

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

2932

Springer

Berlin

Heidelberg

New York

Hong Kong

London

Milan

Paris

Tokyo

Peter Van Emde Boas Jaroslav Pokorný
Mária Bielíková Július Štuller (Eds.)

SOFSEM 2004: Theory and Practice of Computer Science

30th Conference on Current Trends
in Theory and Practice of Computer Science
Měříň, Czech Republic, January 24-30, 2004
Proceedings



Springer

Series Editors

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

Volume Editors

Peter Van Emde Boas
University of Amsterdam, Faculty of Sciences
ILLC - Department of Mathematics and Computer Science
Plantage Muidergracht 24, 1018 TV Amsterdam, The Netherlands
E-mail: peter@science.uva.nl

Jaroslav Pokorný
Charles University, Faculty of Mathematics and Physics
Malostranské nám. 25, 118 00 Prague 1, Czech Republic
E-mail: pokorny@ksi.ms.mff.cuni.cz

Mária Bielíková
Slovak University of Technology
Faculty of Informatics and Information Technologies
Ilkovičova 3, 812 19 Bratislava, Slovak Republic
E-mail: bielik@elf.stuba.sk

Július Štuller
Academy of Sciences of the Czech Republic, Institute of Computer Science
Pod Vodárenskou věží 2, 182 07 Prague 8, Czech Republic
E-mail: stuller@cs.cas.cz

Cataloging-in-Publication Data applied for

A catalog record for this book is available from the Library of Congress.

Bibliographic information published by Die Deutsche Bibliothek
Die Deutsche Bibliothek lists this publication in the Deutsche Nationalbibliografie;
detailed bibliographic data is available in the Internet at <<http://dnb.ddb.de>>.

CR Subject Classification (1998): F.1, F.2, F.3, H.2, I.2, H.3, H.4, C.2

ISSN 0302-9743

ISBN 3-540-20779-1 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 is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2004
Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Protago-TeX-Production GmbH
Printed on acid-free paper SPIN: 10979303 06/3142 5 4 3 2 1 0

Preface

The 30th Anniversary Conference on Current Trends in Theory and Practice of Computer Science, **SOFSEM 2004**, took place during January 24–30, 2004, in the Hotel VZ Měřín, located about 60 km south of Prague on the right shore of Slapská přehrada (“Slapy Dam”) in the Czech Republic.

Having transformed itself over the years from a local event to a fully international conference, the contemporary SOFSEM tries to keep the best of its winter school aspects (the high number of invited talks) together with multidisciplinary trends in computer science – this year illustrated by the selection of the following 4 tracks:

- Computer Science Theory (Track Chair: Peter Van Emde Boas)
- Database Technologies (Track Chair: Jaroslav Pokorný)
- Cognitive Technologies (Track Chair: Peter Šinčák)
- Web Technologies (Track Chair: Július Štuller)

Its aim was, as always, to promote cooperation among professionals from academia and industry working in various areas of computer science.

The 17 SOFSEM 2004 Program Committee members coming from 9 countries evaluated a record 136 submissions. After a careful review process (counting usually at least 3 reviews per paper), followed by detailed discussions at the PC meeting held on October 2–3, 2003 in Prague, Czech Republic, 59 papers were selected for presentation at the SOFSEM 2004:

- 22 contributed talks papers selected by the SOFSEM 2004 PC for publication in the Springer-Verlag LNCS proceedings volume (acceptance rate 19%), including the best paper from the Student Research Forum,
- 29 contributed talks papers that will appear in the MatFyzPress Proceedings (acceptance rate 26%),
- 9 student research forum papers (acceptance rate 38%), 8 of which will appear in the MatFyzPress proceedings.

The Springer-Verlag proceedings were completed by the 10 invited talks papers.

SOFSEM 2004 was the result of considerable effort by a number of people. It is our pleasure to express our thanks to:

- the SOFSEM Steering Committee for its general guidance,
- the SOFSEM 2004 Program Committee and additional referees who devoted an extraordinary effort to reviewing a huge number of assigned papers (on average about 24 papers per PC member),
- the Springer-Verlag LNCS Executive Editor Mr. Alfred Hofmann for his continuing trust in SOFSEM,
- Springer-Verlag for publishing the proceedings, and
- the SOFSEM 2004 Organizing Committee for a smooth preparation of the conference.

Special thanks go to:

- Hana Bílková from the Institute of Computer Science (ICS), Prague, who did an excellent job in the completion of the proceedings,
- Michal Bušta and Martin Stareček from ICS for realizing the SOFSEM 2004 web pages and a submission and review system that worked perfectly thus allowing a smooth PC session in Prague.

Finally we highly appreciate the financial support of our sponsors (ERCIM, Microsoft, Deloitte & Touche, SOFTEC Bratislava, Centrum.cz) which assisted with the invited speakers and helped the organizers to offer lower student fees.

November 11, 2003

Peter Van Emde Boas
Jaroslav Pokorný
Mária Bieliková
Július Štuller

•≡ Advisory Board

Dines Bjørner	Technical University of Denmark, Lyngby, DK
Peter Van Emde Boas	University of Amsterdam, NL
Manfred Broy	Technical University Munich, DE
Michal Chytil	ANIMA Prague, CZ
Georg Gottlob	Vienna University of Technology, AT
Keith G. Jeffery	CLRC RAL, Chilton, Didcot, Oxon, UK
Maria Zemánková	NSF, Washington, DC, USA

•≡ Steering Committee

Branislav Rován, <i>Chair</i>	Comenius University, Bratislava, SK
Miroslav Bartošek	Masaryk University, Brno, CZ
Mária Bielíková	Slovak University of Technology in Bratislava, SK
Keith G. Jeffery	CLRC RAL, Chilton, Didcot, Oxon, UK
Antonín Kučera	Masaryk University, Brno, CZ
Július Štuller	Institute of Computer Science, Prague, CZ
Gerard Tel	Utrecht University, NL
Petr Tůma	Charles University in Prague, CZ
Jan Staudek, <i>Observer</i>	Masaryk University, Brno, CZ
Jiří Wiedermann, <i>Observer</i>	Institute of Computer Science, Prague, CZ

•≡ Program Committee

Peter Van Emde Boas, <i>Chair</i>	University of Amsterdam, NL
Jaroslav Pokorný, <i>Co-chair</i>	Charles University, Prague, CZ
Peter Šinčák, <i>Co-chair</i>	Technical University, Košice, SK
Július Štuller, <i>Co-chair</i>	Institute of Computer Science, Prague, CZ
Witold Abramowicz	Poznan University of Economics, PL
Martin Beran	Charles University, Prague, CZ
Mária Bielíková	Slovak University of Technology, Bratislava, SK
Shuji Hashimoto	Waseda University/Humanoid Institute, JP
Juraj Hromkovič	RWTH University, Aachen, D
Leonid Kalinichenko	Institute for Problems of Informatics, RU
Vladimír Kvasnička	Slovak University of Technology, Bratislava, SK
Roman Neruda	Institute of Computer Science, Prague, CZ
Dimitris Plexousakis	University of Crete, GR
Michael Schröder	City University, London, UK
Václav Snášel	VŠB-TU Ostrava, CZ
Gerard Tel	Utrecht University, NL
Bernhard Thalheim	Brandenburg Technical University, Cottbus, D

•= Additional Referees

Eduardo Alonso	Joachim Kupke
Vangelis Angelakis	Rasto Lencses
Grigoris Antoniou	Peter Lennartz
Yannis Askoxylakis	Maarten Marx
Krzysztof Banaskiewicz	Vladimír Mencl
Andrzej Bassara	Daniel Moody
David Bednárek	Tshiamo Motshegwa
Hans-Joachim Boeckenhauer	Manfred Nagl
Hans L. Bodlaender	Athanasios Nikolaos
Dirk Bongartz	Petr Pajas
Peter A.N. Bosman	Demos Panagopoulos
Harry M. Buhrman	Nikos Papadopoulos
Lubomír Bulej	Štefan Porubský
Bernadette Charron-Bost	Jiří Pospíchal
David Coufal	Anthony Savidis
Panos Dafas	Ralf Schweimeier
Martin Doerr	Sebastian Seibert
Gunar Fiedler	George Serfiotis
Miroslav Galbavý	Manolis Spanakis
Christos Georgis	Branislav Steinmuller
Jurgen Giesl	Yannis Stylianou
Jacek Gomoluch	Ioannis Tollis
Jurriaan Hage	Vojtěch Toman
Pavel Hloušek	Nikolaos M. Tsatsakis
Martin Holeňa	Petr Tůma
Tomasz Kaczmarek	Walter Unger
Ivan Kapustik	Marinus Veldhorst
Stamatis Karvounarakis	Peter Verbaan
George Kokkinidis	Krzysztof Wecel
Manolis Koubarakis	Marek Wisniewski
Marek Kowalkiewicz	Jakub Yaghob
Stano Krajčí	Pawel Zebrowski
Jaroslav Král	Stanislav Žák
Ivan Kramosil	Michal Žemlička
Kiriakos Kritikos	

•= Organization

The 30th Anniversary SOFSEM 2004 was organized by

Institute of Computer Science, Academy of Sciences of the Czech Republic,
Prague

Charles University, Faculty of Mathematics and Physics, Prague

Faculty of Informatics, Masaryk University, Brno

Institute of Computer Science, Masaryk University, Brno

Czech Society for Computer Science

in co-operation with the Slovak Society for Computer Science

•= Organizing Committee

Július Štuller, *Chair*

Hana Bílková

Martina Brodská

Michal Bušta

Zuzana Hájková

Martin Stareček

Milena Zeithamlová

Institute of Computer Science, Prague, CZ

Institute of Computer Science, Prague, CZ

Action M Agency, Prague, CZ

Institute of Computer Science, Prague, CZ

Action M Agency, Prague, CZ

Institute of Computer Science, Prague, CZ

Action M Agency, Prague, CZ

•= Sponsoring Institutions

ERCIM

Microsoft

Deloitte & Touche

SOFTEC Bratislava

Centrum.cz

Table of Contents

Invited Talks

Games, Theory and Applications	1
<i>H.J. van den Herik, H.H.L.M. Donkers</i>	
Database Research Issues in a WWW and GRIDs World	9
<i>K.G. Jeffery</i>	
Integration, Diffusion, and Merging in Information Management Discipline	22
<i>V. Kumar</i>	
Flexibility through Multiagent Systems: Solution or Illusion?	41
<i>P.C. Lockemann, J. Nimis</i>	
World Wide Web Challenges: Supporting Users in Search and Navigation	57
<i>N. Milic-Frayling</i>	
Querying and Viewing the Semantic Web: An RDF-Based Perspective	60
<i>D. Plexousakis</i>	
Knowledge Acquisition and Processing: New Methods for Neuro-Fuzzy Systems	62
<i>D. Rutkowska</i>	
Algorithms for Scalable Storage Servers	82
<i>P. Sanders</i>	
Fuzzy Unification and Argumentation for Well-Founded Semantics	102
<i>R. Schweimeier, M. Schroeder</i>	
Tree Signatures and Unordered XML Pattern Matching	122
<i>P. Zezula, F. Mandreoli, R. Martoglia</i>	

Regular Papers

Quantum Query Complexity for Some Graph Problems	140
<i>A. Berzina, A. Dubrovsky, R. Freivalds, L. Lace, O. Scegulnaja</i>	
A Model of Versioned Web Sites	151
<i>M. Bieliková, I. Noris</i>	

Design of Secure Multicast Models for Mobile Services	163
<i>E. Blessing, R., R. Uthariaraj, V.</i>	
Some Notes on the Complexity of Protein Similarity Search under mRNA Structure Constraints	174
<i>D. Bongartz</i>	
Measures of Intrinsic Hardness for Constraint Satisfaction Problem Instances	184
<i>G. Boukeas, C. Halatsis, V. Zissimopoulos, P. Stamatopoulos</i>	
Validity Conditions in Agreement Problems and Time Complexity	196
<i>B. Charron-Bost, F. Le Fessant</i>	
Supporting Evolution in Workflow Definition Languages	208
<i>S.M. Fernandes, J. Cachopo, A.R. Silva</i>	
Clustered Level Planarity	218
<i>M. Forster, C. Bachmaier</i>	
Artificial Perception: Auditory Decomposition of Mixtures of Environmental Sounds – Combining Information Theoretical and Supervised Pattern Recognition Approaches	229
<i>L. Janku</i>	
Features of Neighbors Spaces	241
<i>M. Jirina, M. Jirina, Jr.</i>	
Discovery of Lexical Entries for Non-taxonomic Relations in Ontology Learning	249
<i>M. Kavalec, A. Maedche, V. Svátek</i>	
Approaches Based on Markovian Architectural Bias in Recurrent Neural Networks	257
<i>M. Makula, M. Čerňanský, Ľ. Beňušková</i>	
Processing XPath Expressions in Relational Databases	265
<i>T. Pankowski</i>	
An Embedded Language Approach to Router Specification in Curry	277
<i>J.G. Ramos, J. Silva, G. Vidal</i>	
Multi-document Automatic Text Summarization Using Entropy Estimates	289
<i>G. Ravindra, N. Balakrishnan, K.R. Ramakrishnan</i>	
Implicit Flow Maximization by Iterative Squaring	301
<i>D. Sawitzki</i>	

Evolving Constructors for Infinitely Growing Sorting Networks and Medians	314
<i>L. Sekanina</i>	
Fuzzy Group Models for Adaptation in Cooperative Information Retrieval Contexts	324
<i>M.-Á. Sicilia, E. García</i>	
Theory of One Tape Linear Time Turing Machines	335
<i>K. Tadaki, T. Yamakami, J.C.H. Lin</i>	
Avoiding Forbidden Submatrices by Row Deletions	349
<i>S. Wernicke, J. Alber, J. Gramm, J. Guo, R. Niedermeier</i>	
Building a Bridge between Mirror Neurons and Theory of Embodied Cognition	361
<i>J. Wiedermann</i>	
The Best Student Paper	
Fully Truthful Mechanisms	373
<i>N. Chen, H. Zhu</i>	
Author Index	385