# Table of Contents

Rob Tristan Gerth: 1956–2003 .................................................. 1

Static Program Analysis via 3-Valued Logic ............................ 15
  Thomas W. Reps, Mooly Sagiv, and Reinhard Wilhelm

Deductive Verification of Pipelined Machines
Using First-Order Quantification ........................................... 31
  Sandip Ray and Warren A. Hunt, Jr.

A Formal Reduction for Lock-Free Parallel Algorithms ................. 44
  Hui Gao and Wim H. Hesselink

An Efficiently Checkable, Proof-Based Formulation of Vacuity
in Model Checking ............................................................ 57
  Kedar S. Namjoshi

Termination of Linear Programs ............................................ 70
  Ashish Tiwari

Symbolic Model Checking of Non-regular Properties .................. 83
  Martin Lange

Proving More Properties with Bounded Model Checking ............ 96
  Mohammad Awedh and Fabio Somenzi

Parallel LTL-X Model Checking of High-Level Petri Nets
Based on Unfoldings .......................................................... 109
  Claus Schröter and Victor Khomenko

Using Interface Refinement to Integrate Formal Verification
into the Design Cycle ....................................................... 122
  Jacob Chang, Sergey Berezin, and David L. Dill

Indexed Predicate Discovery for Unbounded System Verification ..... 135
  Shuvendu K. Lahiri and Randal E. Bryant

Range Allocation for Separation Logic .................................. 148
  Muralidhar Talupur, Nishant Sinha, Ofer Strichman, and Amir Pnueli

An Experimental Evaluation of Ground Decision Procedures ....... 162
  Leonardo de Moura and Harald Rueß
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPLL(T): Fast Decision Procedures</td>
<td>175</td>
</tr>
<tr>
<td><em>Harald Ganzinger, George Hagen, Robert Nieuwenhuis, Albert Oliveras, and Cesare Tinelli</em></td>
<td></td>
</tr>
<tr>
<td>Verifying (\omega)-Regular Properties of Markov Chains</td>
<td>189</td>
</tr>
<tr>
<td><em>Doron Bustan, Sasha Rubin, and Moshe Y. Vardi</em></td>
<td></td>
</tr>
<tr>
<td>Statistical Model Checking of Black-Box Probabilistic Systems</td>
<td>202</td>
</tr>
<tr>
<td><em>Koushik Sen, Mahesh Viswanathan, and Gul Agha</em></td>
<td></td>
</tr>
<tr>
<td>Compositional Specification and Model Checking in GSTE</td>
<td>216</td>
</tr>
<tr>
<td><em>Jin Yang and Carl-Johan H. Seger</em></td>
<td></td>
</tr>
<tr>
<td>GSTE Is Partitioned Model Checking</td>
<td>229</td>
</tr>
<tr>
<td><em>Roberto Sebastiani, Eli Singerman, Stefano Tonetta, and Moshe Y. Vardi</em></td>
<td></td>
</tr>
<tr>
<td>Stuck-Free Conformance</td>
<td>242</td>
</tr>
<tr>
<td><em>Cédric Fournet, Tony Hoare, Sriram K. Rajamani, and Jakob Rehof</em></td>
<td></td>
</tr>
<tr>
<td>Symbolic Simulation, Model Checking and Abstraction with Partially Ordered Boolean Functional Vectors</td>
<td>255</td>
</tr>
<tr>
<td><em>Amit Goel and Randal E. Bryant</em></td>
<td></td>
</tr>
<tr>
<td>Functional Dependency for Verification Reduction</td>
<td>268</td>
</tr>
<tr>
<td><em>Jie-Hong R. Jiang and Robert K. Brayton</em></td>
<td></td>
</tr>
<tr>
<td>Verification via Structure Simulation</td>
<td>281</td>
</tr>
<tr>
<td><em>Niel Immerman, Alexander Rabinovich, Thomas W. Reps, Mooly Sagiv, and Great Yorsh</em></td>
<td></td>
</tr>
<tr>
<td>Symbolic Parametric Safety Analysis of Linear Hybrid Systems with BDD-Like Data-Structures</td>
<td>295</td>
</tr>
<tr>
<td><em>Farn Wang</em></td>
<td></td>
</tr>
<tr>
<td>Abstraction-Based Satisfiability Solving of Presburger Arithmetic</td>
<td>308</td>
</tr>
<tr>
<td><em>Daniel Kroening, Joël Ouaknine, Sanjit A. Seshia, and Ofer Strichman</em></td>
<td></td>
</tr>
<tr>
<td>Widening Arithmetic Automata</td>
<td>321</td>
</tr>
<tr>
<td><em>Constantinos Bartzis and Tevfik Bultan</em></td>
<td></td>
</tr>
<tr>
<td>Why Model Checking Can Improve WCET Analysis</td>
<td>334</td>
</tr>
<tr>
<td><em>Alexander Metzner</em></td>
<td></td>
</tr>
<tr>
<td>Regular Model Checking for LTL(MSO)</td>
<td>348</td>
</tr>
<tr>
<td><em>Parosh Aziz Abdulla, Bengt Jonsson, Marcus Nilsson, Julien d’Orso, and Mayank Saksena</em></td>
<td></td>
</tr>
<tr>
<td>Image Computation in Infinite State Model Checking</td>
<td>361</td>
</tr>
<tr>
<td><em>Alain Finkel and Jérôme Leroux</em></td>
<td></td>
</tr>
</tbody>
</table>
Abstract Regular Model Checking ................................................. 372
Ahmed Bouajjani, Peter Habermehl, and Tomáš Vojnar

Global Model-Checking of Infinite-State Systems .......................... 387
Nir Piterman and Moshe Y. Vardi

QB or Not QB: An Efficient Execution Verification Tool
for Memory Orderings .......................................................... 401
Ganesh Gopalakrishnan, Yue Yang, and Hemanthkumar Sivaraj

Verification of an Advanced mips-Type Out-of-Order
Execution Algorithm .......................................................... 414
Tamarah Arons

Automatic Verification of Sequential Consistency for Unbounded
Addresses and Data Values .................................................... 427
Jesse Bingham, Anne Condon, Alan J. Hu, Shaz Qadeer,
and Zhichuan Zhang

Efficient Modeling of Embedded Memories in Bounded Model Checking.. 440
Malay K. Ganai, Aarti Gupta, and Pranav Ashar

Understanding Counterexamples with explain ............................ 453
Alex Groce, Daniel Kroening, and Flavio Lerda

ZAPATO: Automatic Theorem Proving
for Predicate Abstraction Refinement ........................................ 457
Thomas Ball, Byron Cook, Shuvendu K. Lahiri, and Lintao Zhang

JNuke: Efficient Dynamic Analysis for Java .............................. 462
Cyrille Artho, Viktor Schuppan, Armin Biere, Pascal Eugster,
Marcel Baur, and Boris Zweimüller

The HiVy Tool Set ..................................................................... 466
Paula J. Pingree and Erich Mikk

OBSSLICE: A Timed Automata Slicer Based on Observers .......... 470
Víctor Braberman, Diego Garbervetsky, and Alfredo Olivero

The UCLID Decision Procedure ............................................... 475
Shuvendu K. Lahiri and Sanjit A. Seshia

MCK: Model Checking the Logic of Knowledge .......................... 479
Peter Gammie and Ron van der Meyden

Zing: A Model Checker for Concurrent Software ......................... 484
Tony Andrews, Shaz Qadeer, Sriram K. Rajamani,
Jakob Rehof, and Yichen Xie
## Table of Contents

The Mec 5 Model-Checker ..................................................... 488  
*Alain Griffault and Aymeric Vincent*

PlayGame: A Platform for Diagnostic Games ........................ 492  
*Li Tan*

SAL 2 ................................................................. 496  
*Leonardo de Moura, Sam Owre, Harald Rueß, John Rushby,  
  N. Shankar, Maria Sorea, and Ashish Tiwari*

Formal Analysis of Java Programs in JavaFAN ....................... 501  
*Azadeh Farzan, Feng Chen, José Meseguer, and Grigore Roşu*

A Toolset for Modelling and Verification of GALS Systems ........ 506  
*S. Ramesh, Sampada Sonalkar, Vijay D’silva, Naveen Chandra R.,  
  and B. Vijayalakshmi*

WSAT: A Tool for Formal Analysis of Web Services ................... 510  
*Xiang Fu, Tevfik Bultan, and Jianwen Su*

CVC Lite: A New Implementation  
of the Cooperating Validity Checker – Category B ...................... 515  
*Clark Barrett and Sergey Berezin*

CirCUs: A Satisfiability Solver Geared  
towards Bounded Model Checking. ................................. 519  
*HoonSang Jin, Mohammad Awedh, and Fabio Somenzi*

Mechanical Mathematical Methods for Microprocessor Verification .... 523  
*Warren A. Hunt, Jr.*

**Author Index** .......................................................... 535
Computer Aided Verification
16th International Conference, CAV 2004, Boston, MA, USA, July 13-17, 2004, Proceedings
Alur, R.; Peled, D. (Eds.)
2004, XII, 536 p., Softcover
ISBN: 978-3-540-22342-9