simulations in Frege Systems with Substitutions	115
<i>M. L. Bonet, N. Galesi</i>	
A Formulation of Linear Logic Based on Dependency-Relations	129
<i>T. Braüner, V. de Paiva</i>	
Resolution and the Weak Pigeonhole Principle	149
<i>S. Buss, T. Pitassi</i>	
Higher-Order Matching and Tree Automata	157
<i>H. Comon, Y. Jurski</i>	
A Proof-Theoretical Investigation of Zantema's Problem	177
<i>Th. Coquand, H. Persson</i>	
Spectra with Only Unary Function Symbols	189
<i>A. Durand, R. Fagin, B. Loescher</i>	
Classical Proofs via Basic Logic	203
<i>C. Faggian</i>	
Canonization for L^k -Equivalence is Hard	220
<i>M. Grohe</i>	
Full Abstractness for a Functional/Concurrent Language with Higher-Order Value-Passing	239
<i>Ch. Hartonas, M. Hennessy</i>	
A Duality Theory for Quantitative Semantics	255
<i>R. Heckmann, M. Huth</i>	
A Mixed Modal/Linear Lambda Calculus with Applications to Bellantoni-Cook Safe Recursion	275
<i>M. Hofmann</i>	

Equational Axioms of Test Algebra	295
<i>M. Hollenberg</i>	
Mona & Fido: The Logic-Automaton Connection in Practice	311
<i>N. Klarlund</i>	
Existence of Reduction Hierarchies	327
<i>O. Kupferman, R. P. Kurshan, M. Yannakakis</i>	
A Game-Theoretic, Concurrent and Fair Model of the Typed λ -Calculus, with Full Recursion	341
<i>Y. N. Moschovakis</i>	
A Conjunctive Logical Characterization of Nondeterministic Linear Time	360
<i>F. Olive</i>	
On the Computational Complexity of Type 2 Functionals	373
<i>E. Pezzoli</i>	
Categories with Algebraic Structure	389
<i>J. Power</i>	
Concurrent Constraint Programming and Non-commutative Logic	406
<i>P. Ruet, F. Fages</i>	
A Hierarchical Approach to Monadic Second-Order Logic over Graphs	424
<i>I. Schiering</i>	
The Monadic Quantifier Alternation Hierarchy over Grids and Pictures.....	441
<i>N. Schweikardt</i>	
Padding and the Expressive Power of Existential Second-Order Logics.....	461
<i>Th. Schwentick</i>	
Rich ω -words and Monadic Second-Order Arithmetic	478
<i>L. Staiger</i>	
A Simple Ordinal Recursive Normalization of Gödel's T	491
<i>P. J. Voda</i>	
Author Index	511