

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

Alfred Kobsa

University of California, Irvine, CA, 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

TU Dortmund University, Germany

Madhu Sudan

Microsoft Research, Cambridge, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max Planck Institute for Informatics, Saarbruecken, Germany

Jens B. Schmitt (Ed.)

Measurement, Modelling, and Evaluation of Computing Systems *and* Dependability and Fault Tolerance

16th International GI/ITG Conference
MMB & DFT 2012

Kaiserslautern, Germany, March 19-21, 2012
Proceedings

Volume Editor

Jens B. Schmitt
University of Kaiserslautern
disco - Distributed Computer Systems Lab
Computer Science Department
Building 36, P.O. Box 3049
67663 Kaiserslautern, Germany
E-mail: jschmitt@cs.uni-kl.de

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-642-28539-4 e-ISBN 978-3-642-28540-0
DOI 10.1007/978-3-642-28540-0
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2012932064

CR Subject Classification (1998): C.2, C.4, C.1, D.2.8, D.2, D.4.8, D.4

LNCS Sublibrary: SL 2 – Programming and Software Engineering

© Springer-Verlag Berlin Heidelberg 2012

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.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

This volume contains a selection of the papers presented at the 16th International GI/ITG Conference on Measurement, Modelling and Evaluation of Computing Systems and Dependability and Fault Tolerance (MMB & DFT 2012) held during March 19–21, 2012 in Kaiserslautern, hosted by the University of Kaiserslautern. MMB & DFT 2012 covered diverse aspects of performance and dependability evaluation of systems including networks, computer architectures, distributed systems, software, fault-tolerant and secure systems. This biennial conference has a long tradition starting as early as in 1981.

Besides its main scientific program, MMB & DFT 2012 comprised two keynotes, two tutorials from academic and industrial experts, several tool presentations as well as three workshops. Specifically, we were very happy to have the keynote talks by Anja Feldmann (TU Berlin / Deutsche Telekom Laboratories) on “Internet Architecture Trends” and by Lothar Thiele (ETH Zürich) on “Modeling and Evaluation of Thermal System Properties.” In this edition of MMB & DFT, we had the speciality of integrated workshops featuring certain topics (with their own call for papers):

- Workshop on Network Calculus (WoNeCa), organized by Anne Bouillard (ENS, France), Markus Fidler (Leibniz University of Hannover), and Florin Ciucu (TU Berlin / Deutsche Telekom Laboratories)
- Workshop on Modeling and Analysis of Complex Reaction Networks (MA-CoRN), organized by Werner Sandmann (TU Clausthal) and Verena Wolf (Saarland University)
- Workshop on Physically Augmented Security for Wireless Networks (PI-LATES), organized by Matthias Hollick (TU Darmstadt), Ivan Martinovic (University of Oxford), and Dirk Westhoff (HAW Hamburg)

Overall we received 54 submissions, 36 to the main conference (including 6 tool papers) and 18 to the workshops, by authors from 17 different countries. Each submission was reviewed by at least 3, and on average 3.9, Program Committee members. In a physical TPC meeting with further technical discussions, 26 of these submissions were selected for inclusion in this volume.

On behalf of the TPC, we would like to thank all authors who submitted their work to MMB & DFT 2012. We hope that all authors appreciate the hard work of the TPC members, and found their feedback and suggestions valuable. We would like to express our debt and gratitude to all the members of the TPC, and the external reviewers, for being so responsive and for their timely and valuable reviews.

We are grateful to everyone involved in the organization of the MMB & DFT 2012 conference, as well as to the speakers and the attendees of the conference. We also appreciate the excellent support of EasyChair in managing the processes of submission, reviewing, and preparing the final version of the proceedings.

January 2012

Jens B. Schmitt

Organization

MMB & DFT 2012 was organized by the Distributed Computer Systems Lab, University of Kaiserslautern, Germany.

Organizing Committee

General and Program Chair
Local Organization Chairs

Jens Schmitt
Steffen Bondorf
Steffen Reithermann
Carolin Reffert-Schmitt

Tools Chair
Submission Chair
Publication Chair
Web Chair
Publicity Chair

Hao Wang
Matthias Wilhelm
Michael Beck
Adam Bachorek
Wint Yi Poe

Program Committee

Lothar Breuer
Peter Buchholz
Joachim Charzinski
Hans Daduna
Klaus Echtele
Bernhard Fechner
Markus Fidler
Reinhard German
Boudewijn Haverkort
Gerhard Haßlinger
Holger Hermanns
Joost-Pieter Katoen
Jörg Keller
Peter Kemper
Udo Krieger

University of Kent, UK
TU Dortmund, Germany
Hochschule der Medien Stuttgart, Germany
Universität Hamburg, Germany
Universität Duisburg-Essen, Germany
Universität Augsburg, Germany
Leibniz Universität Hannover, Germany
Universität Erlangen-Nürnberg, Germany
University of Twente, The Netherlands
Deutsche Telekom, Germany
Universität des Saarlandes, Germany
RWTH Aachen, Germany
FernUniversität in Hagen, Germany
The College of William and Mary, USA
Otto-Friedrich-Universität Bamberg,
Germany

Wolfram Lautenschläger
Axel Lehmann

Alcatel-Lucent, USA
Universität der Bundeswehr München,
Germany

Ralf Lehnert
Erik Maehle
Michael Menth
Bruno Müller-Clostermann

TU Dresden, Germany
Universität zu Lübeck, Germany
Universität Tübingen, Germany
Universität Duisburg-Essen, Germany

Peter Reichl	Forschungszentrum Telekommunikation Wien, Austria
Anne Remke	University of Twente, The Netherlands
Johannes Riedl	Siemens AG, Germany
Francesca Saglietti	Universität Erlangen-Nürnberg, Germany
Werner Sandmann	TU Clausthal, Germany
Jens Schmitt	TU Kaiserslautern, Germany
Markus Siegle	Universität der Bundeswehr München, Germany
Helena Szczerbicka	Leibniz Universität Hannover, Germany
Aad Van Moorsel	Newcastle University, UK
Oliver Waldhorst	Karlsruher Institut für Technologie, Germany
Max Walter	TU München, Germany
Verena Wolf	Universität des Saarlandes, Germany
Bernd Wolfinger	Universität Hamburg, Germany
Katinka Wolter	FU Berlin, Germany
Armin Zimmermann	TU Ilmenau, Germany

Additional Reviewers

Hernán Baró Graf	Universität des Saarlandes, Germany
Matthias Becker	Leibniz Universität Hannover, Germany
Martin Drozda	Leibniz Universität Hannover, Germany
Christian Eisentraut	Universität des Saarlandes, Germany
Philipp Eittenberger	Otto-Friedrich-Universität Bamberg, Germany
Luis María Ferrer Fioriti	Universität des Saarlandes, Germany
Klaus-Dieter Heidtmann	Universität Hamburg, Germany
Michael Hoefling	Universität Tübingen, Germany
Oliver Hohlfeld	TU Berlin, Germany
Andrey Kolesnikov	Universität Hamburg, Germany
Minh Lê	TU München, Germany
Alfons Martin	Universität Tübingen, Germany
Linar Mikeev	Universität des Saarlandes, Germany
Jorge Perez-Hidalgo	TU Dresden, Germany
Martin Riedl	Universität der Bundeswehr München, Germany
Johann Schuster	Universität der Bundeswehr München, Germany
Falak Sher	RWTH Aachen, Germany
David Spieler	Universität des Saarlandes, Germany
Mark Timmer	University of Twente, The Netherlands
Sebastian Vastag	TU Dortmund, Germany
Hannes Weisgrab	Forschungszentrum Telekommunikation Wien, Austria

Keynote Talks at MMB & DFT 2012

Modeling and Evaluation of Thermal System Properties

Lothar Thiele, ETH Zurich
thiele@ethz.ch

Power density has been continuously increasing in modern processors, leading to high on-chip temperatures. A system could fail if the operating temperature exceeds a certain threshold, leading to low reliability and even chip burnout. There have been many results in recent years about thermal management, including (1) thermal-constrained scheduling to maximize performance or determine the schedulability of real-time systems under given temperature constraints, (2) peak temperature reduction to meet performance constraints, and (3) thermal control by applying control theory for system adaption. The presentation will cover challenges, problems and approaches to real-time scheduling under temperature constraints for single- as well as multi-processors.

Internet Architecture Trends

Anja Feldmann, TU Berlin / T-Labs
anja@net.t-labs.tuberlin.de

The ever growing demand for information of Internet users is putting a significant burden on the current Internet infrastructure whose architecture has been more or less unchanged over the last 30 years. Indeed, rather than adjusting the architecture small fixes, e.g., MPLS, have been deployed within the core network.

Today, new technical abilities enable us to rethink the Internet architecture. In this talk we first highlight how Internet usage has changed in the area of user generated context. Then we explore two technology trends: Cloud networks and open hardware/software interfaces.

Virtualization, a main motor for innovation, decouples services from the underlying infrastructure and allows for resource sharing while ensuring performance guarantees. Server virtualization is widely used, e.g., in the clouds. However, cloud virtualization alone is meaningless without taking into account the network needed to access the cloud resources and data: cloud networks.

Current infrastructures are limited to use the tools provided by the hardware vendors as there are hardly any open software stacks available for network devices in the core. This hurts innovation. However, novel programming interfaces for network devices, e.g., OpenFlow, provide open hardware/software interfaces and may enable us to build a network OS with novel features. We outline initial work in this area.

Table of Contents

Full Papers

Availability in Large Networks: Global Characteristics from Local Unreliability Properties	1
<i>Hans Daduna and Lars Peter Saul</i>	
Stochastic Analysis of a Finite Source Retrial Queue with Spares and Orbit Search	16
<i>Feng Zhang and Jinting Wang</i>	
Bounds for Two-Terminal Network Reliability with Dependent Basic Events	31
<i>Minh Lê and Max Walter</i>	
Software Reliability Testing Covering Subsystem Interactions	46
<i>Matthias Meitner and Francesca Saglietti</i>	
Failure-Dependent Timing Analysis - A New Methodology for Probabilistic Worst-Case Execution Time Analysis	61
<i>Kai Höfig</i>	
A Calculus for SLA Delay Properties	76
<i>Sebastian Vastag</i>	
Verifying Worst Case Delays in Controller Area Network	91
<i>Nikola Ivkovic, Dario Kresic, Kai-Steffen Hielscher, and Reinhard German</i>	
Lifetime Improvement by Battery Scheduling	106
<i>Marijn R. Jongerden and Boudewijn R. Haverkort</i>	
Weighted Probabilistic Equivalence Preserves ω -Regular Properties	121
<i>Arpit Sharma</i>	
Probabilistic CSP: Preserving the Laws via Restricted Schedulers	136
<i>Sonja Georgievska and Suzana Andova</i>	
Heuristics for Probabilistic Timed Automata with Abstraction Refinement	151
<i>Luis María Ferrer Fioriti and Holger Hermanns</i>	
Simulative and Analytical Evaluation for ASD-Based Embedded Software	166
<i>Ramin Sadre, Anne Remke, Sjors Hettinga, and Boudewijn Haverkort</i>	

Reducing Channel Zapping Delay in WiMAX-Based IPTV Systems	182
<i>Alireza Abdollahpouri and Bernd E. Wolfinger</i>	
Performance Evaluation of 10GE NICs with SR-IOV Support: I/O Virtualization and Network Stack Optimizations	197
<i>Shu Huang and Ilia Baldine</i>	
Business Driven BCM SLA Translation for Service Oriented Systems . . .	206
<i>Ulrich Winkler, Wasif Gilani, and Alan Marshall</i>	
Boosting Design Space Explorations with Existing or Automatically Learned Knowledge	221
<i>Ralf Jahr, Horia Calborean, Lucian Vintan, and Theo Ungerer</i>	

Tool Papers

IBPM: An Open-Source-Based Framework for InfiniBand Performance Monitoring	236
<i>Michael Hoeftling, Michael Menth, Christian Kniep, and Marcus Camen</i>	
A Workbench for Internet Traffic Analysis	240
<i>Philipp M. Eittenberger and Udo R. Krieger</i>	
A Modelling and Analysis Environment for <i>LARES</i>	244
<i>Alexander Gouberman, Martin Riedl, Johann Schuster, and Markus Siegle</i>	
Simulation and Statistical Model Checking for Modestly Nondeterministic Models	249
<i>Jonathan Bogdoll, Arnd Hartmanns, and Holger Hermanns</i>	
UniLoG: A Unified Load Generation Tool	253
<i>Andrey Kolesnikov</i>	

Selected Workshop Papers

Non Preemptive Static Priority with Network Calculus: Enhancement	258
<i>William Mangoua Sofack and Marc Boyer</i>	
A Demand-Response Calculus with Perfect Batteries	273
<i>Jean-Yves Le Boudec and Dan-Cristian Tomozei</i>	
A Formal Definition and a New Security Mechanism of Physical Unclonable Functions	288
<i>Rainer Plaga and Frank Koob</i>	

Modeling and Analysis of a P2P-VoD System Based on Stochastic Network Calculus	302
<i>Kai Wang, Yuming Jiang, and Chuang Lin</i>	
Using NFC Phones for Proving Credentials	317
<i>Gergely Alpár, Lejla Batina, and Roel Verdult</i>	
Author Index	331