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

17th International GI/ITG Conference, MMB & DFT 2014
Bamberg, Germany, March 17-19, 2014
Proceedings



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Preface

As conference chairs, it is our pleasure to present this LNCS volume with its contributions on performance and dependability evaluation techniques for advanced distributed systems, computer and software architectures, and communication networks. The papers it contains were presented at the 17th International GI/ITG Conference on “Measurement, Modelling and Evaluation of Computing Systems” and “Dependability and Fault-Tolerance” (MMB and DFT 2014), held during March 17–19, 2014, at Otto-Friedrich-University Bamberg in Germany.

Since the start of the biennial MMB conference series in the early 1980s, we have seen substantial changes in the field of performance evaluation, dependability, and fault-tolerance of computer and communication systems. Modelling and simulation of isolated computer systems and the analysis of their performance and dependability metrics by standard queueing or stochastic Petri net models have been enhanced with more advanced or new methodologies, such as stochastic process algebras or stochastic network calculus, and new areas of application have entered the realm of this research.

Today, we cope with the scientific challenges of very complex, interconnected system architectures that comprise a multitude of hardware and software components. In recent years, measurement, mathematical modelling, and analysis techniques related to these advanced interconnected systems and complex networks have also been expanding into new vital application areas, including energy networks, energy-efficient systems, and social networks among others. Thus, the Program Committee of MMB and DFT 2014 organized three satellite workshops covering corresponding research topics in these fast-evolving areas:

- The International Workshop on Demand Modeling and Quantitative Analysis of Future Generation Energy Networks and Energy-Efficient Systems (FGENET 2014)
- The International Workshop on Modeling, Analysis and Management of Social Networks and their Applications (SOCNET 2014)
- The Second Workshop on Network Calculus (WoNeCa 2014)

Following a thorough review procedure by at least three reviewers and after a careful selection process, the Program Committee of MMB and DFT 2014 conference compiled an interesting scientific program that included 16 regular papers and three tool presentations. In addition, the MMB and DFT 2014 program was fortunate to have two distinguished keynote speeches:

1. “Probabilistic Analysis of the RESTART Protocol and Checkpointing in Computer Reliability” by distinguished Professor Dr. Dr.h.c. Søren Asmussen, Aarhus University, Denmark, whose scientific achievements were honored by the John von Neumann Theory Prize 2010 and the Gold Medal for Great Contributions in Mathematics, awarded by the Sobolev Institute of Mathematics of the Siberian Branch of the Russian Academy of Sciences in 2011

2. “On the Performance of Caching in Information-Centric Networks” by Dr. James W. Roberts, IRT-SystemX, France, who has been honored with the Arne Jensen Lifetime Achievement Award from the International Teletraffic Congress (ITC)

As conference chairs, we express our gratitude to all members of the Program Committee and all external reviewers for their dedicated service, maintaining the quality objectives of the conference, and for the timely provision of their valuable reviews.

We express our sincere appreciation to Otto-Friedrich-University Bamberg as the conference host, as well as to all the members of the local Organizing Committee of MMB and DFT 2014 for their great efforts devoted to the success of the conference.

We thank all the authors for their submitted contributions, all the speakers for their lively presentations, and all the participants for their contributions to interesting discussions.

We acknowledge the support of the EasyChair conference system and express our gratitude to its management team for the commitment to serve the scientific community in an altruistic manner.

Further, we thank Springer, in particular Alfred Hofmann, Vice-President Publishing Computer Science, for unceasing support and excellent management of the LNCS publishing project.

Finally, it is our hope that readers will find these MMB and DFT 2014 proceedings informative and useful for their future research on measurement, modelling, analysis, and performance evaluation of advanced distributed, dependable, or fault-tolerant systems.

March 2014

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Abstracts of Invited Talks

Probabilistic Analysis of the RESTART Protocol and Checkpointing in Computer Reliability

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Abstract. A task like the execution of a computer program or the transmission of a packet on a communication line may fail. There are various protocols for how the system will deal with this. We consider here RESTART where the task needs to be restarted from scratch, with the aim of assessing probabilities of large delays (in contrast to other protocols like RESUME, this was long an open problem). The result is, somewhat surprisingly, that unless the task time is a bounded random variable, the delay time is always heavy-tailed (for example, with a power tail). We further consider the effects of inserting checkpoints in the task, such that upon failure restarting needs only be done from the last checkpoint.

This is joint work with Lester Lipsky, Pierre Fiorini, Robert Sheahan and Tomasz Rolski.

On the Performance of Caching in Information-Centric Networks

James Roberts

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Abstract. Whether the architecture of the future Internet is an incremental evolution of IP or a clean slate design like CCN, it is clear that caching will be increasingly used to reduce the amount of content traffic the network has to carry. It is important to understand the performance of caching in order to quantify its impact on traffic flows and to draw correct conclusions regarding the optimal network structure. We discuss recent work on modelling cache performance, identifying the crucial importance of how user requests are distributed over the vast catalogue of available content and stressing the difficulty in estimating this popularity distribution. Lastly, we consider the memory-bandwidth tradeoff that determines the potential cost advantage of investing in storage capacity rather than in the infrastructure that would otherwise be necessary to transport content across the network. Our evaluations suggest large caches at the network edge are preferable to equipping routers with limited capacity content stores, as envisaged in some proposed architectures.

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