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Coordination Models and Languages

16th IFIP WG 6.1 International Conference,
COORDINATION 2014

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



Springer

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 at 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 papers presented at COORDINATION 2014: the 16th IFIP WG 6.1 International Conference on Coordination Models and Languages held during June 3–4, 2014, in Berlin. The conference is the premier forum for publishing research results and experience reports on software technologies for collaboration and coordination in concurrent, distributed, and complex systems. Its distinctive feature is the emphasis on high-level abstractions that capture interaction patterns manifest at all levels of the software architecture and extending into the realm of the end-user domain. COORDINATION 2014 called for high-quality contributions on the usage, study, design, and implementation of languages, models, and techniques for coordination in distributed, concurrent, pervasive, and multicore software systems.

The Program Committee (PC) of COORDINATION 2014 consisted of 26 top researchers from 12 different countries. We received 37 abstracts that materialized in a total of 31 submissions out of which the PC selected 12 papers for inclusion in the program. All submissions were reviewed by three to four independent referees; papers were selected based on their quality, originality, contribution, clarity of presentation, and relevance to the conference topics. The review process included an in-depth discussion phase, during which the merits of all papers were discussed by the PC. The process culminated in a shepherding phase whereby some of the authors received active guidance by one member of the PC in order to produce a high-quality final version. The selected papers constituted a program covering a varied range of the conference topics: programming abstractions and languages, coordination models and paradigms, applied software engineering principles, specification and verification, foundations and types, distributed middleware architectures, multicore programming, collaborative adaptive systems, and coordination related use cases. The program was further enhanced by an invited talk by Frank Leymann from the University of Stuttgart (Germany) entitled “Orchestrating Management Behavior of Cloud Applications.”

The success of COORDINATION 2014 was due to the dedication of many people. We thank the authors for submitting high-quality papers and the PC and their sub-reviewers for their careful reviews and lively discussions during the final selection process. We thank the providers of the EasyChair conference management system, which was used to run the review process and to facilitate the preparation of the proceedings. Finally, we thank the Distributed Computing Techniques Organizing Committee from TU Berlin, led by Uwe Nestmann, for its contribution in making the logistical aspects of COORDINATION 2014 a success.

June 2014

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Invited Talk

Orchestrating Management Behavior of Cloud Applications

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Ensuring quality of services of applications in the cloud is a major concern. Applications that should benefit from the desirable properties of the cloud must follow certain architectural principles. The most fundamental of such principles have been described as patterns that we will motivate. In particular, the IDEAL principle recommending Isolated state, Distribution, Elasticity, Automated management, and Loose coupling for a cloud application is described.

Just turning an application into a virtual image and running it in the cloud does not make appropriate use of cloud properties. For example, scalability cannot be ensured without introducing redundant componentry that often comes with unexpected high cost and consistency problems. Thus, an application that should adequately run in the cloud must consist of a collection of more fine-grained components. To allow the cloud environment to perform management actions on it, specific relations between the former components must be defined. Together, the topology of the application must be specified.

The topology of a (not too complex) application allows for automatically deriving the basic management behavior of the application, e.g., how it is provisioned and decommissioned. More complex management behavior requires the specification of plans, i.e., workflows that define how to perform management actions in terms of the topology of the to-be-managed application. Pros and cons of the former (declarative) approach and the latter (imperative) approach are discussed.

A language (called TOSCA - Topology and Orchestration Specification for Cloud Applications) to define the topology and associated plans of an application has been standardized. This language is sketched. An architecture of an environment supporting this language is outlined and an open source implementation of a such an environment (called OpenTOSCA) is briefly introduced.

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