Tiziana Margaria
Bernhard Steffen (Eds.)

Leveraging Applications of Formal Methods, Verification and Validation

Practice

LNCS 13704

11th International Symposium, ISoLA 2022
Rhodes, Greece, October 22–30, 2022
Proceedings, Part IV

Springer

Lecture Notes in Computer Science 13704

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ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-031-19761-1 ISBN 978-3-031-19762-8 (eBook)
https://doi.org/10.1007/978-3-031-19762-8

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Introduction

As General and Program Chairs we would like to welcome you to the proceedings of ISoLA 2022, the 11th International Symposium on Leveraging Applications of Formal Methods, Verification and Validation held in Rhodes (Greece) during October 22–30, 2022, and endorsed by EASST, the European Association of Software Science and Technology.

Returning to the traditional in-person event, ISoLA 2022 provided a forum for developers, users, and researchers to discuss issues related to the adoption and use of rigorous tools and methods for the specification, analysis, verification, certification, construction, testing, and maintenance of systems from the point of view of their different application domains. Thus, since 2004 the ISoLA series of events has served the purpose of bridging the gap between designers and developers of rigorous tools on one side, and users in engineering and in other disciplines on the other side. It fosters and exploits synergetic relationships among scientists, engineers, software developers, decision makers, and other critical thinkers in companies and organizations. By providing a specific, dialogue-oriented venue for the discussion of common problems, requirements, algorithms, methodologies, and practices, ISoLA aims in particular at supporting researchers in their quest to improve the practicality, reliability, flexibility, and efficiency of tools for building systems, and users in their search for adequate solutions to their problems.

The program of ISoLA 2022 consisted of a collection of special tracks devoted to the following hot and emerging topics:

1. Rigorous Engineering of Collective Adaptive Systems
   (Organizers: Rocco De Nicola, Stefan Jähnichen, Martin Wirsing)
2. Programming: What is Next?
   (Organizers: Klaus Havelund, Bernhard Steffen)
3. X-by-Construction meets Runtime Verification
   (Organizers: Maurice H. ter Beek, Loek Cleophas, Martin Leucker, Ina Schaefer)
4. Automated Software Re-Engineering
   (Organizers: Serge Demeyer, Reiner Hähnle, Heiko Mantel)
5. Digital Twin Engineering
   (Organizers: John Fitzgerald, Peter Gorm Larsen, Tiziana Margaria, Jim Woodcock, Claudio Gomes)
6. SpecifyThis - Bridging gaps between program specification paradigms
   (Organizers: Wolfgang Ahrendt, Marieke Huisman, Mattias Ulbrich, Paula Herber)
7. Verification and Validation of Concurrent and Distributed Heterogeneous Systems
   (Organizers: Marieke Huisman, Cristina Seceleanu)
8. Formal Methods Meet Machine Learning
   (Organizers: Kim Larsen, Axel Legay, Bernhard Steffen, Marielle Stoelinga)
9. Formal methods for DIStributed COmputing in future RAILway systems
   (Organizers: Alessandro Fantechi, Stefania Gnesi, Anne Haxthausen)

10. Automated Verification of Embedded Control Software
    (Organizers: Dilian Gurov, Paula Herber, Ina Schaefer)
11. Digital Thread in Smart Manufacturing
    (Organizers: Tiziana Margaria, Dirk Pesch, Alan McGibney)

It also included the following the embedded or co-located events:

- Doctoral Symposium and Poster Session (Sven Jörges, Salim Saay, Steven Smyth)
- Industrial Day (Axel Hessenkämper, Falk Howar, Hardi Hungar, Andreas Rausch)
- DIME Days 2022 (Tiziana Margaria, Bernhard Steffen)

Altogether, the proceedings of ISoLA 2022 comprises contributions collected in four volumes:

- Part 1: Verification Principles
- Part 2: Software Engineering
- Part 3: Adaptation and Learning
- Part 4: Practice

We thank the track organizers, the members of the program committee, and their reviewers for their effort in selecting the papers to be presented, the local Organization Chair, Petros Stratis, and the EasyConferences team for their continuous precious support during the entire period preceding the events, and the Springer for being, as usual, a very reliable partner for the proceedings production. Finally, we are grateful to Christos Therapontos for his continuous support for the Web site and the program, and to Steve Bosselmann for his help with the editorial system EquinOCS.

Special thanks are due to the following organizations for their endorsement: EASST (European Association of Software Science and Technology) and Lero - The Irish Software Research Centre, along with our own institutions - TU Dortmund and the University of Limerick.

We wish you, as an ISoLA participant, lively scientific discussions at this edition, and also later, when reading the proceedings, valuable new insights that contribute to your research and its uptake.

October 2022

Bernhard Steffen
Tiziana Margaria

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Contents – Part IV

Digital Twin Engineering

Engineering of Digital Twins for Cyber-Physical Systems 3
John Fitzgerald, Peter Gorm Larsen, Tiziana Margaria, Jim Woodcock, and Cláudio Gomes

Towards Requirements Engineering for Digital Twins of Cyber-Physical Systems 9
Tao Yue, Shaukat Ali, Paolo Arcaini, and Fuyuki Ishikawa

Digital Twins for Organ Preservation Devices 22
Aaron John Buhagiar, Leo Freitas, William E. Scott III, and Peter Gorm Larsen

Using Digital Twins in the Development of Complex Dependable Real-Time Embedded Systems 37
Xiaotian Dai, Shuai Zhao, Benjamin Lesage, and Iain Bate

Towards Reactive Planning with Digital Twins and Model-Driven Optimization 54
Martin Eisenberg, Daniel Lehner, Radek Sindelar, and Manuel Wimmer

Digital Twin Reconfiguration Using Asset Models 71
Eduard Kamburjan, Vidar Norstein Klungre, Rudolf Schlatte, S. Lizeth Tapia Tarifa, David Cameron, and Einar Broch Johnsen

Formally Verified Self-adaptation of an Incubator Digital Twin 89
Thomas Wright, Cláudio Gomes, and Jim Woodcock

Adaptive Data-driven Predictor of Ship Maneuvering Motion Under Varying Ocean Environments 110
Tongtong Wang, Robert Skulstad, Motoyasu Kanazawa, Lars Ivar Hatledal, Guoyuan Li, and Houxiang Zhang

Robust Adaptive Back-Stepping Control Approach Using Quadratic Lyapunov Functions for MMC-Based HVDC Digital Twins 126
Le Liu, Aleksandra Lekić, and Marjan Popov

Data-Driven Reachability Analysis of Digital Twin FMI Models 139
Sergiy Bogomolov, John Fitzgerald, Sadegh Soudjani, and Paulius Stankaitis

Towards Secure Digital Twins 159
Tomas Kulik, Cláudio Gomes, Hugo Daniel Macedo, Stefan Hallerstede, and Peter Gorm Larsen

Digital Thread in Smart Manufacturing

Digital Thread in Smart Manufacturing 179
Tiziana Margaria, Dirk Pesch, and Alan McGibney

Integrating Wearable and Camera Based Monitoring in the Digital Twin for Safety Assessment in the Industry 4.0 Era 184
Michele Boldo, Nicola Bombieri, Stefano Centomo, Mirco De Marchi, Florenc Demrozi, Graziano Pravadelli, Davide Quaglia, and Cristian Turetta

Model-Driven Engineering in Digital Thread Platforms: A Practical Use Case and Future Challenges 195
Hafiz Ahmad Awais Chaudhary, Ivan Guevara, Jobish John, Amandeep Singh, Amrita Ghosal, Dirk Pesch, and Tiziana Margaria

Trust and Security Analyzer for Collaborative Digital Manufacturing Ecosystems 208
Pasindu Kuruppuarachchi, Susan Rea, and Alan McGibney

DISTiL: DIStributed Industrial Computing Environment for Trustworthy DigiTaL Workflows: A Design Perspective 219
Alan McGibney and Sourabh Bharti

Using Model Selection and Reduction to Develop an Empirical Model to Predict Energy Consumption of a CNC Machine 227
Liam Morris, Rose Clancy, Andriy Hryshchenko, Dominic O'Sullivan, and Ken Bruton

Crazy Nodes: Towards Ultimate Flexibility in Ubiquitous Big Data Stream Engineering, Visualisation, and Analytics, in Smart Factories 235
Mirco Soderi and John G. Breslin

Formal Methods for DIStributed COmputing in Future RAILway Systems

Formal Methods for Distributed Control Systems of Future Railways 243
Alessandro Fantechi, Stefania Gnesi, and Anne E. Haxthausen

Safe and Secure Future AI-Driven Railway Technologies: Challenges for Formal Methods in Railway 246
Monika Seisenberger, Maurice H. ter Beek, Xiuyi Fan, Alessio Ferrari, Anne E. Haxthausen, Phillip James, Andrew Lawrence, Bas Luttik, Jaco van de Pol, and Simon Wimmer

Future Train Control Systems: Challenges for Dependability Assessment 269
Alessandro Fantechi, Stefania Gnesi, and Gloria Gori

Standardisation Considerations for Autonomous Train Control 286
Jan Peleska, Anne E. Haxthausen, and Thierry Lecomte

Automatic Generation of Domain-Aware Control Plane Logic for Software Defined Railway Communication Networks 308
Roberto Canonico, Francesco Flammini, Stefano Marrone, Roberto Nardone, and Valeria Vittorini

Safe and Secure Architecture Using Diverse Formal Methods 321
Thierry Lecomte

Industrial Day

Formal Methods for a Digital Industry: Industrial Track at ISoLA 2022 337
Axel Hessenkämper, Falk Howar, Hardi Hungar, and Andreas Rausch

Domain-Specificity as Enabler for Global Organization aLignment and Decision 340
Barbara Steffen and Steve Boßelmann

Evolving Data Space Technologies: Lessons Learned from an IDS Connector Reference Implementation 366
Julia Pampus, Brian-Frederik Jahnke, and Ronja Quensel

Towards a Methodology for Formally Analyzing Federated Identity Management Systems 382
Katerina Ksystra, Maria Dimarogkona, Nikolaos Triantafyllou, Petros Stefaneas, and Petros Kavassalis

Model-Driven Edge Analytics: Practical Use Cases in Smart Manufacturing . . . 406
Ivan Guevara, Hafiz Ahmad Awais Chaudhary, and Tiziana Margaria

Author Index 423