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Tools and Algorithms for the Construction and Analysis of Systems

18th International Conference, TACAS 2012
Held as Part of the European Joint Conferences
on Theory and Practice of Software, ETAPS 2012
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Proceedings



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Foreword

ETAPS 2012 is the fifteenth instance of the European Joint Conferences on Theory and Practice of Software. ETAPS is an annual federated conference that was established in 1998 by combining a number of existing and new conferences. This year it comprised six sister conferences (CC, ESOP, FASE, FOSSACS, POST, TACAS), 21 satellite workshops (ACCAT, AIPA, BX, BYTECODE, CMCS, DICE, FESCA, FICS, FIT, GRAPHITE, GT-VMT, HAS, IWIGP, LDTA, LINEARITY, MBT, MSFP, PLACES, QAPL, VSSE and WRLA), and eight invited lectures (excluding those specific to the satellite events).

The six main conferences received this year 606 submissions (including 21 tool demonstration papers), 159 of which were accepted (6 tool demos), giving an overall acceptance rate just above 26%. Congratulations therefore to all the authors who made it to the final programme! I hope that most of the other authors will still have found a way to participate in this exciting event, and that you will all continue to submit to ETAPS and contribute to making it the best conference on software science and engineering.

The events that comprise ETAPS address various aspects of the system development process, including specification, design, implementation, analysis, security and improvement. The languages, methodologies and tools that support these activities are all well within its scope. Different blends of theory and practice are represented, with an inclination towards theory with a practical motivation on the one hand and soundly based practice on the other. Many of the issues involved in software design apply to systems in general, including hardware systems, and the emphasis on software is not intended to be exclusive.

ETAPS is a confederation in which each event retains its own identity, with a separate Programme Committee and proceedings. Its format is open-ended, allowing it to grow and evolve as time goes by. Contributed talks and system demonstrations are in synchronised parallel sessions, with invited lectures in plenary sessions. Two of the invited lectures are reserved for ‘unifying’ talks on topics of interest to the whole range of ETAPS attendees. The aim of cramming all this activity into a single one-week meeting is to create a strong magnet for academic and industrial researchers working on topics within its scope, giving them the opportunity to learn about research in related areas, and thereby to foster new and existing links between work in areas that were formerly addressed in separate meetings.

This year, ETAPS welcomes a new main conference, *Principles of Security and Trust*, as a candidate to become a permanent member conference of ETAPS. POST is the first addition to our main programme since 1998, when the original five conferences met in Lisbon for the first ETAPS event. It combines the practically important subject matter of security and trust with strong technical connections to traditional ETAPS areas.

A step towards the consolidation of ETAPS and its institutional activities has been undertaken by the Steering Committee with the establishment of *ETAPS e.V.*, a non-profit association under German law. ETAPS e.V. was founded on April 1st, 2011 in Saarbrücken, and we are currently in the process of defining its structure, scope and strategy.

ETAPS 2012 was organised by the *Institute of Cybernetics at Tallinn University of Technology*, in cooperation with

- ▷ European Association for Theoretical Computer Science (EATCS)
- ▷ European Association for Programming Languages and Systems (EAPLS)
- ▷ European Association of Software Science and Technology (EASST)

and with support from the following sponsors, which we gratefully thank:

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The organising team comprised:

General Chair: *Tarmo Uustalu*

Satellite Events: *Keiko Nakata*

Organising Committee: *James Chapman, Juhan Ernits, Tiina Laasma, Monika Perkmann* and their colleagues in the *Logic and Semantics* group and *administration* of the *Institute of Cybernetics*

The ETAPS portal at <http://www.etaps.org> is maintained by *RWTH Aachen University*.

Overall planning for ETAPS conferences is the responsibility of its Steering Committee, whose current membership is:

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Scott Smolka (Stony Brook), Gabriele Taentzer (Marburg), Tarmo Uustalu (Tallinn), Dániel Varró (Budapest), Andrea Zisman (London), and Lenore Zuck (Chicago).

I would like to express my sincere gratitude to all of these people and organisations, the Programme Committee Chairs and PC members of the ETAPS conferences, the organisers of the satellite events, the speakers themselves, the many reviewers, all the participants, and Springer-Verlag for agreeing to publish the ETAPS proceedings in the ARCoSS subline.

Finally, I would like to thank the Organising Chair of ETAPS 2012, Tarmo Uustalu, and his Organising Committee, for arranging to have ETAPS in the most beautiful surroundings of Tallinn.

January 2012

Vladimiro Sassone
ETAPS SC Chair

Preface

This volume contains the proceedings of the 18th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS 2012). TACAS 2012 took place in Tallinn, Estonia, March 27–30, 2012, as part of the 15th European Joint Conferences on Theory and Practice of Software (ETAPS 2012), whose aims, organization, and history are presented in the foreword of this volume by the ETAPS Steering Committee Chair, Vladimiro Sassone.

TACAS is a forum for researchers, developers, and users interested in rigorously based tools and algorithms for the construction and analysis of systems. The research areas covered by TACAS include, but are not limited to, formal methods, software and hardware verification, static analysis, programming languages, software engineering, real-time systems, communications protocols, and biological systems. The TACAS forum provides a venue for such communities at which common problems, heuristics, algorithms, data structures, and methodologies can be discussed and explored.

This year TACAS solicited four kinds of papers. Research papers are full-length papers that contain novel research on topics within the scope of the TACAS conference and relevant to tool construction. Case study papers report on case studies, describing goals of the study and the research methodologies and approach used. Regular tool papers present a new tool, a new tool component, or novel extensions to an existing tool, and focus primarily on engineering aspects. Tool demonstration papers are shorter papers that give an overview of a particular tool and its applications or evaluation.

This edition of the conference attracted a total of 147 submissions (108 research papers, 7 case study papers, 11 regular tool papers, and 21 tool demonstration papers). Each submission was evaluated by at least three reviewers, who wrote detailed evaluations and gave insightful comments. After a six-week reviewing process, we had a three-week electronic Program Committee meeting, during which we accepted 36 papers (25 research papers, 2 case study papers, 3 regular tool papers, and 6 tool demonstration papers) for presentation at the conference. In addition, the TACAS conference program was greatly enriched by the invited talk by Holger Hermanns and by the ETAPS unifying speakers Bruno Blanchet and Georg Gottlob.

One novel aspect of TACAS this year was the inclusion of a Competition on Software Verification. This volume includes an overview of the competition organization and results, presented by the TACAS Competition Chair Dirk Beyer, as well as short papers describing individual tools in the competition.

We would like to thank the authors of all submitted papers, the Program Committee members, and the external referees for their invaluable contributions. We also thank Alessandro Cimatti for serving as the TACAS Tool Chair and Dirk Beyer for organizing the Competition on Software Verification. The

EasyChair system greatly facilitated the TACAS conference submission and program selection process. Finally, we would like to express our appreciation to the ETAPS Steering Committee and especially its Chair, Vladimiro Sassone, as well as the Organizing Committee, for their efforts in making ETAPS 2012 such a successful event.

January 2012

Cormac Flanagan
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Table of Contents

Invited Contribution

Quantitative Models for a Not So Dumb Grid	1
<i>Holger Hermanns</i>	

SAT and SMT Based Methods

History-Aware Data Structure Repair Using SAT	2
<i>Razieh Nokhbeh Zaeem, Divya Gopinath, Sarfraz Khurshid, and Kathryn S. McKinley</i>	
The Guardol Language and Verification System	18
<i>David Hardin, Konrad Slind, Michael Whalen, and Tuan-Hung Pham</i>	
A Bit Too Precise? Bounded Verification of Quantized Digital Filters ...	33
<i>Arlen Cox, Sriram Sankaranarayanan, and Bor-Yuh Evan Chang</i>	
Numeric Bounds Analysis with Conflict-Driven Learning	48
<i>Vijay D'Silva, Leopold Haller, Daniel Kroening, and Michael Tautschnig</i>	

Automata

Ramsey-Based Analysis of Parity Automata	64
<i>Oliver Friedmann and Martin Lange</i>	
VATA: A Library for Efficient Manipulation of Non-deterministic Tree Automata	79
<i>Ondřej Lengál, Jiří Šimáček, and Tomáš Vojnar</i>	
LTL to Büchi Automata Translation: Fast and More Deterministic	95
<i>Tomáš Babiak, Mojmír Křetínský, Vojtěch Řehák, and Jan Strejček</i>	

Model Checking

Pushdown Model Checking for Malware Detection	110
<i>Fu Song and Tayssir Touili</i>	
Aspect-Oriented Runtime Monitor Certification	126
<i>Kevin W. Hamlen, Micah M. Jones, and Meera Sridhar</i>	

Partial Model Checking Using Networks of Labelled Transition Systems and Boolean Equation Systems	141
<i>Frédéric Lang and Radu Mateescu</i>	

From Under-Approximations to Over-Approximations and Back	157
<i>Aws Albarghouthi, Arie Gurfinkel, and Marsha Chechik</i>	

Case Studies

Automated Analysis of AODV Using UPPAAL	173
<i>Ansgar Fehnker, Rob van Glabbeek, Peter Höfner, Annabelle McIver, Marius Portmann, and Wee Lum Tan</i>	

Modeling and Verification of a Dual Chamber Implantable Pacemaker	188
<i>Zhihao Jiang, Miroslav Pajic, Salar Moarref, Rajeev Alur, and Rahul Mangharam</i>	

Memory Models and Termination

Counter-Example Guided Fence Insertion under TSO	204
<i>Parosh Aziz Abdulla, Mohamed Faouzi Atig, Yu-Fang Chen, Carl Leonardsson, and Ahmed Rezzine</i>	

Java Memory Model-Aware Model Checking	220
<i>Huafeng Jin, Tuba Yavuz-Kahveci, and Beverly A. Sanders</i>	

Compositional Termination Proofs for Multi-threaded Programs	237
<i>Corneliu Popsea and Andrey Rybalchenko</i>	

Deciding Conditional Termination	252
<i>Marius Bozga, Radu Iosif, and Filip Konečný</i>	

Internet Protocol Verification

The AVANTSSAR Platform for the Automated Validation of Trust and Security of Service-Oriented Architectures	267
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*Alessandro Armando, Wihem Arzac, Tigran Avanesov,
Michele Barletta, Alberto Calvi, Alessandro Cappai,
Roberto Carbone, Yannick Chevalier, Luca Compagna,
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Serena Elisa Ponta, Marco Rocchetto, Michael Rusinowitch,
Mohammad Torabi Dashti, Mathieu Turuani, and Luca Viganò*

Reduction-Based Formal Analysis of BGP Instances	283
<i>Anduo Wang, Carolyn Talcott, Alexander J.T. Gurney, Boon Thau Loo, and Andre Scedrov</i>	

Stochastic Model Checking

Minimal Critical Subsystems for Discrete-Time Markov Models	299
<i>Ralf Wimmer, Nils Jansen, Erika Ábrahám, Bernd Becker, and Joost-Pieter Katoen</i>	
Automatic Verification of Competitive Stochastic Systems	315
<i>Taolue Chen, Vojtěch Forejt, Marta Kwiatkowska, David Parker, and Aistis Simaitis</i>	
Coupling and Importance Sampling for Statistical Model Checking	331
<i>Benoît Barbot, Serge Haddad, and Claudine Picaronny</i>	
Verifying pCTL Model Checking	347
<i>Johannes Hölzl and Tobias Nipkow</i>	

Synthesis

Parameterized Synthesis	362
<i>Sven Jacobs and Roderick Bloem</i>	
QuteRTL: Towards an Open Source Framework for RTL Design Synthesis and Verification	377
<i>Hu-Hsi Yeh, Cheng-Yin Wu, and Chung-Yang (Ric) Huang</i>	
Template-Based Controller Synthesis for Timed Systems	392
<i>Bernd Finkbeiner and Hans-Jörg Peter</i>	

Provers and Analysis Techniques

Zeno: An Automated Prover for Properties of Recursive Data Structures	407
<i>William Sonnex, Sophia Drossopoulou, and Susan Eisenbach</i>	
A Proof Assistant for Alloy Specifications	422
<i>Mattias Ulbrich, Ulrich Geilmann, Aboubakr Achraf El Ghazi, and Mana Taghdiri</i>	
Reachability under Contextual Locking	437
<i>Rohit Chadha, P. Madhusudan, and Mahesh Viswanathan</i>	
Bounded Phase Analysis of Message-Passing Programs	451
<i>Ahmed Bouajjani and Michael Emmi</i>	

Tool Demonstrations

Demonstrating Learning of Register Automata	466
<i>Maik Merten, Falk Howar, Bernhard Steffen, Sofia Cassel, and Bengt Jonsson</i>	

Symbolic Automata: The Toolkit	472
<i>Margus Veanes and Nikolaj Bjørner</i>	
McScM: A General Framework for the Verification of Communicating Machines	478
<i>Alexander Heußner, Tristan Le Gall, and Grégoire Sutre</i>	
SLMC: A Tool for Model Checking Concurrent Systems against Dynamical Spatial Logic Specifications	485
<i>Luís Caires and Hugo Torres Vieira</i>	
TAPAAL 2.0: Integrated Development Environment for Timed-Arc Petri Nets.....	492
<i>Alexandre David, Lasse Jacobsen, Morten Jacobsen, Kenneth Yrke Jørgensen, Mikael H. Møller, and Jiří Srba</i>	
A Platform for High Performance Statistical Model Checking – PLASMA.....	498
<i>Cyrille Jegourel, Axel Legay, and Sean Sedwards</i>	
Competition on Software Verification	
Competition on Software Verification (SV-COMP)	504
<i>Dirk Beyer</i>	
Predicate Analysis with BLAST 2.7 (Competition Contribution)	525
<i>Pavel Shved, Mikhail Mandrykin, and Vadim Mutilin</i>	
CPACHECKER with Adjustable Predicate Analysis (Competition Contribution)	528
<i>Stefan Löwe and Philipp Wendler</i>	
Block Abstraction Memoization for CPAchecker (Competition Contribution)	531
<i>Daniel Wonisch</i>	
Context-Bounded Model Checking with ESBMC 1.17 (Competition Contribution)	534
<i>Lucas Cordeiro, Jeremy Morse, Denis Nicole, and Bernd Fischer</i>	
Proving Reachability Using FSHELL (Competition Contribution)	538
<i>Andreas Holzer, Daniel Kroening, Christian Schallhart, Michael Tautschnig, and Helmut Veith</i>	
LLBMC: A Bounded Model Checker for LLVM's Intermediate Representation (Competition Contribution)	542
<i>Carsten Sinz, Florian Merz, and Stephan Falke</i>	

Predator: A Verification Tool for Programs with Dynamic Linked Data Structures (Competition Contribution)	545
<i>Kamil Dudka, Petr Müller, Petr Peringer, and Tomáš Vojnar</i>	
HSF(C): A Software Verifier Based on Horn Clauses (Competition Contribution)	549
<i>Sergey Grebenshchikov, Ashutosh Gupta, Nuno P. Lopes, Corneliu Popeea, and Andrey Rybalchenko</i>	
SatAbs: A Bit-Precise Verifier for C Programs (Competition Contribution)	552
<i>Gérard Basler, Alastair Donaldson, Alexander Kaiser, Daniel Kroening, Michael Tautschnig, and Thomas Wahl</i>	
WOLVERINE: Battling Bugs with Interpolants (Competition Contribution)	556
<i>Georg Weissenbacher, Daniel Kroening, and Sharad Malik</i>	
Author Index	559