Formal Methods in System Design
https://doi.org/10.1007/s10703-024-00451-4

Preface for the Formal Methods in System Design special issue on 'FASE 2022'

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Accepted: 19 March 2024

This special issue includes articles based on selected papers from the 25th International Conference on Fundamental Approaches to Software Engineering (FASE 2022). The conference is part of the European Joint Conferences on Theory and Practice of Software (ETAPS 2022), which took place in Munich, Germany, April 2–7, 2022.

FASE is concerned with the foundations of software engineering, covering topics such as software engineering as an engineering discipline, requirements engineering, software architectures, software quality, model-driven development, software processes, software evolution, AI-based software engineering, and the specification, design, and implementation of different classes of systems, such as(self-)adaptive, collaborative, AI, embedded, distributed, mobile, pervasive, cyber-physical, or service-oriented applications.

This special issue contains the following three contributions:

Information-flow Interfaces by Ezio Bartocci, Thomas Ferrere, Thomas A. Henzinger, Dejan Nickovic and Ana Oliveira da Costa. This paper introduces an interface theory to ensure system-wide security properties, together with a refinement relation and a composition operation for incremental design and independent implementability. The interfaces can support information-flow contracts where assumptions and guarantees are sets of flow relations.

Software Doping Analysis for Human Oversight by Sebastian Biewer, Kevin Baum, Sarah Sterz, Holger Hermanns, Sven Hetmank, Markus Langer, Anne Lauber-Ronsberg and Franz Lehr. This paper introduces a framework to mitigate societal risks that software can pose, in particular related to software doping, unfairness and discrimination in high-risk decision-making systems.

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Published online: 02 April 2024

Construction of Verifier Combinations from Off-the-Shelf Components by Dirk Beyer, Tobias Kleinert, Sudeep Kanav and Cedric Richter. This paper introduces a method to systematically and conveniently construct verifier combinations from existing tools and demonstrate that such combinations can improve the verification results without additional computational resources.

We would like to thank the authors who contributed to this special issue as well as to the conference, the Program Committee members and the reviewers for their thorough reviews and constructive discussions. Many additional people contributed to the success of FASE 2022. We thank the ETAPS 2022 organizers, in particular Marieke Huisman and Andrzej Wąsowski (ETAPS and FASE Steering Committee Chairs) for their feedback and support. We are especially grateful to our Artefact Evaluation Committee Chairs Marie-Christine Jakobs and Eduard Kamburjan. We would also like to acknowledge the support throughout the editorial process from the editors of Formal Methods in System Design.

February 2, 2024
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