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Modelling Foundations and Applications

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Foreword

Software Technologies: Applications and Foundations (STAF) is a federation of leading conferences on software technologies. It provides a loose umbrella organization with a Steering Committee that ensures continuity. The STAF federated event takes place annually. The participating conferences may vary from year to year, but they all focus on foundational and practical advances in software technology. The conferences address all aspects of software technology, from object-oriented design, testing, mathematical approaches to modeling and verification, transformation, model-driven engineering, aspect-oriented techniques, and tools.

STAF 2017 took place in Marburg, Germany, during July 17–21, 2017, and hosted the four conferences ECMFA 2017, ICGT 2017, ICMT 2017, and TAP 2017, the transformation tool contest TTC 2017, six workshops, a doctoral symposium, and a projects showcase event. STAF 2017 featured four internationally renowned keynote speakers, and welcomed participants from around the world.

The STAF 2017 Organizing Committee would like to thank (a) all participants for submitting to and attending the event, (b) the Program Committees and Steering Committees of all the individual conferences and satellite events for their hard work, (c) the keynote speakers for their thoughtful, insightful, and inspiring talks, and (d) the Philipps-Universität, the city of Marburg, and all sponsors for their support. A special thanks goes to Christoph Bockisch (local chair), Barbara Dinklage, and the rest of the members of the Department of Mathematics and Computer Science of the Philipps-Universität, coping with all the foreseen and unforeseen work to prepare a memorable event.

July 2017 Gabriele Taentzer

Preface

The European Conference on Modeling Foundations and Applications (ECMFA) is dedicated to advancing the state of knowledge and fostering the industrial application of Model-Based Engineering (MBE) and related methods. MBE is an approach to software engineering that sets a primary focus on leveraging high-level and suitable abstractions (models) to enable computer-based automation and advanced analyses; MBE techniques promise a significant boost in both productivity and quality.

The 13th edition of ECMFA was held during July 19–20, 2017, in Marburg as part of the Software Technologies: Applications and Foundations (STAF) federation of conferences. The Program Committee received 48 submissions, each of which was reviewed by at least three Program Committee members. The committee decided to accept 18 papers, 13 papers for the Foundations Track and five papers for the Applications Track, resulting in an overall acceptance rate of 38%. Papers on a wide range of MBE aspects were accepted, including model-driven generative techniques, model consistency management and evolution, language engineering, and experience reports.

We thank Lionel Briand for his interesting talk on the current challenges of model-driven verification and testing of cyber-physical systems. We are grateful to all Program Committee members and additional reviewers for providing excellent reviews, participating actively in ensuing discussions, and providing constructive feedback for all submitted papers. We thank the STAF organization for providing an excellent framework in which ECMFA can continue to co-exist and profit from the synergy with other related conferences. Finally, we thank all authors who submitted papers to ECMFA 2017, making this conference possible.

July 2017

Anthony Anjorin
Huáscar Espinoza

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Model-Driven Verification and Testing of Cyber-Physical Systems: Tackling Scalability and Practicality Challenges (Invited Talk)

Lionel C. Briand

University of Luxembourg, Luxembourg City, Luxembourg

Abstract. Testing and verification problems in the software industry come in many different forms, due to significant differences across domains and contexts. But one common challenge in the context of cyber-physical systems is scalability; the capacity to test and verify increasingly large systems interacting with complex physical environments. Another concern relates to practicality. Can the inputs required by a given technique be realistically provided by engineers given their background and time constraints? This talk reports on ten years of research tackling the verification and testing of cyber-physical systems as a search and optimization problem, often but not always relying on abstractions and models of the system under test. This experience spans several application domains and organizations. Our observation is that most of the problems we faced could be effectively re-expressed so as to make use of appropriate search and optimization techniques to automate specific testing or verification strategies, targeting various categories of faults. However, to achieve scalability, such solutions had to be often complemented by machine learning to help the search focus on regions of the input space that were more likely to exhibit failures.

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