Lecture Notes in Computer Science

3707

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

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

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

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

New York University, NY, USA

Doug Tygar

University of California, Berkeley, CA, USA

Moshe Y. Vardi

Rice University, Houston, TX, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Doron A. Peled Yih-Kuen Tsay (Eds.)

Automated Technology for Verification and Analysis

Third International Symposium, ATVA 2005 Taipei, Taiwan, October 4-7, 2005 Proceedings



Volume Editors

Doron A. Peled University of Warwick Department of Computer Science Coventry, CV4 7AL, UK E-mail: doron@dcs.warwick.ac.uk

Yih-Kuen Tsay National Taiwan University Department of Information Management No. 1, Sec. 4, Roosevelt Rd., Taipei 106, Taiwan (ROC) E-mail: tsay@im.ntu.edu.tw

Library of Congress Control Number: 2005932760

CR Subject Classification (1998): B.1.2, B.2.2, B.5.2, B.6, B.7.2, C.2, C.3, D.2, D.3, F.3

ISSN 0302-9743

ISBN-10 3-540-29209-8 Springer Berlin Heidelberg New York ISBN-13 978-3-540-29209-8 Springer 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. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2005 Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India Printed on acid-free paper SPIN: 11562948 06/3142 5 4 3 2 1 0

Preface

The Automated Technology for Verification and Analysis (ATVA) international symposium series was initiated in 2003, responding to a growing interest in formal verification spurred by the booming IT industry, particularly hardware design and manufacturing in East Asia. Its purpose is to promote research on automated verification and analysis in the region by providing a forum for interaction between the regional and the international research/industrial communities of the field. ATVA 2005, the third of the ATVA series, was held in Taipei, Taiwan, October 4–7, 2005. The main theme of the symposium encompasses design, complexities, tools, and applications of automated methods for verification and analysis. The symposium was co-located and had a two-day overlap with FORTE 2005, which was held October 2–5, 2005.

We received a total of 95 submissions from 17 countries. Each submission was assigned to three Program Committee members, who were helped by their subreviewers, for rigorous and fair evaluation. The final deliberation by the Program Committee was conducted over email for a duration of about 10 days after nearly all review reports had been collected. In the end, 33 papers were selected for inclusion in the program. ATVA 2005 had three keynote speeches given respectively by Amir Pnueli (joint with FORTE 2005), Zohar Manna, and Wolfgang Thomas. The main symposium was preceded by a tutorial day, consisting of three two-hour lectures given also by the keynote speakers.

ATVA 2005 was supported by National Science Council, Ministry of Education, and Academia Sinica of Taiwan and also by the Center for Information and Electronics Technologies at National Taiwan University and Cadence Design Systems. Their generous sponsorships are gratefully acknowledged. We would like to thank the Program Committee members and their subreviewers for the hard work in evaluating the submissions and selecting the program. We thank the keynote speakers for their extra effort in delivering the tutorials. We thank the Steering Committee for their advice, particularly Farn Wang, who also served as program chair of the two previous ATVA symposia and of FORTE 2005, for providing many valuable suggestions and for being very cooperative with the joint events of ATVA 2005 and FORTE 2005.

For administrative support, we thank the Department of Information Management and the Department of Electrical Engineering at National Taiwan University. In particular, we thank Mr. Yu-Fang Chen for maintaining the conference Web site among many other administrative chores. We thank also the MyReview team for making available a free and convenient submission system.

Organization

Steering Committee

E. Allen Emerson University of Texas at Austin, USA

Oscar H. Ibarra University of California, Santa Barbara, USA

Insup Lee University of Pennsylvania, USA Doron A. Peled University of Warwick, UK

Farn Wang National Taiwan University, Taiwan Hsu-Chun Yen National Taiwan University, Taiwan

General Chair

Insup Lee University of Pennsylvania, USA

Program Committee

Parosh Aziz Abdulla Uppsala University, Sweden Rajeev Alur University of Pennsylvania, USA Christel Baier University of Bonn, Germany

Tevfik Bultan University of California, Santa Barbara, USA Yung-Pin Cheng National Taiwan Normal University, Taiwan

Ching-Tsun Chou Intel, USA

Jin Song Dong National University of Singapore, Singapore

Susanne Graf VERIMAG, France
Teruo Higashino Osaka University, Japan

Pei-Hsin Ho

Gerard J. Holzmann

NASA/JPL, USA

NASA/JPL, USA

Pao-Ann Hsiung National Chung Cheng University, Taiwan Chung-Yang Huang National Taiwan University, Taiwan

Oscar H. Ibarra University of California, Santa Barbara, USA

Bengt Jonsson Uppsala University, Sweden Orna Kupferman Hebrew University, Israel

Robert P. Kurshan Cadence, USA

Shaoying Liu Hosei University, Japan

Doron A. Peled University of Warwick, UK (Co-chair)

Scott Smolka SUNY, Stony Brook, USA

Yih-Kuen Tsay National Taiwan University, Taiwan (Co-chair)

Moshe Y. Vardi Rice University, USA Bow-Yaw Wang Academia Sinica, Taiwan

Hsu-Chun Yen National Taiwan University, Taiwan Tomohiro Yoneda Tokyo Institute of Technology, Japan Lenore Zuck University of Illinois, Chicago, USA

Local Arrangements

Chung-Yang Huang National Taiwan University, Taiwan

Bow-Yaw Wang Academia Sinica, Taiwan

Reviewers

Zaher S. Andraus Kiyoharu Hamaguchi Kai Salomaa Ittai Balaban Ziyad Hanna Pierluigi San F

Ittai Balaban Ziyad Hanna Pierluigi San Pietro Constantinos Bartzis Kunihiko Hiraishi Hiroyuki Seki Samik Basu Chun-Hsian Huang Oleg Sokolsky

Frederic Beal Geng-Dian Huang Martin Steffen
Aysu Betin-Can Marcin Jurdzinski Scott Stoller

Per Bjesse Andreas Kassler Jun Sun

Bernhard Boigelot Tomoya Kitani Ashutosh Trivedi Chunqing Chen Barbara König Ming-Hsien Tsai Yean-Ru Chen Gregor von Laszewksi Tatsuhiro Tsuchiya

Yu-Fang Chen Martin Leucker Takaaki Umedu Johann Deneux Yuan Fang Li Björn Victor Yifei Dong Shang-Wei Lin Dirk Walther Julien Dorso Annie Liu Dong Wang

Ashvin Dsouza Shiyong Lu Heike Wehrheim Lars-Henrik Eriksson Rupak Majumdar Frank Wolter Yi Fang Oded Maler Keh-Ren Wu

Yuzheng Feng In-Ho Moon Ping Yang Martin Fränzle Akio Nakata Pei Ye Xiang Fu Andrei Paun Wang Yi Noriyuki Fujimoto Andreas Podelski Fang Yu

Jim Grundy Hongyang Qu Gaoyan Xie Anubhav Gupta Jakob Rehof

Sponsoring Institutions

National Science Council, Taiwan (ROC)

Ministry of Education, Taiwan

Institute of Information Science, Academia Sinica, Taiwan

National Taiwan University (NTU), Taiwan

Center for Information and Electronics Technologies, NTU, Taiwan

Department of Information Management, NTU, Taiwan

Department of Electrical Engineering, NTU, Taiwan

Cadence Design Systems

Table of Contents

Keynote Speeches

Ranking Abstraction as a Companion to Predicate Abstraction Amir Pnueli	1
Termination and Invariance Analysis of Loops Aaron Bradley, Zohar Manna	2
Some Perspectives of Infinite-State Verification Wolfgang Thomas	3
Model Checking	
Verifying Very Large Industrial Circuits Using 100 Processes and Beyond	
Limor Fix, Orna Grumberg, Amnon Heyman, Tamir Heyman, Assaf Schuster	11
A New Reachability Algorithm for Symmetric Multi-processor Architecture	
Debashis Sahoo, Jawahar Jain, Subramanian Iyer, David Dill	26
Comprehensive Verification Framework for Dependability of Self-optimizing Systems	
Y. Zhao, M. Kardos, S. Oberthür, F.J. Rammig	39
Exploiting Hub States in Automatic Verification Giuseppe Della Penna, Igor Melatti, Benedetto Intrigila,	
Enrico Tronci	54
Combined Methods	
An Approach for the Verification of SystemC Designs Using AsmL Ali Habibi, Sofiène Tahar	69
Decomposition-Based Verification of Cyclic Workflows Yongsun Choi, J. Leon Zhao	84

Timed, Embedded, a	and Hybrid Systen	\mathbf{s} (I)
--------------------	-------------------	------------------

Non-linear Robust Discrete Time Hybrid Systems Werner Damm, Guilherme Pinto, Stefan Ratschan	99
Computation Platform for Automatic Analysis of Embedded Software Systems Using Model Based Approach A. Dubey, X. Wu, H. Su, T.J. Koo	114
Quantitative and Qualitative Analysis of Temporal Aspects of Complex Activities Andrei Voinikonis	129
Automatic Test Case Generation with Region-Related Coverage Annotations for Real-Time Systems Geng-Dian Huang, Farn Wang	144
Abstraction and Reduction Techniques	
Selective Search in Bounded Model Checking of Reachability Properties Maciej Szreter	159
Predicate Abstraction of RTL Verilog Descriptions Using Constraint Logic Programming Tun Li, Yang Guo, SiKun Li, GongJie Liu	174
State Space Exploration of Object-Based Systems Using Equivalence Reduction and the Sweepline Method Charles A. Lakos, Lars M. Kristensen	187
Syntactical Colored Petri Nets Reductions S. Evangelista, S. Haddad, JF. Pradat-Peyre	202
Decidability and Complexity	
Algorithmic Algebraic Model Checking II: Decidability of Semi-algebraic Model Checking and Its Applications to Systems Biology V. Mysore, C. Piazza, B. Mishra	217
A Static Analysis Using Tree Automata for XML Access Control Isao Yagi, Yoshiaki Takata, Hiroyuki Seki	234

Table of Contents	XI
Reasoning About Transfinite Sequences Stéphane Demri, David Nowak	248
Semi-automatic Distributed Synthesis Bernd Finkbeiner, Sven Schewe	263
Established Formalisms and Standards	
A New Graph of Classes for the Preservation of Quantitative Temporal Constraints	
Xiaoyu Mao, Janette Cardoso, Robert Valette	278
Comparison of Different Semantics for Time Petri Nets B. Bérard, F. Cassez, S. Haddad, Didier Lime, O.H. Roux	293
Introducing Dynamic Properties with Past Temporal Operators in the B Refinement	
Mouna Saad, Leila Jemni Ben Ayed	308
Approximate Reachability for Dead Code Elimination in Esterel* Olivier Tardieu, Stephen A. Edwards	323
Compositional Verification and Games	
Synthesis of Interface Automata Purandar Bhaduri	338
Multi-valued Model Checking Games Sharon Shoham, Orna Grumberg	354
Timed, Embedded, and Hybrid Systems (II)	
Model Checking Prioritized Timed Automata Shang-Wei Lin, Pao-Ann Hsiung, Chun-Hsian Huang, Yean-Ru Chen	370
An MTBDD-Based Implementation of Forward Reachability for Probabilistic Timed Automata Fuzhi Wang, Marta Kwiatkowska	385
Protocols Analysis, Case Studies, and Tools	909
An EFSM-Based Intrusion Detection System for Ad Hoc Networks Jean-Marie Orset, Baptiste Alcalde, Ana Cavalli	400

XII Table of Contents

Modeling and Verification of a Telecommunication Application Using Live Sequence Charts and the Play-Engine Tool Pierre Combes, David Harel, Hillel Kugler	414
Formal Construction and Verification of Home Service Robots: A Case Study	
Moonzoo Kim, Kyo Chul Kang	429
Model Checking Real Time Java Using Java PathFinder Gary Lindstrom, Peter C. Mehlitz, Willem Visser	444
Infinite-State and Parameterized Systems	
Using Parametric Automata for the Verification of the Stop-and-Wait Class of Protocols Guy Edward Gallasch, Jonathan Billington	457
Flat Acceleration in Symbolic Model Checking Sébastien Bardin, Alain Finkel, Jérôme Leroux, Philippe Schnoebelen	474
Flat Counter Automata Almost Everywhere! Jérôme Leroux, Grégoire Sutre	489
Author Index	505