

Preface

This volume contains the papers accepted for the Student Research Forum and Poster section at the 41st Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM 2015), which was held January 24–29, 2015, in Pec pod Sněžkou, in the Czech Republic.

SOFSEM (originally SOFTware SEMinar) is devoted to leading research and fosters cooperation among researchers and professionals from academia and industry in all areas of computer science. SOFSEM started in 1974 in the former Czechoslovakia as a local conference and winter school combination. The renowned invited speakers and the growing interest of the authors from abroad gradually changed SOFSEM in the mid-1990s to an international conference with proceedings published in the Springer LNCS series. SOFSEM became a well-established and fully international conference maintaining the best of its original winter school aspects, such as a higher number of invited talks and an in-depth coverage of novel research results in selected areas of computer science. SOFSEM 2015 was organized around the following four tracks:

- Foundations of Computer Science (chaired by Roger Wattenhofer)
- Software and Web Engineering (chaired by Tiziana Margaria)
- Data, Information, and Knowledge Engineering (chaired by Jaroslav Pokorný)
- Cryptography, Security, and Verification (chaired by Jean-Jacques Quisquater)

With its four tracks, SOFSEM 2015 covered the latest advances in research, both theoretical and applied, in leading areas of computer science. The SOFSEM 2015 Program Committee consisted of 69 international experts from 23 different countries, representing the track areas with outstanding expertise.

An integral part of SOFSEM 2015 was the traditional SOFSEM Student Research Forum (chaired by Roman Špánek), organized with the aim of presenting student projects on both the theory and practice of computer science, and to give the students feedback on the originality of their results. The papers presented at the Student Research Forum were published in separate local proceedings.

In response to the call for papers, SOFSEM 2015 received 101 submissions from 31 different countries. The submissions were distributed in the conference tracks as follows: 59 in the Foundations of Computer Science, 11 in the Software and Web Engineering, 17 in the Data, Information, and Knowledge Engineering, and 14 in the Cryptography, Security, and Verification. From these, 31 submissions fell in the student category.

In response to the call for posters, SOFSEM 2015 received next 10 submissions.

After a detailed reviewing process (using the EasyChair conference system for an electronic discussion), a careful selection procedure was carried out within

each track. Following strict criteria of quality and originality, 42 papers were selected for presentation, namely: 26 in the Foundations of Computer Science, four in the Software and Web Engineering, eight in the Data, Information, and Knowledge Engineering, and four in the Cryptography, Security, and Verification. Based on the recommendation of the chair of the Student Research Forum, 12 student papers were chosen for the SOFSEM 2015 Student Research Forum.

As editors of these proceedings, we are grateful to everyone who contributed to the scientific program of the conference, especially the invited speakers and all the authors of contributed papers. We also thank the authors for their prompt responses to our editorial requests. SOFSEM 2015 was the result of a considerable effort by many people. We would like to express our special thanks to:

- The members of the SOFSEM 2015 Program Committee and all external reviewers for their careful reviewing of the submissions
- Roman Špánek for his preparation and handling of the Student Research Forum
- The SOFSEM Steering Committee, chaired by Július Štuller, for guidance and support throughout the preparation of the conference
- The Organizing Committee, consisting of Martin Řimnác (Chair), Július Štuller, Pavel Tyl, Dana Kuželová and Milena Zeithamlová, for the generous support and preparation of all aspects of the conference
- Springer’s LNCS series for its continued support of the SOFSEM conferences
- CEUR WS for publishing the student research forum papers and posters online

We are greatly indebted to the Action M Agency, in particular Milena Zeithamlová, for the local arrangements of SOFSEM 2015. We thank the Institute of Computer Science of the Academy of Sciences of the Czech Republic in Prague, for its invaluable support of all aspects of SOFSEM 2015. Finally, we are very grateful for the financial support of the Czech Society for Cybernetics and Informatics.

January 2015

Giuseppe F. Italiano
Tiziana Margaria
Jaroslav Pokorný
Jean-Jacques Quisquater
Roger Wattenhofer
Roman Špánek
Martin Řimnác

•= Steering Committee

Ivana Černá	Masaryk University, Brno, Czech Republic
Brian Matthews	STFC Rutherford Appleton Laboratory, United Kingdom
Mirosław Kutylowski	Wrocław University of Technology, Poland
Jan van Leeuwen	Utrecht University, The Netherlands
Branislav Rován	Comenius University, Bratislava, Slovakia
Petr Šaloun	Technical University of Ostrava, Czech Republic
Július Štuller, <i>Chair</i>	Institute of Computer Science, Academy of Sciences, Czech Republic

•= Program Committee**•= PC General Chair**

Giuseppe F. Italiano	University of Rome “Tor Vergata”, Italy
----------------------	---

•= Track Chairs

Roger Wattenhofer	ETH Zurich, Switzerland
Tiziana Margaria-Steffen	University of Limerick, Ireland
Jaroslav Pokorný	Charles University in Prague, Czech Republic
Jean-Jacques Quisquater	Catholic University of Louvain, Belgium

•= Student Research Forum Chair

Roman Špánek	Technical University of Liberec, Czech Republic
--------------	--

•= PC Members

Elena Andreeva	Leuven-Heverlee, Belgium
Zohra Anagnostopoulos	Lamia, Greece
Zohra Bellahsene	Montpellier, France
Petr Berka	Prague, Czech Republic
Malgorzata Biernacka	Wrocław, Poland
Laura Bocchi	London, United Kingdom
Goetz Botterweck	Limerick, Ireland
Samia Bouzefrane	Paris, France
Kevin Buchin	Eindhoven, The Netherlands
Ivana Černá	Brno, Czech Republic
Richard Chbeir	Anglet, France
Stéphanie Delaune	Cachan, France

VI SOFSEM 2015 Committees

Stefan Dobrev	Bratislava, Slovakia
Cezara Drăgoi	IST, Austria
Johann Eder	Klagenfurt, Austria
Uwe Egly	Wien, Austria
Michael Felderer	Innsbruck, Austria
Leszek Gasieniec	Liverpool, United Kingdom
Solange Ghernaouti	Lausanne, Switzerland
Inge Li Goertz	Lyngby, Denmark
Hele-Mai Haav	Tallinn, Estonia
Stephan Holzer	MIT, USA
Falk Howar	Dortmund, Germany
Theo Härder	Kaiserslautern, Germany
Taisuke Izumi	Nagoya, Japan
Hannu Jaakkola	Pori, Finland
Petteri Kaski	Aalto, Finland
Felix Klaedkte	NEC Europe, Germany
Stanislav Krajčí	Košice, Slovakia
Rastislav Kráľovič	Bratislava, Slovakia
Antonín Kučera	Prague, Czech Republic
Anna-Lena Lamprecht	Potsdam, Germany
Maryline Laurent	Paris, France
Óscar Pastor López	Valencia, Spain
Yannis Manolopoulos	Thessaloniki, Greece
Yves Métivier	Bordeaux, France
Tadeusz Morzy	Poznan, Poland
Kaisa Nyberg	Aalto, Finland
Gopal Pandurangan	Nanyang, Singapore
Tadeusz Pankowski	Poznan, Poland
Periklis Papakonstantinou	Tsinghua, China
Marina Papatriantafilou	Gothenburg, Sweden
Dirk Pattinson	Canberra, Australia
Olivier Pereira	Louvain, Belgium
Giuseppe Persiano	Salerno, Italy
Dimitris Pleousakis	Heraklion, Greece
Mila Dalla Preda	Verona, Italy
Andreas Rausch	Clausthal-Zellerfeld, Germany
Harald Sack	Potsdam, Germany
Ina Schäfer	Braunschweig, Germany
Stefan Schmid	T-Labs, Germany
Ulrich Schmid	Vienna, Austria
Markus Schordan	Livermore, USA
Cristina Seceleanu	Vasteras, Sweden
Martin Stanek	Bratislava, Slovakia
Srikanta Tirthapura	Ames, USA
Massimo Tisi	Nantes, France

A Min Tjoa	Wien, Austria
Remco Veltkamp	Utrecht, The Netherlands
Claire Vishik	Wakefield, USA
Peter Vojtáš	Prague, Czech Republic
Manuel Wimmer	Wien, Austria
Stefan Wolf	USI, Switzerland
Grigory Yaroslavtsev	Philadelphia, USA
Franco Zambonelli	Modena, Italy

•= Subreviewers

Aghiles Adjaz	Salvatore La Torre
Andris Ambainis	Anissa Lamani
Nikola Benes	Francois Le Gal
Tomas Brazdil	Lvzhou Li
Broňa Brejová	Yuanzhi Li
Witold Charatonik	Vahid Liaghat
Yijia, Chen	Kaitai Liang
Rajesh Chitnis	Peter Ljunglöf
Patrick Hagge Cording	Daniel Lokshtanov
Francesco Corman	Łukasik, Ewa
Anindya De	Ladislav Maršík
Kord Eickmeyer	Hernan Melgratti
Constantin Enea	Benjamin Mensing
Patryk Filipiak	Oscar Morales
Klaus-Tycho Förster	Ehab Morsy
Matthias Függer	Dejan Nickovic
Ariel Gabizon	Petr Novotný
Georgios Georgiadis	Thomas Nowak
Mohsen Ghaffari	Jan Obdrzalek
Alexander Golovnev	Svetlana Obraztsova
Nick Gravin	Gabriel Oksa
Dusan Guller	Hiroataka Ono
Abel Gómez	Jan Otop
Christoph Haase	Radha K.R. Pallavali
Petr Hlineny	Katarzyna Paluch
Fatiha Houacine	Debmalya Panigrahi
Bart M.P. Jansen	Panagiotis Papadakos
Artur Jež	Dana Pardubska
Christian Kissig	Martin Perner
Kim-Manuel Klein	Oleg Prokopyev
Haridimos Kondylakis	Jibran Rashid
Matthias Kowal	Vojtech Rehak
Kyriakos Kritikos	Saket Saurabh
Julius Köpke	A.C. Cem Say Alceste Scalas

VIII Organization

Randolf Schaerfig	Alceste Scalas
André Schulz	Yushi Uno
Manfred Schwarz	Søren Vind
Ayumi Shinohara	Imrich Vrto
Jiri Srba	Kira Vyatkina
Frank Stephan	Magnus Wahlström
Przemysław Stpicyński	Kyrill Winkler
Mária Svoreňová	Abuzer Yakaryilmaz
Li-Yang Tan	Anastasios Zouzias
Bangsheng Tang	Damien Zufferey

•= Organization


41st SOFSEM 2015 was organized by:

Institute of Computer Science, Academy of Sciences of the Czech Republic,
Prague
Action M Agency, Prague

•= Organizing Committee

Martin Římnáč, <i>Chair</i>	Institute of Computer Science, Prague, Czech Republic
Július Štuller	Institute of Computer Science, Prague, Czech Republic
Pavel Tyl	Technical University Liberec, Czech Republic
Dana Kuželová	Institute of Computer Science, Prague, Czech Republic
Milena Zeithamlová	Action M Agency, Prague, Czech Republic

•= Supported by

ČSKI – Czech Society for Cybernetics and Informatics 


SSCS – Slovak Society for Computer Science 

Table of Contents

STUDENT PAPERS

Foundations of Computer Science

Advantages of Ultrametric Counter Automata	1
<i>Valdis Ādamsons, Kārlis Jēriņš, Rihards Krišlauks, Marta Lapiņa, Andris Pakulis, and Rūsiņš Freivalds</i>	
Ultrametric Automata with One Head Versus Multihead Nondeterministic Automata	13
<i>Maksims Dimitrijevs and Irina Ščeguļnaja</i>	
Fast Primality Testing for Integers That Fit into a Machine Word	20
<i>Michal Forišek and Jakub Jančina</i>	
A Fixed-Parameter Algorithm for Max Edge Domination	31
<i>Tesshu Hanaka and Hirotaka Ono</i>	
Position Heaps for Permuted Pattern Matching on Multi-Track Strings . . .	41
<i>Takashi Katsura, Yuhei Otomo, Kazuyuki Narisawa, and Ayumi Shinohara</i>	

Software & Web Engineering

Performance Analysis Patterns for Requirements Analysis	54
<i>Azadeh Alebrahim</i>	

Cryptography, Security, and Verification

An Improved Transformation between HILL and Metric Conditional Pseudoentropy	67
<i>Maciej Skorski</i>	
Indistinguishability and Unpredictability Hardcore Lemmas: New Proofs with Applications to Pseudoentropy	78
<i>Maciej Skorski</i>	
Metric Pseudoentropy: Characterizations and Applications	90
<i>Maciej Skorski</i>	

POSTERS

Introduction to Android 5 Security	103
<i>Lukáš Aron and Petr Hanáček</i>	
Towards Indestructible Molecular Robots	112
<i>İlir Çapuni, Anisa Halimi, and Dorjan Hitaj</i>	
Experiments in Complexity of Probabilistic and Ultrametric Automata . . .	120
<i>Kristīne Čipola, Andris Pakulis, and Rūsiņš Freivalds</i>	
Measuring Complexity of Domain Standard Specifications using XML Schema Entropy	124
<i>George Feuerlicht, Vladimir Kovar, David Hartman, Marek Beranek, and Pavel Bory</i>	
Team Semantics and Recursive Enumerability	132
<i>Antti Kuusisto</i>	
Superimposed Codes and Query Algorithms	140
<i>Anete Lāce, Muntis Rudzītis, Ēriks Gopaks, and Rūsiņš Freivalds</i>	
Frequency Pushdown Automata	148
<i>Ilmārs Pužulis and Rūsiņš Freivalds</i>	
Implementing the Aho-Corasick Automata for Phonetic Search	154
<i>Ondřej Sýkora</i>	
Author Index	163