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Formal Integrated Development Environment
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Preface

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José Proença (*HASLab/INESC-TEC & CISTER/ISEP, Portugal*)

F-IDE 2019 is the fifth international workshop on Formal Integrated Development Environment, held on October 7, 2019 in Porto, Portugal, as part of the FM 2019 World Congress on Formal Methods.

High levels of safety, security and also privacy standards require the use of formal methods to specify and develop compliant software (sub)systems. Any standard comes with an assessment process, which requires a complete documentation of the application in order to ease the justification of design choices and the review of code and proofs. Ideally, an F-IDE dedicated to such developments should comply with several requirements. The first one is to associate a logical theory with a programming language, in a way that facilitates the tightly coupled handling of specification properties and program constructs. The second is to offer a language/environment simple enough to be usable by most developers, even if they are not fully acquainted with higher-order logics or set theory, in particular by making development of proofs as easy as possible. The third is to offer automated management of application documentation. It may also be expected that developments done with such an F-IDE are reusable and modular. Tools for testing and static analysis may be embedded within F-IDEs to support the assessment process. The workshop is a forum of exchange on different features related to F-IDEs.

We solicited several kinds of contributions: research papers providing new concepts and results, position papers and research perspectives, experience reports, tool presentations. The workshop was open to contributions on all aspects of a system development process, including specification, design, implementation, analysis and documentation. The current edition is a one-day workshop with eight communications, offering a large variety of approaches, techniques and tools. Each submission was reviewed by three reviewers.

We also had the honor of welcoming Wolfgang Ahrendt, from Chalmers University of Technology, who gave a keynote entitled What is KeY's key to software verification?

The committees of F-IDE 2019 were composed of:

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- Yi Zhang (U.S. Food and Drug Administration)

We would like to thank the PC members for doing such a great job in writing high-quality reviews and participating in the electronic PC discussion. We would like to thank all authors who submitted their work to F-IDE 2019. We are grateful to the organisers of the 3rd World Congress on Formal Methods who hosted our workshop. The logistics of our job as Program Chairs were facilitated by the EasyChair system and we thank the editors of Electronic Proceedings in Theoretical Computer Science who accepted the papers for publication.

What is KeY's Key to Software Verification?

Wolfgang Ahrendt (*Chalmers University of Technology, Sweden*)

F-IDE Keynote

KeY is a deductive software verification approach and system, whose most elaborate version targets Java programs. In a recent KeY case study, which attracted attention also outside formal method circles, verification with KeY could reveal a bug in the main sorting routine of OpenJDK. While this talk will also cover the user interface of KeY, the focus of the discussion is more fundamental. KeY follows to a significant extent principles which are different from other deductive verification systems, on the level of the program logic, the proof calculus, the interaction with the prover, the transparency of proofs, and the usage of back-end solvers. In this talk, I will discuss the impact of these aspects, with a special focus on usability. In addition, we will look at how the design of the logic and calculus influenced the integration with other validation techniques, like test generation and runtime verification.
