Preface

Research on theoretical aspects of computing has a direct impact on the practice of computer systems development. Over many decades, fundamental theories have emerged to describe functionality, temporal behavior and resource consumption. Theories of application domains are beginning to be exploited for modelling and analyzing intended computing systems before the expensive commitment is made to real programs and hardware. Recent years have seen major improvements in the cost-effectiveness of tools supporting the exploitation of theories through proof, model-checking and testing. Against this encouraging background, we are pleased to present papers that show something of the liveliness and diversity of research in theoretical aspects of computing today.

ICTAC 2008, the 5th International Colloquium on Theoretical Aspects of Computing, was held on 1-3 September 2008 in Istanbul, Turkey, hosted by Sabancı University. The ICTAC series was founded by the International Institute for Software Technology of the United Nations University (UNU-IIST). It brings together practitioners and researchers from academia, industry and government to present results and to exchange ideas and experience addressing challenges in both theoretical aspects of computing and in the exploitation of theory through methods and tools for system development. The series also promotes cooperation in research and education between participants and their institutions, from developing and industrial countries, in accordance with the mandate of the United Nations University. The previous ICTAC colloquia were held in Guiyang, China (2004, LNCS 3407), Hanoi, Vietnam (2005, LNCS 3722), Tunis, Tunisia (2006, LNCS 4281) and Macau SAR, China (2007, LNCS 4711).

This year, over 70 submissions were received and each paper had three reviews. We thank the members of the Program Committee and the other specialist referees for the effort and skill that they invested in the review and selection process, which was managed using easychair. Some 27 papers were accepted to accompany keynote talks from three invited speakers: Jean-Raymond Abrial, Jan Peleska and Bill Roscoe. Each invited speaker also offered a tutorial on their work, and these were held at Sabancı University on 31 August. Co-located workshops included the International Workshop on Quality Aspects of Coordination (QAC 2008), chaired by Sun Meng and Farhad Arbab; the 2nd International Workshop on Harnessing Theories for Tool Support in Software, chaired by Jianhua Zhao and Volker Stolz; and the International Workshop on Foundations of Computer Science as Logic-Related, chaired by Walter Carnielli.

Events such as ICTAC are community efforts and can not succeed without the generosity of sponsors. ICTAC 2008 was kindly supported by UNU-IIST, Sabancı University and the Scientific and the Technological Research Council of Turkey (TUBITAK). Prof. Peleska’s lecture was made possible by financial support from Formal Methods Europe.
We are grateful to our publisher, especially to Alfred Hofmann and Nicole Sator at Springer’s Computer Science Editorial, for their help in creating this volume. Finally, we would like to thank our fellow organizers of ICTAC 2008: our colleagues in Istanbul, our Publicity Chair Jeremy Bryans and, at UNU-IIST, Kitty Chan and Clark Chan. We have been greatly helped by the advice, experience and enthusiasm of Zhiming Liu, Mike Reed (Director of UNU-IIST), and the ICTAC Steering and Advisory Committees.

June 2008

J. S. Fitzgerald
A. Haxthausen
H. Yenigun
ICTAC 2008 was organized by Sabancı University in cooperation with the United Nations University International Institute for Software Technology.

Conference Committee

General Chair  George Michael Reed (UNU-IIST, Macau)
Program Chairs  John S. Fitzgerald (Newcastle University, UK)
                Anne Haxthausen (Technical University of Denmark)
Organization Chair  Husnu Yenigun (Sabancı University, Turkey)
Publicity  Jeremy Bryans (Newcastle University, UK)

ICTAC Steering Committee

John S. Fitzgerald (Newcastle University, UK)
Martin Leucker (Technische Universität München, Germany)
Zhiming Liu (Chair) (UNU-IIST, Macao)
Tobias Nipkow (Technische Universität München, Germany)
Augusto Sampaio (Universidade Federal de Pernambuco, Brazil)
Natarajan Shankar (SRI, USA)
Jim Woodcock (University of York, UK)

Program Committee

Keijiro Araki  Lindsay Groves  Wolfgang Reisig
Jonathan Bowen  Michael R. Hansen  Augusto Sampaio
Michael Butler  Ian Hayes  Bernhard Schaeetz
Ana Cavalcanti  Dang Van Hung  Natarajan Shankar
Patrice Chalin  Tomasz Janowski  Serdar Tasiran
Christine Choppy  He Jifeng  Helen Treharne
Jim Davies  Joe Kiniry  Ji Wang
Jin Song Dong  Maciej Koutny  Alan Wassyng
George Eleftherakis  Kung-Kiu Lau  Jim Woodcock
Esla Erdem  Martin Leucker  Husnu Yenigun
Wan Fokkink  Peter Mosses  Naijun Zhan
Marcelo Frias  Ernst-Rdiger Olderog
Kokichi Futatsugi  Paritosh K Pandya
Chris George  Anders Ravn
External Reviewers

Marco Aiello
Yuji Arichika
Rilwan Basanya
Anirban Bhattacharyya
Jens Calamé
Sagar Chaki
Yuki Chiba
Robert Colvin
Phan Cong-Vinh
Marcio Cornelio
Charles Crichton
Kriangsak Damchoom
Zhe Dang
Brijesh Dongol
Elsa Estevez
Radu Grigore
Alexander Gruler
Tingting Han
Benjamin Hummel
Ryszard Janicki
Mikolas Janota
Christian Damsgaard Jensen
Christophe Joubert
Weiqiang Kong
Kemal Kilic
Daniel Klink
Alexander Knapp
Istvan Knoll
Stephan Korsholm
Shigeru Kusakabe
Edmund Lam
Wanwei Liu
Xiaodong Ma
Nicolas Markey
Manuel Mazzara
Michael Meier
Roland Meyer

Hiroshi Mochio
Sotiris Moschoyiannis
Alexandre Mota
Mohammad Reza Mousavi
Masaki Nakamura
Viet Ha Nguyen
Ioannis Ntalamagkas
Kazuhiro Ogata
Adegboyega Ojo
Joseph Okika
Yoichi Omori
Elisabeth Pelz
Franck Pommereau
Rodrigo Ramos
Tauseef Rana
Wolfgang Reisig
Markus Roggenbach
David Rydeheard
Lily Safie
Mar Yah Said
Cesar Sanchez
Jeff Sanders
Cem Say
Jun Sun
Cuong Minh Tran
Anh Hoang Truong
Robert Walters
Zhaofei Wang
Michael Weber
James Welch
Kirsten Winter
Stephen Wright
Berrin Yanikoglu
Naijun Zhan
Wenhui Zhang
Xian Zhang
# Table of Contents

Using Design Patterns in Formal Methods: An Event-B Approach  
(Extended Abstract) ............................................. 1  
  *J.-R. Abrial and Thai Son Hoang*

A Unified Approach to Abstract Interpretation, Formal Verification  
and Testing of C/C++ Modules  ................................ 3  
  *Jan Peleska*

The Three Platonic Models of Divergence-Strict CSP ............ 23  
  *A.W. Roscoe*

Monotonic Abstraction in Action (Automatic Verification of Distributed  
Mutex Algorithms) ..................................................... 50  
  *Parosh Aziz Abdulla, Giorgio Delzanno, and Ahmed Rezine*

Non-interleaving Semantics with Causality for Nondeterministic  
Dataflow .......................................................... 66  
  *Oana Agrigoroaiei and Gabriel Ciobanu*

Symbolic Reachability for Process Algebras with Recursive Data  
Types ................................................................. 81  
  *Stefan Blom and Jaco van de Pol*

Inclusion Test Algorithms for One-Unambiguous Regular Expressions... 96  
  *Haiming Chen and Lei Chen*

Refinement of Kripke Models for Dynamics  .......................... 111  
  *Francien Dechesne, Simona Orzan, and Yanjing Wang*

Tomorrow and All our Yesterdays: MTL Satisfiability over the  
Integers ............................................................. 126  
  *Carlo A. Furia and Paola Spoletini*

A Theory of Pointers for the UTP  .................................. 141  
  *Will Harwood, Ana Cavalcanti, and Jim Woodcock*

Recasting Constraint Automata into Büchi Automata ............. 156  
  *Mohammad Izadi and Marcello M. Bonsangue*

A Complete Realisability Semantics for Intersection Types and  
Arbitrary Expansion Variables .................................. 171  
  *Fairouz Kamareddine, Karim Nour, Vincent Rahli, and J.B. Wells*
Towards Efficient Verification of Systems with Dynamic Process Creation ........................................................ 186

_Hanna Klaudel, Maciej Koutny, Elisabeth Pelz, and Franck Pommereau_

An Observational Model for Transactional Calculus of Services
Orchestration .................................................................................................................. 201

_Jing Li, Huibiao Zhu, and Jifeng He_

Everything Is PSPACE-Complete in Interaction Systems ...................... 216

_Mila Majster-Cederbaum and Christoph Minnameier_

A New Approach for the Construction of Multiway Decision Graphs .... 228

_Y. Mokhtari, Sa’ed Abed, O. Ait Mohamed, S. Tahar, and X. Song_

Congruence Results of Scope Equivalence for a Graph Rewriting Model of Concurrent Programs ........................................ 243

_Masaki Murakami_

Guided Test Generation from CSP Models .................................................. 258

_Sidney Nogueira, Augusto Sampaio, and Alexandre Mota_

Relaxing Goodness Is Still Good ................................................................. 274

_Gordon J. Pace and Gerardo Schneider_

Benchmarking Model- and Satisfiability-Checking on Bi-infinite Time ... 290

_Matteo Pradella, Angelo Morzenti, and Pierluigi San Pietro_

Formal Analysis of Workflows Using UML 2.0 Activities and Graph Transformation Systems .............................................. 305

_Vahid Rafe and Adel T. Rahmani_

Testing Concurrent Objects with Application-Specific Schedulers ...... 319

_Rudolf Schlatte, Bernhard Aichernig, Frank de Boer, Andreas Griesmayer, and Einar Broch Johnsen_

A Theory of Bounded Fair Scheduling ...................................................... 334

_Jens Schönborn and Marcel Kyas_

Fair Exchange Is Incomparable to Consensus ........................................ 349

_Simona Orzan and Mohammad Torabi Dashti_

Automatic Generation of CSP || B Skeletons from xUML Models ...... 364

_Edward Turner, Helen Treharne, Steve Schneider, and Neil Evans_

Bounded Model Checking for Partial Kripke Structures ...................... 380

_Heike Wehrheim_

Verification of Linear Duration Invariants by Model Checking CTL Properties ................................................................. 395

_Miaomiao Zhang, Dang Van Hung, and Zhiming Liu_
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exact Response Time Scheduling Analysis of Accumulatively Monotonic Multiframe Real Time Tasks</td>
<td>410</td>
</tr>
<tr>
<td>Areej Zuhily and Alan Burns</td>
<td></td>
</tr>
<tr>
<td>Endomorphisms for Non-trivial Non-linear Loop Invariant Generation</td>
<td>425</td>
</tr>
<tr>
<td>Rachid Rebiha, Nadir Matringe, and Arnaldo Vieira Moura</td>
<td></td>
</tr>
<tr>
<td>Instantiation for Parameterised Boolean Equation Systems</td>
<td>440</td>
</tr>
<tr>
<td>A. van Dam, B. Ploeger, and T.A.C. Willemse</td>
<td></td>
</tr>
<tr>
<td>Author Index</td>
<td>455</td>
</tr>
</tbody>
</table>