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Editorial

Modelling techniques and tools for computer performance evaluation

Welcome to this special section of Performance Evaluation, presenting expanded versions of selected papers from the 13th International Conference on Modelling Techniques and Tools for Computer Performance Evaluation. The series of TOOLS conferences has provided a forum for the community of performance engineers with their diverse interests to interact with one another in a wide variety of theoretical and applied areas. TOOLS 2003 was the second conference in the TOOLS series to be held in the state of Illinois, USA. It was one of four component conferences that met together under the umbrella of the 2003 Illinois Multiconference on Measurement, Modelling, and Evaluation of Computer-Communication Systems at the University of Illinois at Urbana-Champaign. The other conferences held in conjunction with TOOLS 2003 were the 10th International Workshop on Petri Nets and Performance Models (PNPM 2003), the 2003 International Conference on the Numerical Solution of Markov Chains (NSMC 2003) and the Sixth International Workshop on Performability Modelling of Computer and Communication Systems (PMCCS-6).

TOOLS 2003 had 37 regular submissions, of which 17 were selected as full papers. The proceedings of TOOLS 2003 have been published in the Lecture Notes in Computer Science series (vol. 2794, P. Kemper, W.H. Sanders (Eds.)) by Springer-Verlag, as has been the tradition in this conference series since 1994.

In the current special issue, a selection of three papers from TOOLS 2003 is presented. These papers have been selected by the Program Committee, and have been extended and considerably improved by their authors to reach their current form. An additional review procedure and revision process took place, and final versions of the papers were delivered in Spring 2005.

The first paper, entitled *Closed-Form Solutions for Mapping General Distributions to Quasi-Minimal PH Distributions*, by Takayuki Osogami and Mor Harchol-Balter (CMU), considers the approximation of general distributions as phase type distributions. In particular, the authors propose an algorithm for mapping a general distribution G to a phase-type distribution that matches the first three moments of the original distribution. The efficiency and accuracy of their approach result from a beneficial selection of a class of distributions. By combining Erlang-n and Coxian distributions, the authors obtain a distribution with a small number of parameters for which closed form solutions are obtained as well as a nice result on the minimality of the number of phases in the resulting distribution.

In the second paper, entitled *Correlation Bounds for Second-Order MAPs with Application to Queueing Network Decomposition*, Armin Heindl (University of Erlangen-Nuremberg), Ken Mitchell, and Appie

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van de Liefvoort (UMKC) give insight on how two-dimensional processes correlate and provide several analytic bounds for the correlation parameter. In doing so, they propose an algorithm that aids in decision as on whether second-order Markovian arrival processes (MAPs) are able to model compact and correlated traffic processes. Their algorithm converts a phase-type distribution into a second-order MAP whenever feasible according to the first three moments and a newly introduced correlation parameter.

Finally, in the third paper, Gianfranco Ciardo, R.L. Jones, Andrew S. Miner, and R. Siminiceanu present SMART, a tool for the functional and quantitative evaluation of systems, in *Logical and Stochastic Modeling with SMART*. SMART provides state-of-the-art methods for the numerical analysis of Markov chains, a simulation engine for general discrete models, and a model checker for symbolic model checking of finite state models with respect to the branching time logic CTL. SMART is designed for learning, research, and industrial applications and is the result of many years of research in modelling and analysis of discrete-event systems.

To conclude, we would like to thank all who contributed to the success of TOOLS 2003. Special thanks go to the program committee members and external reviewers. We would also like to thank Dr. Werner Bux, Performance Evaluation editor-in-chief, for giving us the opportunity to prepare this special issue and Elsevier for handling the editorial and production process. Furthermore, we would like to thank all reviewers for their careful and timely reports. It has been a privilege for us to compile this special issue. We hope you enjoy the selected papers as much as we did.

Peter Kemper holds a diploma degree in computer science (Dipl.-Inform., 1992) and a doctoral degree (Dr.rer.nat, 1996), both from Universitẗ Dortmund, Germany, where he performs research and lectures in the Department of Computer Science. His main interests are in the quantitative evaluation of systems and formal aspects of software engineering. In addition to developing modelling techniques and tools for performance and dependability assessment of computer and communication systems, he also works on model-based evaluation of manufacturing systems and logistic networks. Since 1998, he has been contributing to the Collaborative Research Center on Modelling Large Networks in Logistics, SFB 559, funded by Deutsche Forschungsgemeinschaft. He has contributed to several tools for functional and quantitative analysis of discrete event systems, including the QPN tool, the APNN toolbox, and the ProC/B toolset.

William H. Sanders is a professor in the Department of Electrical and Computer Engineering and the Coordinated Science Laboratory at the University of Illinois, and is the director of the Information Trust Institute. He is a Fellow of the IEEE and the ACM. He is a vice-chair of IFIP Working Group 10.4 on Dependable Computing. In addition, he serves on the editorial boards of *Performance Evaluation* and *IEEE Transactions on Reliability*, and is the Area Editor for Simulation and Modeling of Computer Systems for the *ACM Transactions on Modeling and Computer Simulation*. He is a past chair of the IEEE Technical Committee on Fault-Tolerant Computing. His research interests include performance/dependability evaluation, dependable computing, and reliable distributed systems. He has published more than 150 technical papers in these areas. He is a co-developer of three tools for assessing networked systems: METASAN, *UltraSAN*, and Mb̈ius. Mb̈ius and *UltraSAN* have been distributed widely to industry and academia; more than 300 licenses for the tools have been issued to universities and companies for evaluating the performance, dependability, security, and performability of a variety of systems. He is also a codeveloper of the Loki distributed system fault injector and the AQuA/ITUA middlewares for providing dependability/security to distributed and networked applications.

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