

Lecture Notes in Computer Science

Edited by G. Goos, J. Hartmanis and J. van Leeuwen

2142

Springer

Berlin

Heidelberg

New York

Barcelona

Hong Kong

London

Milan

Paris

Tokyo

Laurent Fribourg (Ed.)

Computer Science Logic

15th International Workshop, CSL 2001

10th Annual Conference of the EACSL

Paris, France, September 10-13, 2001, Proceedings



Springer

Series Editors

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

Volume Editor

Laurent Fribourg
LSV (Ecole Normale Supérieure de Cachan and CNRS)
61, Avenue du Président Wilson, 94230 Cachan, France
E-mail: fribourg@lsv.ens-cachan.fr

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Computer science logic : 15th international workshop ; proceedings /
CSL 2001, Paris, France, September 10 - 13, 2001. Laurent Fribourg (ed.). -
Berlin ; Heidelberg ; New York ; Barcelona ; Hong Kong ; London ; Milan ;
Paris ; Tokyo : Springer, 2001

(Annual Conference of the EACSL ... ; 2001)

(Lecture notes in computer science ; Vol. 2142)

ISBN 3-540-42554-3

CR Subject Classification (1998): F.4, I.2.3-4, F.3

ISSN 0302-9743

ISBN 3-540-42554-3 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 2001
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Olgun Computergrafik
Printed on acid-free paper SPIN 10840185 06/3142 5 4 3 2 1 0

Preface

The Annual Conference of the European Association for Computer Science Logic, CSL 2001, was held in Paris, Palais de la Mutualité, on September 10–13, 2001. This was the 15th in a series of annual meetings, originally intended as International Workshops on Computer Science Logic, and the 10th to be held as the Annual Conference of the EACSL. The conference was organized by Laboratoire Spécification et Vérification (CNRS & ENS Cachan).

The CSL 2001 program committee selected 39 of 91 submitted papers for presentation at the conference and publication in this proceedings volume. The submitted papers originated from 26 different countries. Each paper was refereed by at least three reviewers.

In addition to the contributed papers, the scientific program of CSL 2001 included three invited talks (Jean-Yves Girard, Peter O’Hearn, and Jan Van den Bussche). This volume includes the papers provided by the invited speakers as well as the selected contributed papers. The topics of the papers include: linear logic, descriptive complexity, semantics, higher-order programs, modal logics, verification, automata, λ -calculus, induction, equational calculus, and constructive theory of types.

I am most grateful to the members of the program committee and all the referees for their thorough work. I am also particularly indebted to François Laroussinie, helped by Patricia Bouyer, Nicolas Markey, and Philippe Schnoebelen, for the successful organization of this event. Special thanks to Emmanuel Fleury for the design of the beautiful “Notre-Dame de Paris” poster.

June 2001

Laurent Fribourg

Program Committee

Andrea Asperti (U. Bologna)	Aart Middeldorp (U. Tsukuba)
Julian Bradfield (U. Edinburgh)	Catuscia Palamidessi (Penn. State)
René David (U. Savoie)	Frank Pfenning (CMU)
Gilles Dowek (INRIA)	Philippe Schnoebelen (ENS Cachan)
Laurent Fribourg (ENS Cachan) (chair)	Iain Stewart (U. Leicester)
Daniel Leivant (Indiana U.)	Moshe Vardi (Rice U.)
David McAllester (AT&T)	Philip Wadler (Avaya Labs)
Johann Makowsky (Technion Haifa)	Thomas Wilke (U. Kiel)

Referees

Andreas Abel	Neil Ghani	John Longley
Thorsten Altenkirch	Eduardo Gimenez	Denis Lugiez
Arnon Avron	Jean Goubault-Larrecq	Christoph Lüth
Steve Awodey	Erich Graedel	Christopher Lynch
Philippe Balbiani	Etienne Grandjean	Jim Lynch
David Basin	Martin Grohe	Ian Mackie
Peter Baumgartner	Orna Grumberg	Grant Malcolm
Michael Benedikt	Stefano Guerrini	Julian Marino
Ulrich Berger	Joe Halpern	Jean-Yves Marion
Rudolf Berghammer	Michael Hanus	Simone Martini
Didier Bert	Hugo Herbelin	Marteen Marx
Leopoldo Bertossi	Tin Kam Ho	Dale Miller
Egon Boerger	Josh Hodas	Alexandre Miquel
Guillaume Bonfante	Ian Hodkinson	Cesar Munoz
Olivier Bournez	Doug Howe	Paliath Narendran
Hubert Comon	Rick Hull	Joachim Niehren
Paolo Coppola	Florent Jacquemard	Robert Nieuwenhuis
Tristan Crolard	David Janin	Ulf Nilsson
Anuj Dawar	Marcin Jurdzinski	K. Nour
Jean-Paul Delahaye	Shmuel Katz	Luke Ong
Stéphane Demri	Claude Kirchner	Vincent van Oostrom
Joëlle Despeyroux	Ralf Kuesters	Fiedrich Otto
Mariangiola Dezani	Dietrich Kuske	Martin Otto
Roberto Di Cosmo	Juliana Küster Filipe	Luca Padovani
Roy Dyckhoff	Yves Lafont	Nicolas Peltier
Zoltan Esik	Yassine Lakhnech	Laure Petrucci
Maribel Fernandez	Arnaud Lallouet	Claudine Picaronny
Nissim Francez	Richard Lassaigne	Brigitte Pientka
Didier Galmiche	Giacomo Lenzi	Andreas Podelski
Ian Gent	Jordi Levy	Axel Poigné
Alfons Geser	Leonid Libkin	Jeff Polakow
Herman Geuvers	Patrick Lincoln	Randy Pollack

John Power	Alex Simpson	Alasdair Urquhart
Christophe Raffalli	Robert Staerk	Pawel Urzyczyn
Femke van Raamsdonk	Ludwig Staiger	Tarmo Uustalu
Alexander Razborov	Ian Stark	Jan Van den Bussche
Laurent Régnier	Colin Stirling	Kumar N. Verma
Mark Reynolds	Howard Straubing	René Vestergaard
Christophe Ringeissen	Aaron D. Stump	Luca Viganò
Giuseppe Rosolini	Taro Suzuki	Laurent Vigneron
Paul Rozière	Armando Tacchella	Igor Walukiewicz
Claudio Sacerdoti Coen	Jean-Marc Talbot	Pascal Weil
Ildiko Sain	Sophie Tison	Benjamin Werner
Irene Schena	Konstantinos Tourlas	
Thomas Schwentick	Ralf Treinen	

Local Organizing Committee

Patricia Bouyer
 Laurent Fribourg
 François Laroussinie
 Nicolas Markey
 Philippe Schnoebelen

Sponsors

CNRS
 ENS Cachan
 France Télécom
 INRIA
 LSV
 Ministère de la Recherche

Table of Contents

Invited Papers

Local Reasoning about Programs that Alter Data Structures	1
<i>Peter O’Hearn, John Reynolds, and Hongseok Yang</i>	
Applications of Alfred Tarski’s Ideas in Database Theory	20
<i>Jan Van den Bussche</i>	
Locus Solum: From the Rules of Logic to the Logic of Rules	38
<i>Jean-Yves Girard</i>	

Contributed Papers

The Expressive Power of Horn Monadic Linear Logic	39
<i>Max Kanovich</i>	
Non-commutativity and MELL in the Calculus of Structures	54
<i>Alessio Guglielmi and Lutz Straßburger</i>	
Quadratic Correctness Criterion for Non-commutative Logic	69
<i>Virgile Mogbil</i>	

Descriptive Complexity

Capture Complexity by Partition	84
<i>Yijia Chen and Enshao Shen</i>	
An Existential Locality Theorem	99
<i>Martin Grohe and Stefan Wöhrle</i>	
Actual Arithmetic and Feasibility	115
<i>Jean-Yves Marion</i>	
The Natural Order-Generic Collapse for ω -Representable Databases over the Rational and the Real Ordered Group	130
<i>Nicole Schweikardt</i>	

Semantics

An Algebraic Foundation for Higraphs	145
<i>John Power and Konstantinos Tourlas</i>	
Semantic Characterisations of Second-Order Computability over the Real Numbers	160
<i>M. V. Korovina and O. V. Kudinov</i>	

An Abstract Look at Realizability	173
<i>Edmund Robinson and Giuseppe Rosolini</i>	

The Anatomy of Innocence	188
<i>Vincent Danos and Russell Harmer</i>	

Higher-Order Programs

An Improved Extensionality Criterion for Higher-Order Logic Programs ..	203
<i>Marc Bezem</i>	

A Logic for Abstract State Machines	217
<i>Robert F. Stärk and Stanislas Nanchen</i>	

Constrained Hyper Tableaux	232
<i>Jan van Eijck</i>	

Modal Logics

Modal Logic and the Two-Variable Fragment	247
<i>Carsten Lutz, Ulrike Sattler, and Frank Wolter</i>	

A Logic for Approximate First-Order Reasoning	262
<i>Frédéric Koriche</i>	

Inflationary Fixed Points in Modal Logic	277
<i>A. Dawar, E. Grädel, and S. Kreutzer</i>	

Categorical and Kripke Semantics for Constructive S4 Modal Logic	292
<i>Natasha Alechina, Michael Mendler, Valeria de Paiva, and Eike Ritter</i>	

Verification

Labelled Natural Deduction for Interval Logics	308
<i>Thomas Marthedal Rasmussen</i>	

Decidable Navigation Logics for Object Structures	324
<i>Frank S. de Boer and Rogier M. van Eijk</i>	

The Decidability of Model Checking Mobile Ambients	339
<i>Witold Charatonik and Jean-Marc Talbot</i>	

Automata

A Generalization of the Büchi-Elgot-Trakhtenbrot Theorem	355
<i>Matthias Galota, Heribert Vollmer</i>	

An Effective Extension of the Wagner Hierarchy to Blind Counter Automata	369
<i>Olivier Finkel</i>	

Decision Procedure for an Extension of WS1S	384
<i>Felix Klaedtke</i>	

Lambda-Calculus

Limiting Partial Combinatory Algebras towards Infinitary Lambda-Calculi and Classical Logic	399
<i>Yohji Akama</i>	

Intersection Logic	414
<i>Simona Ronchi Della Rocca and Luca Roversi</i>	

Life without the Terminal Type	429
<i>Lutz Schröder</i>	

Fully Complete Minimal PER Models for the Simply Typed λ -Calculus ...	443
<i>Samson Abramsky and Marina Lenisa</i>	

Induction

A Principle of Induction	458
<i>Keye Martin</i>	

On a Generalisation of Herbrand's Theorem	469
<i>Matthias Baaz and Georg Moser</i>	

Well-Founded Recursive Relations	484
<i>Jean Goubault-Larrecq</i>	

Equational Calculus

Stratified Context Unification Is in PSPACE	498
<i>Manfred Schmidt-Schauß</i>	

Uniform Derivation of Decision Procedures by Superposition	513
<i>Alessandro Armando, Silvio Ranise, and Michaël Rusinowitch</i>	

Complete Categorical Equational Deduction	528
<i>Grigore Roşu</i>	

Beyond Regularity: Equational Tree Automata for Associative and Commutative Theories	539
<i>Hitoshi Ohsaki</i>	

Constructive Theory of Types

Normalized Types 554
Pierre Courtieu

Markov’s Principle for Propositional Type Theory 570
Alexei Kopylov and Aleksey Nogin

Recursion for Higher-Order Encodings 585
Carsten Schürmann

Monotone Inductive and Coinductive Constructors of Rank 2 600
Ralph Matthes

Author Index 615