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Tools and Algorithms for the Construction and Analysis of Systems

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ETAPS Foreword

Welcome to the proceedings of ETAPS 2017, which was held in Uppsala! It was the first time ever that ETAPS took place in Scandinavia.

ETAPS 2017 was the 20th instance of the European Joint Conferences on Theory and Practice of Software. ETAPS is an annual federated conference established in 1998, and consists of five conferences: ESOP, FASE, FoSSaCS, TACAS, and POST. Each conference has its own Program Committee (PC) and its own Steering Committee. The conferences cover various aspects of software systems, ranging from theoretical computer science to foundations to programming language developments, analysis tools, formal approaches to software engineering, and security. Organizing these conferences in a coherent, highly synchronized conference program enables participation in an exciting event, offering the possibility to meet many researchers working in different directions in the field and to easily attend talks of different conferences. Before and after the main conference, numerous satellite workshops take place and attract many researchers from all over the globe.

ETAPS 2017 received 531 submissions in total, 159 of which were accepted, yielding an overall acceptance rate of 30%. I thank all authors for their interest in ETAPS, all reviewers for their peer reviewing efforts, the PC members for their contributions, and in particular the PC (co-)chairs for their hard work in running this entire intensive process. Last but not least, my congratulations to all authors of the accepted papers!

ETAPS 2017 was enriched by the unifying invited speakers Kim G. Larsen (Aalborg University, Denmark) and Michael Ernst (University of Washington, USA), as well as the conference-specific invited speakers (FoSSaCS) Joel Ouaknine (MPI-SWS, Germany, and University of Oxford, UK) and (TACAS) Dino Distefano (Facebook and Queen Mary University of London, UK). In addition, ETAPS 2017 featured a public lecture by Serge Abiteboul (Inria and ENS Cachan, France). Invited tutorials were offered by Véronique Cortier (CNRS research director at Loria, Nancy, France) on security and Ken McMillan (Microsoft Research Redmond, USA) on compositional testing. My sincere thanks to all these speakers for their inspiring and interesting talks!

ETAPS 2017 took place in Uppsala, Sweden, and was organized by the Department of Information Technology of Uppsala University. It was further supported by the following associations and societies: ETAPS e.V., EATCS (European Association for Theoretical Computer Science), EAPLS (European Association for Programming Languages and Systems), and EASST (European Association of Software Science and Technology). Facebook, Microsoft, Amazon, and the city of Uppsala financially supported ETAPS 2017. The local organization team consisted of Parosh Aziz Abdulla (general chair), Wang Yi, Björn Victor, Konstantinos Sagonas, Mohamed Faouzi Atig, Andreina Francisco, Kaj Lampka, Tjark Weber, Yunyun Zhu, and Philipp Rümmer.

The overall planning for ETAPS is the main responsibility of the Steering Committee, and in particular of its executive board. The ETAPS Steering Committee

consists of an executive board, and representatives of the individual ETAPS conferences, as well as representatives of EATCS, EAPLS, and EASST. The executive board consists of Gilles Barthe (Madrid), Holger Hermanns (Saarbrücken), Joost-Pieter Katoen (chair, Aachen and Twente), Gerald Lüttgen (Bamberg), Vladimiro Sassone (Southampton), Tarmo Uustalu (Tallinn), and Lenore Zuck (Chicago). Other members of the Steering Committee are: Parosh Abdulla (Uppsala), Amal Ahmed (Boston), Christel Baier (Dresden), David Basin (Zurich), Lujo Bauer (Pittsburgh), Dirk Beyer (Munich), Giuseppe Castagna (Paris), Tom Crick (Cardiff), Javier Esparza (Munich), Jan Friso Groote (Eindhoven), Jurriaan Hage (Utrecht), Reiko Heckel (Leicester), Marieke Huisman (Twente), Panagotios Katsaros (Thessaloniki), Ralf Küsters (Trier), Ugo del Lago (Bologna), Kim G. Larsen (Aalborg), Axel Legay (Rennes), Matteo Maffei (Saarbrücken), Tiziana Margaria (Limerick), Andrzej Murawski (Warwick), Catuscia Palamidessi (Palaiseau), Julia Rubin (Vancouver), Alessandra Russo (London), Mark Ryan (Birmingham), Don Sannella (Edinburgh), Andy Schürr (Darmstadt), Gabriele Taentzer (Marburg), Igor Walukiewicz (Bordeaux), and Hongseok Yang (Oxford).

I would like to take this opportunity to thank all speakers, attendees, organizers of the satellite workshops, and Springer for their support. Finally, a big thanks to Parosh and his local organization team for all their enormous efforts enabling a fantastic ETAPS in Uppsala!

April 2017

Joost-Pieter Katoen

Preface

TACAS 2017 was the 23rd edition of the International Conference on Tools and Algorithms for the Construction and Analysis of Systems. The conference took place during April 2017, in the Uppsala Concert and Congress Hall as part of the 19th European Joint Conferences on Theory and Practice of Software (ETAPS 2017).

TACAS is a forum for researchers, developers, and users interested in rigorously based tools and algorithms for the construction and analysis of systems. The conference aims to bridge the gaps between different communities with this common interest and to support them in their quest to improve the utility, reliability, flexibility, and efficiency of tools and algorithms for building systems.

As in former years, TACAS 2017 solicited four types of submissions:

- Research papers, identifying and justifying a principled advance to the theoretical foundations for the construction and analysis of systems, where applicable supported by experimental validation
- Case-study papers, reporting on case studies and providing information about the system being studied, the goals of the study, the challenges the system poses to automated analysis, research methodologies and approaches used, the degree to which goals were attained, and how the results can be generalized to other problems and domains
- Regular tool papers, presenting a new tool, a new tool component, or novel extensions to an existing tool, with an emphasis on design and implementation concerns, including software architecture and core data structures, practical applicability, and experimental evaluation
- Short tool-demonstration papers, focusing on the usage aspects of tools

This year, 181 papers were submitted to TACAS, among which 167 were research, case study, or tool papers, and 14 were tool demonstration papers. After a rigorous review process followed by an online discussion, the Program Committee accepted 48 full papers and four tool demonstration papers. This volume also includes an invited paper by the ETAPS unifying speaker Kim. G. Larsen titled “Validation, Synthesis, and Optimization for Cyber-Physical Systems” and an invited paper by TACAS invited speaker Dino Distefano titled “The Facebook Infer Static Analyzer.”

TACAS 2017 also hosted the 6th International Competition on Software Verification (SV-COMP), chaired and organized by Dirk Beyer. The competition again had a high participation: 32 verification tools from 12 countries were submitted for the systematic comparative evaluation, including two submissions from industry. This volume includes an overview of the competition results, and short papers describing 12 of the participating verification systems. These papers were reviewed by a separate Program Committee; each of the papers was assessed by four reviewers. One session in the TACAS program was reserved for the presentation of the results: the summary by the SV-COMP chair and the participating tools by the developer teams.

Many people worked hard and offered their valuable time generously to make TACAS 2017 successful. First, the chairs would like to thank the authors for submitting their papers to TACAS 2017. We are grateful to the reviewers who contributed to nearly 550 informed and detailed reports and discussions during the electronic Program Committee meeting. We also sincerely thank the Steering Committee for their advice. We also acknowledge the work of Parosh Aziz Abdulla and the local organizers for ETAPS 2017. Furthermore, we would like to express a special thanks to Joost-Pieter Katoen, who answered many of our questions during the preparation of TACAS 2017. Finally, we thank EasyChair for providing us with the infrastructure to manage the submissions, the reviewing process, the Program Committee discussion, and the preparation of the proceedings.

April 2017

Dirk Beyer
Axel Legay
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Abstracts of Invited Talks

Validation, Synthesis and Optimization for Cyber-Physical Systems

Kim Guldstrand Larsen

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Abstract. The growing complexity of Cyber-Physical Systems increasingly challenges existing methods and techniques. What is needed is a new generation of scalable tools for model-based learning, analysis, synthesis and optimization based on a mathematical sound foundation, that enables trade-offs between functional safety and quantitative performance. In paper we illustrate how recent branches of the UPPAAL tool suit are making an effort in this direction.

The Facebook Infer Static Analyser

Dino Distefano

Facebook Inc., Menlo Park, USA

Abstract. Infer is an open-source static analyser developed at Facebook [1]. Originally based on Separation Logic [2, 3], Infer has lately evolved from a specific tool for heap-manipulating programs to a general framework which facilitates the implementation of new static analyses.

In this talk, I will report on the Infer team’s experience of applying our tool to Facebook mobile code, each day helping thousands of engineers to build more reliable and secure software [4]. Moreover, I will discuss the team’s current effort to turn Infer into a static analysis platform for research and development useful both to academic researchers and industrial practitioners.

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