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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 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 2016 took place at TU Wien, Austria, during July 4–8, 2016, and hosted the five conferences ECMFA 2016, ICGT 2016, ICMT 2016, SEFM 2016, and TAP 2016, the transformation tool contest TTC 2016, eight workshops, a doctoral symposium, and a projects showcase event. STAF 2016 featured eight internationally renowned keynote speakers, and welcomed participants from around the world.

The STAF 2016 Organizing Committee thanks (a) all participants for submitting to and attending the event, (b) the program chairs and Steering Committee members of the individual conferences and satellite events for their hard work, (c) the keynote speakers for their thoughtful, insightful, and inspiring talks, and (d) TU Wien, the city of Vienna, and all sponsors for their support. A special thank you goes to the members of the Business Informatics Group, coping with all the foreseen and unforeseen work (as usual ☺)!

July 2016 Gerti Kappel

Preface

The European Conference on Modelling 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. By model-based engineering we understand an approach to the design, analysis, and development of software and systems that relies on exploiting high-level models and computer-based automation to achieve significant boosts in both productivity and quality.

The 12th edition of ECMFA was held during July 6–7, 2016, in Vienna as part of the Software Technologies: Applications and Foundations (STAF) federation of conferences. The Program Committee received 47 submissions. Each submission was reviewed by at least three Program Committee members. The committee decided to accept 16 papers, 12 papers for the Foundations Track and four papers for the Applications Track, resulting in an overall acceptance rate of 34 %. Papers on a wide range of MBE aspects were accepted, including topics such as foundations for modeling semantics, model management and evolution, model transformation, modeling tools, and model-driven engineering in neurorobotics.

We thank Krzysztof Czarnecki and Stefan Voget for interesting talks on the use of MDE in the automotive domain and other areas of embedded systems engineering. Furthermore, we are grateful to all the Program Committee members and all additional reviewers for providing their expertise and quality while reviewing the submitted papers. Their helpful and constructive feedback is most appreciated. We thank the STAF organization for providing an excellent framework in which ECMFA can continue to exist. Last but certainly not least, we thank all authors who submitted papers to ECMFA 2016, contributing to this important research area.

July 2016

Andrzej Wąsowski
Henrik Lönn

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Keynotes

A Model-Based Driver's License for Self-Driving Cars: Challenges and Future Directions

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Abstract. Vehicles with limited self-driving capabilities are already on the market and some car makers have promised products capable of autonomous driving in an urban setting in 2020. Self-driving cars will eventually completely transform the automotive industry, replacing private car ownership by service-based products such as robotic cabs. The deployment of large-scale self-driving vehicle fleets will reduce the number of crashes and crash severity, reduce emissions, allow commuters to use their time more effectively, and free up spaces occupied by parked cars. The engineering of self-driving cars requires sophisticated models of the environment and the electronic driver system in order to develop the necessary perception and motion planning and control functions. While current self-driving technologies have improved immensely in recent years, a major challenge is assuring the safe operation of an autonomous vehicle in all traffic situations and all road conditions. I will present a reference architecture for self-driving cars and use it to describe the types of models used in engineering of such systems. I will then focus on the challenges of assuring model-based engineering of self-driving cars. I will close by outlining promising directions to address these challenges.

Usage of Domain Specific Modeling Languages in the Automotive Industry

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Abstract. Before the introduction of model based engineering, the answer for the language question within the automotive industry was simple: use C. The idea of model based engineering is to shift the complexity out of a textual representation of the code (the source code in C) to a model. Here, the question about language comes up again. This time, it revolves around the decision which language to use to represent the model. Today, the answer is not that simple anymore. Within the automotive industry nearly each project uses it's own representation. Often the representation is determined by the architectural tool used in the project. To become independent from these "tool languages", more and more domain specific modeling languages come up, most of which end up as project specific modeling languages, i.e. specific languages used only in a very dedicated context. In the keynote I will present a motivation for the definition and usage of domain specific modeling languages by using two examples. The first example integrates the development lifecycle of a SW developer with the one of a responsible for functional safety. The second example describes a unified approach for the configuration of different software platforms. Both examples and their motivations are quite different from each other, but show the needs for comprehensive common languages and the importance of model to model transformations to interact between them.

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