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Distributed Applications and Interoperable Systems

14th IFIP WG 6.1 International Conference, DAIS 2014
Held as Part of the 9th International Federated Conference
on Distributed Computing Techniques, DisCoTec 2014
Berlin, Germany, June 3-5, 2014
Proceedings



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Foreword

In 2014, the 9th International Federated Conference on Distributed Computing Techniques (DisCoTec) took place in Berlin, Germany, during June 3–5. It was hosted and organized by the Technische Universität Berlin. The DisCoTec series, one of the major events sponsored by the International Federation for Information Processing (IFIP), included three conferences:

- COORDINATION 2014, the 16th IFIP WG 6.1 International Conference on Coordination Models and Languages
- DAIS 2014, the 14th IFIP WG 6.1 International Conference on Distributed Applications and Interoperable Systems
- FORTE 2014, the 34th IFIP WG 6.1 International Conference on Formal Techniques for Distributed Objects, Components and Systems

Together, these conferences cover the complete spectrum of distributed computing subjects ranging from theoretical foundations over formal specification techniques to systems research issues.

Each day of the federated event began with a plenary speaker nominated by one of the conferences. The three invited speakers were:

- Frank Leymann (University of Stuttgart, Germany)
- Maarten van Steen (VU University Amsterdam, The Netherlands)
- Joachim Parrow (Uppsala University, Sweden)

There were also three satellite events, taking place during June 6–7:

1. The 5th International Workshop on *Interactions Between Computer Science and Biology* (CS2BIO) with keynote lectures by Marco Pettini (Université de la Méditerranée, France) and Vincent Danos (University of Edinburgh, UK) and a tutorial by Jeffrey Johnson (Open University, UK)
2. The 7th Workshop on *Interaction and Concurrency Experience* (ICE) with keynote lectures by Kim Larsen (Aalborg University, Denmark) and Pavol Cerny (University of Colorado Boulder, USA)
3. The First International Workshop on *Meta Models for Process Languages* (MeMo) with keynote lectures by Joachim Parrow (Uppsala University, Sweden) and Marino Miculan (Università degli Studi di Udine, Italy)

This program was an interesting and stimulating event for the participants. Sincere thanks go to the chairs and members of the Program Committees of the involved conferences and workshops for their highly appreciated effort. Moreover, organizing DisCoTec 2014 was only possible thanks to the dedicated work of the Organizing Committee from TU Berlin, including Margit Russ, Kirstin Peters (also publicity and workshop chair), and Christoph Wagner. Finally, many

thanks go to IFIP WG 6.1 for providing the umbrella for this event, to EATCS and TU Berlin for their support and sponsorship, and to EasyChair for providing the refereeing infrastructure.

June 2014

Uwe Nestmann

Preface

This volume contains the proceedings of DAIS 2014, the 14th IFIP International Conference on Distributed Applications and Interoperable Systems, sponsored by IFIP (International Federation for Information Processing) and organized by the IFIP Working Group 6.1.

DAIS was held during June 3–5, 2014, in Berlin, Germany, as part of the DisCoTec (Distributed Computing Techniques) federated conference, together with the International Conference on Formal Techniques for Distributed Systems (FMOODS and FORTE) and the International Conference on Coordination Models and Languages (COORDINATION). DAIS received 53 submissions, with each submission reviewed by at least three Program Committee members. The committee decided to accept 12 full papers and four short papers, giving an acceptance rate of 23% for full research papers. The conference program presented state-of-the-art research results and case studies in the area of distributed applications and interoperable systems. The main themes of this year's conference were cloud computing, replicated storage, and large-scale systems.

In the area of cloud computing, there are papers on service-level agreement differentiation and trust-aware operation of providers in cloud markets, and adaptive and scalable high availability for infrastructure clouds. A significant number of the papers cover distributed storage, including a strongly consistent relational model for metadata in HDFS, and distributed exact deduplication for primary storage; there is a special focus on eventually consistent stores with papers on scalable causality tracking for eventually consistent stores, and operation-based conflict-free replicated datatypes (CRDTs). Papers on large-scale systems include autonomous multi-dimensional slicing, bandwidth-minimized distribution of measurements in global sensor networks, and coordinated scheduling for inter-grid architectures. We also have papers on behavioral caching for Web content, implementing Web protocols based on formal modeling and automated code generation, energy efficiency, and distributed algorithms.

Finally, we would like to take this opportunity to thank the many people whose work made this conference possible. We wish to express our deepest gratitude to the authors of submitted papers, to all Program Committee members for their active participation in the paper review process, and to all external reviewers for their help in evaluating submissions. We would like to thank the publication chair, Eva Kalyvianaki, for her excellent work in producing the conference proceedings. Further thanks go to the Steering Committee of DAIS, and in particular the chair, Rui Oliveira, who provided useful advice and help. We would also like to thank Maarten van Steen, our invited keynote speaker. Finally we are thankful to the Technical University of Berlin for hosting the event in Berlin, to

the past DAIS chairs Jim Dowling, Francois Taiani, and Karl Goschka for their advice and documentation, and to Uwe Nestmann for acting as a general chair of the joint event.

March 2014

Kostas Magoutis
Peter Pietzuch

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DAIS 2014 Keynote

A Perspective on the Future of Computer Sciences (Through a Technical Example)

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Abstract: Computer sciences have always moved, and continue to move, swiftly. On the one hand, we have seen many subjects come and go. On the other, many of these subjects are becoming the core of new sciences, most recently those emerging from big-data discussions. Where does this place the computer scientist? As a natural reaction, people tend to build a fence around what they believe is “real” computer science, and what is considered to be an application of computer science.

In this talk, I argue that drawing such a line is not only pointless, it is even dangerous. Computer sciences are more than ever in the core of new sciences, and that is where the computer scientists should be as well. Building a fence will place the computer scientist out of the core, potentially leading to isolation.

I illustrate this point by means of a project on crowd management. It is a technical talk, one by a die-hard systems researcher who can only make the project a success by understanding how his science can contribute to the bigger picture and what that means for collaborating with scientists from other disciplines.

From federated conferences to federated sciences?

Speaker: Maarten Van Steen is a professor of large-scale distributed systems at VU University Amsterdam and currently the chair of its Department of Computer Science. For several years, a large part of his research is concentrated on understanding very large networked systems of small, wireless devices such as massive sensor networks. Next to such extreme distributed systems, his interests also reach out to complex-network science and understanding the behavior that emerges from very large networked systems. He is (co-)author of three text books, including *Distributed Systems, Principles and Paradigms* (with Andrew Tanenbaum) and *Graph Theory and Complex Networks, An Introduction*.

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