

The 5th International Workshop on Formal Approaches for Advanced Computing Systems

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Abstract

Advanced computing systems are increasingly adopted to generate productivity gains, improve well-being and help experts to address challenges in various application domains, including mobility, healthcare, cyber-security, industrial robots, autonomous vehicles, cloud-based services, and IoT. Such systems often operate in dynamic, highly complex, partially observable environments and they are affected by external uncertainty as well as internal uncertainty, very often due to “intelligent” and “learning” components that are becoming established and effective for making predictions, recommendations or decisions that influence the surroundings. As a consequence, the design and development of these systems require proper approaches, methodologies, abstractions and architectural design solutions integrating together heterogeneous elements such as networking, computation, engineered physical elements, AI/ML components, and human beings into complex ecosystems. Assuring dependability, trustworthiness and other important qualities of such systems yield challenges that call for novel and formal approaches to system design, development, validation, and verification. Indeed, an unexpected exposure of users to unwanted behaviors, such as threats to confidentiality or even financial or health danger, is highly undesirable.

Preface

The main mission of the workshop is to foster integration between the formal methods and the software architecture communities with the purpose of improving their connection in the field of Advanced Computing Systems. This is an emerging class of software systems that expose complex computational models (such as mobile, cloud, autonomic, adaptive computing, and AI-based) and exploit new technologies and infrastructures (such as IoT connectivity and smart devices) to deliver services and information to a multitude of end-users. The development of these Advanced Computing Systems requires advanced architectural design exploiting the integration of heterogeneous architecture description languages, architectural patterns, qualitative and quantitative assessment of architectures, and solutions already individually tested in specific contexts. Although significant advancement has been achieved during decades of research activity, formal methods are still not widely adopted by the software industry. Thus, delivered products often behave

unexpectedly, sometimes exposing users to highly undesired consequences, such as threats to confidentiality and even financial or health danger. Ensuring the reliability, safety, availability, and so on, of such systems, is a very challenging problem, requiring advanced software architecture design that can be devised by the software architecture community, on one hand, and rigorous modeling and analysis techniques that can be devised by the formal methods community, on the other hand.

The 5th edition of the International Workshop on Formal Approaches for Advanced Computing Systems (FAACS 2021) will be held in virtual mode, on September 14th, 2021. The workshop is co-located for the 4th year in a row with the European Conference on Software Architecture (ECSA). The first edition of FAACS took place in Trento, Italy, on September 4th, 2017, as a satellite workshop of the 15th International Conference on Software Engineering and Formal Methods (SEFM 2017).

This year the workshop received 3 submissions. After an accurate and thorough peer-review process, we selected 1 paper (33% acceptance rate) for presentation at the workshop after review and discussion by at least three members of the Program Committee.

The workshop program includes the invited talk entitled “Exploiting system parameters to test and debug Autonomous Driving Systems” given by Paolo Arcaini from the National Institute of Informatics, Japan.

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