

CBSOFT'20

congresso brasileiro de software
19 a 23 out 2020

ANAIS

MSSIS 2020

*II Workshop de Modelagem
e Simulação de Sistemas
Intensivos em Software*

Realização



Organização

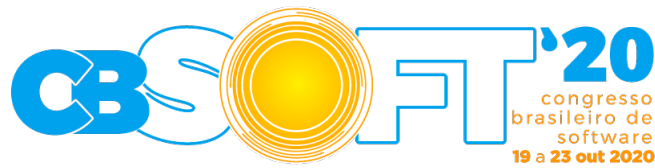


Patrocínio



Google





ANAIS

II Workshop de Modelagem e Simulação de Sistemas Intensivos em Software — MSSiS 2020 —

19 de outubro de 2020

Natal, Rio Grande do Norte, Brazil

Coordenadores Gerais do CBSOFT 2020

Everton Cavalcante (UFRN, Brasil)

Francisco Dantas (UERN, Brasil)

Thais Batista (UFRN, Brasil)

Organizadores do MSSiS 2020

Valdemar Vicente Graciano Neto (UFG, Brasil)

Elisa Yumi Nakagawa (ICMC-USP, Brasil)

Bernard P. Zeigler (RTSync Corp., EUA)

Realização

Sociedade Brasileira de Computação – SBC



Realização



Organização



Patrocínio



Prefácio

Software-intensive systems are those in which software is a dominant, essential element. In those systems, software crosscuts their structure and production stages, substantially impacting the planning, development, and evolution of these systems. With the emergence and rise of new, larger complex types of systems, such as smart cities, cyber-physical systems, system-of-systems, and software ecosystems, new research frontiers are open to enable reliable modeling of these systems. They are often highly dynamic and interact widely with the surrounding environment. In this sense, it is imperative to advance not only the static modeling of software-intensive systems but also the modeling of dynamic aspects of these systems. To do so, the use of dynamic software models, such as runtime models and simulation models, becomes paramount.

This is the scenario of the second Workshop on Modeling and Simulation of Software-Intensive Systems (MSSiS 2020), whose purpose is to outline the Brazilian community that works with simulation in the context of Software Engineering, providing an environment for the discussion of possible synergies among the existing modeling and simulation (M&S) paradigms in Systems Engineering and Software Engineering. This workshop also addresses the Model-Driven Software Engineering research, in particular concerning models@runtime.

This volume contains the papers accepted and presented at the MSSiS 2020, held online on October 19, 2020 from Natal, Brazil, in conjunction with the 11th Brazilian Software Congress (CBSOFT 2020). Eleven full papers and one short paper were submitted for the appreciation of the Program Committee (PC). Each submission was reviewed by at least three PC members. The committee decided to accept eight papers (seven full papers and one short paper). MSSiS 2020 also has two keynote speakers: Prof. Dr. Pablo Antonino (Fraunhofer IESE, Germany), who provides the invited talk entitled *Enabling Continuous Engineering for Dependable Systems with Simulations, Digital Twins, and Virtual Prototypes*, and Prof. Dr. Luis Gustavo Nardin (National College of Ireland), with the invited talk *Bridging the Gap between Discrete-Event and Agent-Based Simulation*.

We also thank the editors of the Journal of the Brazilian Computer Society (JBACS), particularly Dr. Mike Hinchey (Lero/Ireland) and Prof. Dr. Lúcia Drummond (UFF, Brazil), for the waivers granted the extended versions of three best papers awarded in MSSiS 2019 and recently published in the journal.

We wish you an excellent MSSiS 2020 with rich discussions on modeling and simulation of software-intensive systems. May this community grow stronger every day in Brazil.



Valdemar Vicente Graciano Neto (UFG, Brazil)
Elisa Yumi Nakagawa (ICMC-USP, Brazil)
Bernard P. Zeigler (RTSync Corp., USA)
Workshop Organizers - MSSiS 2020

Comissão Organizadora

Coordenação Geral do CBSOft 2020

Everton Cavalcante (UFRN, Brasil)

Francisco Dantas (UERN, Brasil)

Thais Batista (UFRN, Brasil)

Comitê Diretivo do CBSOft

Adenilso Simão (ICMC-USP, Brazil)

Claudio Sant'Anna (UFBA, Brasil)

Elder de Macedo Rodrigues (UNIPAMPA, Brasil)

Everton Cavalcante (UFRN, Brasil)

Fernando Castor (UFPE, Brasil)

Francisco Dantas (UERN, Brasil)

Francisco Sant'Anna (UERJ, Brasil)

Gustavo Pinto (UFPA, Brasil)

Ivan Machado (UFBA, Brasil)

Leopoldo Teixeira (UFPE, Brasil)

Marco Gerosa (Northern Arizona University, USA)

Rafael Prikkladnicki (PUCRS, Brasil)

Rita Suzana Maciel (UFBA, Brasil)

Rodrigo Ribeiro (UFOP, Brasil)

Rodrigo Rocha (UFBA, Brasil)

Sérgio Medeiros (UFRN, Brasil)

Tayana Conte (UFAM, Brasil)

Thais Batista (UFRN, Brasil)

Vania Neves (UFF, Brasil)

Wilkerson Andrade (UFCEG, Brasil)

Comitê de Programa

Coordenadores de Comitê de Programa

Valdemar Vicente Graciano Neto (UFG, Brasil)
Elisa Yumi Nakagawa (ICMC-USP, Brasil)
Bernard P. Zeigler (RTSync Corp., EUA)

Program Committee

Abdurrahman Alshareef (King Saud University, Arábia Saudita)
Adair Rohling (UTFPR, Brasil)
Breno de França (UNICAMP, Brasil)
Carla Bezerra (UFC, Brasil)
Carlos Paes (PUC-SP, Brasil)
Davi Viana (UFMA, Brasil)
Diana Adamatti (FURG, Brasil)
Emanuel Coutinho (UFC, Brasil)
Everton Cavalcante (UFRN, Brasil)
Fábio Basso (UNIPAMPA, Brasil)
Fernando Barros (Universidade de Coimbra, Portugal)
Flavia Delicato (UFF, Brasil)
Flavio Horita (UFABC, Brasil)
Lina Garcés (USP, Brasil)
Luis G. Nardin (National College of Ireland, Irlanda)
María Blas (INGAR, UTN-CONICET, Argentina)
Marcelo Schots (UNIRIO, Brasil)
Maria Istela Cagnin (UFMS, Brasil)
Mohamad Kassab (Pennsylvania State University, EUA)
Pablo Antonino (Fraunhofer IESE, Alemanha)
Paulo Maciel (UFPE, Brasil)
Paulo Pires (UFF, Brasil)
Rafael Capilla (Universidad Rey Juan Carlos, Espanha)
Renato Bulcão Neto (UFG, Brasil)
Rodrigo Santos (UNIRIO, Brasil)
Rosana Braga (ICMC-USP, Brasil)
Sérgio Teixeira (UFG, Brasil)
Sofia Paiva (UFSJ, Brasil)
Toacy Oliveira (UFRJ, Brasil)

Revisores Adicionais

Ahmad Mohsin (Joondalup University, Austrália)
André de Oliveira (UFSJ, Brasil)
Daniel D'Angelo Resende Barros (UFABC, Brasil)
Fernando Giorno (PUC-SP, Brasil)
Renato Manzan (PUC-SP, Brasil)

Sumário

Palestras	viii
Model-Driven Engineering	
Diversity of MDE Toolboxes and Their Uncommon Properties <i>Fábio Basso, Bruno Lebtog, Paulo Teixeira</i>	1
Pesquisando Soluções para Desafios em MDE com Kuaba <i>Adriana Medeiros</i>	11
Business Process Modeling	
Towards BPM@Runtime <i>Luiz Loja, Sofia Paiva, Juliano Lopes de Oliveira</i>	16
Business Process Modeling in Systems of Systems <i>Jean Santos, Valdemar Vicente Graciano Neto, Elisa Yumi Nakagawa</i>	26
Simulation and Empirical Evaluation	
Building DEVS Models from the Functional Design of Software Architecture Components to Estimate Quality <i>María Blas, Horacio Leone, Silvio Gonnet</i>	36
Integration of Activity Specification into DEVS Modeling & Simulation Development Environment <i>Abdurrahman Alshareef, Bernard P. Zeigler</i>	46
Avaliando o Custo de Contratos Inteligentes em Aplicações Blockchain por meio de Ambientes de Simulação <i>Emanuel Coutinho, Welligton Abreu, Wagner Braga Bezerra, Delano Maia</i>	56
An Empirical Evaluation about Using Models to Improve Preliminary Safety Analysis <i>Jéssyka Vilela</i>	66
Índice de Autores	76

Palestras

Enabling Continuous Engineering for Dependable Systems with Simulations, Digital Twins, and Virtual Prototypes



Pablo Antonino

Fraunhofer IESE, Alemanha

Abstract. Continuous software engineering aims at orchestrating engineering knowledge to react faster to market demands, which might range from software update in an industrial production plant to the incorporation of a new feature in a vehicle. In this regard, the use of advanced simulations techniques based on virtual prototypes and digital twins have been widely adopted in the industry of dependable systems as means to continuously enable evaluations of the architecture against the requirements, even prior to actual implementation. Fraunhofer IESE has developed methods and tools to enable simulated evaluations of architecture by means of virtual prototypes and digital twins and has supported companies from Europe in adopting these practices. This talk will present tools like Fraunhofer FERAL and the Industry 4.0 Middleware BaSyx, which have been developed to enable these practices, and will also provide an overview of the concrete challenges and direction for the industrial adoption of these practices.

Short bio. Pablo Oliveira Antonino is Head of the Embedded Software Engineering department of the Fraunhofer Institute for Experimental Software Engineering IESE in Kaiserslautern, Germany. He holds a PhD in Computer Science from Technische Universität Kaiserslautern, and has experience with the design, evaluation, and integration of dependable embedded systems from various domains, such as automotive, avionics, agricultural and construction machines, medical devices, and smart industries.

Bridging the Gap between Discrete-Event and Agent-Based Simulation



Luis Gustavo Nardin

National College of Ireland, Irlanda

Abstract. Agent-based modeling is an appropriate methodology for designing, creating, and evaluating complex adaptive systems. This methodology has been shown particularly well suited for modeling social phenomena since the latter are the result of numerous interconnected and interdependent event decisions taken by (semi-)autonomous agents. In the area of modeling and simulation, however, the term "agent-based" simulation is used ambiguously both for individual-based and cognitive agent simulation. The former takes into consideration the structure and interactions of individual entities, whereas the latter also models the cognitive state and cognitive operations of agents. Existing Discrete Event Simulation (DES) frameworks are well equipped to model individual agent-based simulations, but they do not provide in-built support for agent capabilities required by cognitive agent simulation. This talk will shed some light upon the ambiguous understanding of the term "agent-based" simulation and identify the agent capabilities implied by them. It will then demonstrate how to implement an agent-based social simulation domain using a DES framework highlighting the challenges and limitations. Finally, it will present a proposal to incorporate the required agent capabilities into a DES framework.

Short bio. Luis Gustavo Nardin is a lecturer in the School of Computing at the National College of Ireland. He holds a PhD and Master's degree in Artificial Intelligence and a specialization in Software Engineering from the University of São Paulo, Brazil, and postdoc from the Centre for Modelling Complex Interactions at the University of Idaho, USA. His interests center around the design and use of modeling and simulation methods and tools in combination with Artificial Intelligence and Data Analysis for understanding the impacts of social and human behaviors on the emergent properties of complex adaptive systems. He has experience designing simulation models in various domains of sciences such as criminology, epidemiology, political sciences, philosophy of science, and natural disaster. He is also Executive Member of the RoboCup Rescue Simulation and co-editor of the Journal of Simulation Engineering.