View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by SZTE Publicatio Repozitórium - SZTE - Repository of...

Editorial Board

David Hutchison
Lancaster University, UK

Takeo Kanade
Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler
University of Surrey, Guildford, UK

Jon M. Kleinberg
Cornell University, Ithaca, NY, USA

Alfred Kobsa
University of California, Irvine, CA, USA

Friedemann Mattern
ETH Zurich, Switzerland

John C. Mitchell
Stanford University, CA, USA

Moni Naor
Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz
University of Bern, Switzerland

C. Pandu Rangan
Indian Institute of Technology, Madras, India

Bernhard Steffen
TU Dortmund University, Germany

Madhu Sudan
Microsoft Research, Cambridge, MA, USA

Demetri Terzopoulos
University of California, Los Angeles, CA, USA

Doug Tygar
University of California, Berkeley, CA, USA

Gerhard Weikum
Max Planck Institute for Informatics, Saarbruecken, Germany

Ivana Černá Tibor Gyimóthy
Juraj Hromkovič Keith Jeffery
Rastislav Královič Marko Vukolić
Stefan Wolf (Eds.)

SOFSEM 2011: Theory and Practice of Computer Science

37th Conference on Current Trends
in Theory and Practice of Computer Science
Nový Smokovec, Slovakia, January 22-28, 2011
Proceedings

Springer

Volume Editors

Ivana Černá
Masaryk University, Faculty of Informatics, Department of Computer Science
Botanicka 68 a, 602 00 Brno, Czech Republic, E-mail: cerna@fi.muni.cz

Tibor Gyimóthy
University of Szeged, Department of Software Engineering
Árpád tér 2., 6720 Szeged, Hungary, E-mail: gyimothy@inf.u-szeged.hu

Juraj Hromkovič
ETH Zürich, Informationstechnologie und Ausbildung, CAB F 16, F 13.1
Universitätstr. 6, 8092 Zürich, Switzerland, E-mail: juraj.hromkovic@inf.ethz.ch

Keith Jeffery
Science and Technology Facilities Council, Rutherford Appleton Laboratory
Harwell Science and Innovation Campus, Didcot, OXON OX11 0QX, UK
E-mail: keith.jeffery@stfc.ac.uk

Rastislav Královič
Comenius University, Department of Computer Science
84248 Bratislava, Slovakia, E-mail: kralovic@dcs.fmph.uniba.sk

Marko Vukolić
EURECOM, 2229 Route des Crêtes, BP 193, 06904 Sophia Antipolis cedex, France
E-mail: Marko.Vukolic@eurecom.fr

Stefan Wolf
ETH Zürich, Institute of Theoretical Computer Science, IFW E49.1
Haldeneggsteig 4, 8092 Zürich, Switzerland, E-mail: wolfst@inf.ethz.ch

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-642-18380-5 e-ISBN 978-3-642-18381-2
DOI 10.1007/978-3-642-18381-2
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2010942599

CR Subject Classification (1998): F.2, F.1, D.2, H.2-3, C.2, H.4, D.4, G.2.1

LNCS Sublibrary: SL 1 – Theoretical Computer Science and General Issues

© Springer-Verlag Berlin Heidelberg 2011
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. Violations are liable to prosecution under the German Copyright Law.
The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

The 37th International Conference on Current Trends in Theory and Practice of Computer Science, SOFSEM 2011, was held during January 22–28, 2011 in the Hotel Atrium, Nový Smokovec, of the Tatra Mountains of Slovakia. This volume contains 5 of the invited lectures and 41 contributed papers selected for presentation at the conference. The contributed papers were selected by the Program Committee out of a total of 122 submissions.

SOFSEM (originally SOFtware SEMinar) is an annual international winter conference devoted to the theory and practice of computer science. Its aim is to present the latest developments in research for professionals from academia and industry, working in leading areas of computer science. As a well-established and fully international conference, SOFSEM maintains the best of its original Winter School aspects, such as a high number of invited talks, in-depth coverage of selected research areas, and ample opportunities to discuss and exchange new ideas. SOFSEM 2011 was organized around the following four tracks:

- Foundations of Computer Science (Chair Ivana Černá)
- Software, Systems, and Services (Chair Tibor Gyimothy)
- Processing Large Datasets (Chair Keith Jeffery)
- Cryptography, Security and Trust (Chairs Stefan Wolf and Marko Vukolic)

An integral part of SOFSEM 2011 was the traditional Student Research Forum (Chair Mária Bieliková) organized with the aim to give students feedback on both the originality of their scientific results and on their work in progress. The papers presented at the Student Research Forum were published in local proceedings.

SOFSEM 2011 was organized by the Faculty of Mathematics, Physics and Informatics of the Comenius University in Bratislava, and the Slovak Society for Computer Science with support from the Czech Society of Cybernetics and Informatics.

SOFSEM 2011 added a new page to the tradition of SOFSEM dating back to 1974, which was possible due to the effort of many people. As editors of these proceedings, we are grateful to everyone who contributed to the scientific program of the conference. We would like to thank the invited speakers Christian Cachin, Markus Gross, Juerg Gutknecht, Tony Hey, Rainer Koschke, Ulrich Rührmair, Vitaly Shmatikov, Jiri Srba, and Tomas Vojnar for presenting their work to the audience of SOFSEM 2011. We thank all authors who submitted their papers for consideration. Many thanks go to the Program Committee, and to all external referees, for their hard work in evaluating the papers. The work of the Program Committee was carried out using the EasyChair system, and we gratefully acknowledge this contribution. Special thanks are due to Mária Bieliková, of the Slovak University of Technology in Bratislava, for her expert preparation and

handling of the Student Research Forum, and to the SOFSEM Steering Committee headed by Július Štuller, of the Institute of Computer Science in Prague, for its excellent support throughout the preparation of the conference.

We are also indebted to the Organizing Committee led by Vanda Hambálková and Dana Pardubská.

November 2010

Ivana Černá
Tibor Gyimothy
Juraj Hromkovič
Keith Jeffery
Rastislav Královič
Marko Vukolic
Stefan Wolf

Conference Organization

Program Chairs

Ivana Černá
Tibor Gyimothy
Juraj Hromkovič
Keith Jeffery
Rastislav Královič
Marko Vukolic
Stefan Wolf

Program Committee

Paolo Atzeni
Gildas Avoine
Juan Bicarregui
Michael Brodie
Manfred Broy
Jan Camenisch
Andrea De Lucia
Yvo Desmedt
Massimiliano Di Penta
Matthias Fitzi
Peter Fritzson
Vashti Galpin
Ganesh Gopalakrishnan
Helena Handschuh
Mark Harman
Keijo Heljanko
Mira Kajko-Mattson
Ruediger Kapitza
Engin Kirda
Ralf Laemmel
Corrado Leita
Martin Leucker
Markus Lumpe
Gerald Lüttgen
Radu Marinescu
Eric Mercer
Michele Missikoff
Kirill Morozov
Pavol Navrat
Phong Nguyen
JesperBuus Nielsen
Krzysztof Pietrzak
Dimitris Plexousakis
Jaroslav Pokorny
AhmadReza Sadeghi
David Safranek
Wilhelm Schaefer
Lutz Schubert
Marco Serafini
Arno Siebes
Jiri Sima
Miroslava Sotakova
Jiri Srba
Julius Stuller
Tarja Systa
Patrick Valduriez
Daniel Varro
Paulo Verissimo
Tomas Vojnar
Andreas Winter
Verena Wolf
Juerg Wullschleger
Arie van Deursen
Jaco van de Pol

External Reviewers

Aldeida Aleti
Ernst Althaus
Andreas Artmeier
Gabriele Bavota
Nikola Benes
Marc Benkert
Philip Bille
Markus Bläser
Bruno Blanchet
Hans-Joachim Boeckenhauer
Hans L. Bodlaender
Benedikt Bollig
Jewgenij Botaschanjan
Ulrik Brandes
Xavier Carpent
Jakub Chaloupka
Taolue Chen
Arthur Choi
Allan Clark
Páidí Creed
Morten Dahl
Emilio Di Giacomo
Alexander Ditter
Stefan Dobrev
Wei Dong
Laurent Doyen
Jana Fabrikova
Uli Fahrenberg
Mohamed Faouzi Atig
Henning Fernau
Topher Fischer
Anna Formica
Xiang Gan
Robert Ganian
Massimiliano Goldwurm
Petr Gregor
Lars Grunske
Alexander Harhurin
Julian Haselmayr
Refael Hassin
Chong Hee Kim
Danny Hermelin
Petr Hlineny
Ákos Horváth
Leong Hou U
Yu Huang
David N. Jansen
Michael Jones
Line Juhl
Howard Karloff
Petteri Kaski
Sanjeev Khanna
Daniel Kirsten
Leonid Kof
Dennis Komm
Vaclav Koubek
Michal Koucky
Daniel Kral
Richard Kralovic
Jan Krcal
Bohuslav Krena
Jan Kretinsky
Rom Langerak
Tuomas Launiainen
Matej Lexa
Kamal Lodaya
Sylvain Lombardy
Bodo Manthey
Tania Martin
Alexander Meduna
Everett Morse
Mohammadreza Mousavi
Haiko Muller
Anderson Nascimento
Daniel Neider
Uwe Nestmann
Christian M. Neumann
Gethin Norman
Jan Obdrzalek
Mads Chr. Olesen
M. Sohel Rahman
Andras Salamon
Arnaud Sangnier
Petr Savicky
Giuseppe Scanniello
Andre Schumacher
Stefan Schwoon
Yannick Seurin

Jiří Sgall
Michael Smith
Monika Steinová
Volker Stolz
Jukka Suomela
Till Tantau
Claus Thrane
Jana Tumova
Marc Uetz
Yannis Velegrakis
Walter Vogler
Nicholas Vrvilo
Saint Wesonga
David White
Siert Wieringa
Clinton Woodward
Stanislav Zak

Table of Contents

Integrity and Consistency for Untrusted Services (Extended Abstract) 1
Christian Cachin

A Structured Codesign Approach to Many-Core Architectures for Embedded Systems 15
Jürg Gutknecht

SIMPL Systems, or: Can We Design Cryptographic Hardware without Secret Key Information? 26
Ulrich Rührmair

Verification of Timed-Arc Petri Nets 46
Lasse Jacobsen, Morten Jacobsen, Mikael H. Møller, and Jiří Srba

Efficient Algorithms for Handling Nondeterministic Automata 73
Tomáš Vojnar

The Straight-Line RAC Drawing Problem Is NP-Hard 74
Evmorfia N. Argyriou, Michael A. Bekos, and Antonios Symvonis

Tracking the Evolution of Code Clones 86
Tibor Bakota

Liquidsoap: A High-Level Programming Language for Multimedia Streaming 99
David Baelde, Romain Beauxis, and Samuel Mimram

Combining Traditional Map Labeling with Boundary Labeling 111
Michael A. Bekos, Michael Kaufmann, Dimitrios Papadopoulos, and Antonios Symvonis

On Making a Distinguished Vertex Minimum Degree by Vertex Deletion 123
Nadja Betzler, Robert Bredereck, Rolf Niedermeier, and Johannes Uhlmann

Randomized OBDDs for the Most Significant Bit of Multiplication Need Exponential Size 135
Beate Bollig and Marc Gillé

GreedyMAX-type Algorithms for the Maximum Independent Set Problem 146
Piotr Borowiecki and Frank Göring

Sequential Optimization of Matrix Chain Multiplication Relative to Different Cost Functions 157
Igor Chikalov, Shahid Hussain, and Mikhail Moshkov

One-Reversal Counter Machines and Multihead Automata: Revisited ... 166
Ehsan Chiniforooshan, Mark Daley, Oscar H. Ibarra, Lila Kari, and Shinnosuke Seki

Collisionless Gathering of Robots with an Extent 178
Andreas Cord-Landwehr, Bastian Degener, Matthias Fischer, Martina Hüllmann, Barbara Kempkes, Alexander Klaas, Peter Kling, Sven Kurras, Marcus Märtens, Friedhelm Meyer auf der Heide, Christoph Raupach, Kamil Swierkot, Daniel Warner, Christoph Weddemann, and Daniel Wonisch

Min-Max Coverage in Multi-interface Networks 190
Gianlorenzo D'Angelo, Gabriele Di Stefano, and Alfredo Navarra

Bandwidth Constrained Multi-interface Networks 202
Gianlorenzo D'Angelo, Gabriele Di Stefano, and Alfredo Navarra

A Privacy-Preserving ID-Based Group Key Agreement Scheme Applied in VPAN 214
Yoni De Mulder, Karel Wouters, and Bart Preneel

White Space Regions 226
Shayan Ehsani, MohammadAmin Fazli, Mohammad Ghodsi, MohammadAli Safari, Morteza Saghafian, and Mohammad Tavakkoli

New Results on the Complexity of the Max- and Min-Rep Problems 238
Robert Ganian

In-Place Sorting 248
Viliam Geffert and Jozef Gajdoš

On d-Regular Schematization of Embedded Paths 260
Andreas Gemsa, Martin Nöllenburg, Thomas Pajor, and Ignaz Rutter

Upward Point-Set Embeddability 272
Markus Geyer, Michael Kaufmann, Tamara Mchedlidze, and Antonios Symvonis

Cooperative Query Answering by Abstract Interpretation 284
Raju Halder and Agostino Cortesi

An Improved B+ Tree for Flash File Systems 297
Ferenc Havasi

Comparing GPU and CPU in OLAP Cubes Creation 308
Krzysztof Kaczmarski

A Power Consumption Analysis Technique Using UML-Based Design Models in Embedded Software Development 320
Doo-Hwan Kim, Jong-Phil Kim, and Jang-Eui Hong

Advice Complexity and Barely Random Algorithms 332
Dennis Komm and Richard Královič

Alternative Parameterizations for Cluster Editing 344
Christian Komusiewicz and Johannes Uhlmann

The Complexity of Finding kth Most Probable Explanations in Probabilistic Networks 356
Johan H.P. Kwisthout, Hans L. Bodlaender, and Linda C. van der Gaag

Optimal File-Distribution in Heterogeneous and Asymmetric Storage Networks 368
Tobias Langner, Christian Schindelhauer, and Alexander Souza

On the Complexity of the Metric TSP under Stability Considerations . . . 382
Matúš Mihalák, Marcel Schöngens, Rastislav Šrámek, and Peter Widmayer

Structural Properties of Hard Metric TSP Inputs (Extended Abstract) 394
Tobias Mömke

An Automata-Theoretical Characterization of Context-Free Trace Languages 406
Benedek Nagy and Friedrich Otto

Unambiguous UML Composite Structures: The OMEGA2 Experience 418
Iulian Ober and Iulia Dragomir

Comparing Linear Conjunctive Languages to Subfamilies of the Context-Free Languages 431
Alexander Okhotin

A Local Search Algorithm for Branchwidth 444
Arnold Overwijk, Eelko Penninkx, and Hans L. Bodlaender

Finding the Description of Structure by Counting Method: A Case Study 455
Ahti Peder and Mati Tombak

On Approximating the d-Girth of a Graph 467
David Peleg, Ignasi Sau, and Mordechai Shalom

SScAC: Towards a Framework for Small-Scale Software Architectures Comparison 482
Petr Praus, Slávka Jaroměřská, and Tomáš Černý

Folk Theorems on the Correspondence between State-Based and Event-Based Systems 494
Michel A. Reniers and Tim A.C. Willemse

Privacy, Liveliness and Fairness for Reputation 506
Stefan Schiffner, Sebastian Clauß, and Sandra Steinbrecher

Minimizing Interference for the Highway Model in Wireless Ad-Hoc and Sensor Networks 520
Haisheng Tan, Tiancheng Lou, Francis C.M. Lau, Yuexuan Wang, and Shiteng Chen

Join-Queries between Two Spatial Datasets Indexed by a Single R*-Tree 533
Michael Vassilakopoulos, Antonio Corral, and Nikitas N. Karanikolas

Information Leakage Analysis by Abstract Interpretation 545
Matteo Zanioli and Agostino Cortesi

Partition into Triangles on Bounded Degree Graphs 558
Johan M.M. van Rooij, Marcel E. van Kooten Niekerk, and Hans L. Bodlaender

Author Index 571