Special Issue of the Formal Aspects of Computing Journal on Software Engineering and Formal Methods (SEFM'14)

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Editorial

This special issue of the *Formal Aspects of Computing* journal contains a selection of the best papers accepted at the 12th edition of the international conference series on *Software Engineering and Formal Methods* (SEFM). This conference was held in Grenoble (France) on September 1-5, 2014. The aim of the conference was to bring together practitioners and researchers from academia, industry and government to advance the state of the art in formal methods, to scale up their application in the software industry and to encourage their integration with practical engineering methods.

The SEFM'14 conference received 106 full submissions, and the programme committee of the conference decided to accept 29 papers. Out of these 29 papers, we selected the best six papers, and the authors of these papers were invited to submit a revised and extended version of their work to this special issue. After a meticulous review process, we finally accepted five of the six invited papers. The topics covered in this special issue are the following: Domain Specific Languages, Component-based Systems and Architectures, Learning Finite State Machines, Construction and Verification of Imperative Programs, and Partial Order Reduction in the context of Model Checking.

More precisely, the following papers appear in this special issue:

- *Formalizing and Testing the Consistency of DSL Transformations* by Sarmen Keshishzadeh and Arjan Mooij. This approach for formalizing and testing the consistency of DSL transformations is based on explicitly distinguishing and formalizing both DSL semantics and implementation details. To assess the correctness and consistency of the generated code and analysis models in a practical way, the authors rely on conformance testing.

- *A General Framework for Architecture Composability* by Paul Attie, Eduard Baranov, Simon Bliudze, Mohamad Jaber, and Joseph Sifakis. This paper proposes a formal and general framework for architecture composability based on an associative, commutative and idempotent architecture composition operator. The main result is that if two architectures enforce respectively two safety properties, the composed architecture enforces the conjunction of these properties. The authors also establish preservation of liveness properties by architecture composition.

- *Active Learning for Extended Finite State Machines* by Sofia Cassel, Falk Howar, Bengt Jonsson, and Bernhard Steffen. This paper presents a symbolic active learning algorithm for generating Extended Finite State Machine models of black-box components using dynamic analysis. This algorithm generalizes the classical L* algorithm to the symbolic setting, so that it can generate register automata. The algorithm is parameterized on a particular theory, *i.e.*, a set of operations and tests on the data domain that can be used in the automata guards.

- *Building Program Construction and Verification Tools from Algebraic Principles* by Victor B. F. Gomes, Alasdair Armstrong, and Georg Struth. This paper presents a modular approach to the development of construction and verification tools for imperative programs, in which the control flow and the data flow are cleanly separated. To do so, the authors extend the formalisation for variants of Kleene algebras

in Isabelle/HOL with Kleene algebras with tests, which are of interest to program construction and correctness applications.

- *Optimising the ProB Model Checker for B using Partial Order Reduction* by Ivaylo Dobrikov and Michael Leuschel. This paper presents an implementation of partial order reduction for explicit state model checking in ProB for Event-B (and also classical B) models. The implementation makes use of the ample set theory for reducing the state space and uses new constraint-based analyses to obtain precise relations of influence between events.

We enjoyed in-depth discussions over several time zones in editing this issue. We would like to thank sincerely all the reviewers who did an excellent work in reading, commenting on, and selecting these papers. We are also grateful to John Cooke for his guidance during the elaboration of this special issue.

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