

Communications in Computer and Information Science

1250

Commenced Publication in 2007

Founding and Former Series Editors:

Simone Diniz Junqueira Barbosa, Phoebe Chen, Alfredo Cuzzocrea,
Xiaoyong Du, Orhun Kara, Ting Liu, Krishna M. Sivalingam,
Dominik Ślęzak, Takashi Washio, Xiaokang Yang, and Junsong Yuan

Editorial Board Members

Joaquim Filipe 


Polytechnic Institute of Setúbal, Setúbal, Portugal

Ashish Ghosh

Indian Statistical Institute, Kolkata, India

Igor Kotenko 

*St. Petersburg Institute for Informatics and Automation of the Russian
Academy of Sciences, St. Petersburg, Russia*

Raquel Oliveira Prates 

Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil

Lizhu Zhou

Tsinghua University, Beijing, China

More information about this series at <http://www.springer.com/series/7899>

Marten van Sinderen · Leszek A. Maciaszek (Eds.)

Software Technologies

14th International Conference, ICSOFT 2019
Prague, Czech Republic, July 26–28, 2019
Revised Selected Papers

Editors

Marten van Sinderen
Information Systems Group
University of Twente
Enschede, The Netherlands

Leszek A. Maciaszek
Institute of Business Informatics
Wrocław University of Economics
Wrocław, Poland

Macquarie University
Sydney, Australia

ISSN 1865-0929 ISSN 1865-0937 (electronic)
Communications in Computer and Information Science
ISBN 978-3-030-52990-1 ISBN 978-3-030-52991-8 (eBook)
<https://doi.org/10.1007/978-3-030-52991-8>

© Springer Nature Switzerland AG 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

The present book includes extended and revised versions of a set of selected papers from the 14th International Conference on Software Technologies (ICSOFT 2019), held in Prague, Czech Republic, from July 26–28, 2019.

ICSOFT 2019 received 116 paper submissions from 41 countries, of which 21 contributions (18%) were accepted and presented as full papers. After the conference, the authors of selected full papers were invited to submit a revised and extended version of their papers having at least 30% new material. In the end, 10 revised and extended papers have been included in this Springer book (i.e. 9% of the original 116 submissions).

The papers were selected by the event chairs and their selection was based on a number of criteria that included the classifications and comments provided by the Program Committee members, the session chairs' assessment, and the verification of the papers' revisions and extensions by the program and conference chairs.

The purpose of the ICSOFT conference is to bring together researchers, engineers, and practitioners interested in software technologies. The conference solicits papers and other contributions in themes ranging from software engineering and development via showcasing cutting-edge software systems and applications to addressing foundational innovative technologies for systems and applications of the future. The papers were presented in one of three conference areas: "Software Engineering and Systems Development," "Software Systems and Applications," and "Foundational and Trigger Technologies."

We would like to thank all the authors for their contributions and the reviewers for ensuring the quality of this publication.

July 2019

Marten van Sinderen
Leszek A. Maciaszek

Organization

Conference Chair

Leszek A. Maciaszek

Wrocław University of Economics, Poland,
and Macquarie University, Australia

Program Chair

Marten van Sinderen

University of Twente, The Netherlands

Program Committee

Jose Gonzalez

University of Seville, Spain

Waleed Alsabhan

KACST, UK

Peter Amthor

Technische Universität Ilmenau, Germany

Soumyadip Bandyopadhyay

BITS Pilani K K Birla Goa Campus and Hasso Plattner
Institute, India

Davide Basile

University of Florence, Italy

Doina Bein

California State University, Fullerton, USA

Wolfgang Bein

University of Nevada, Las Vegas, USA

Fevzi Belli

Izmir Institute of Technology, Turkey

Yann Ben Maissa

INPT, Morocco

Jorge Bernardino

Polytechnic of Coimbra - ISEC, Portugal

Mario Berón

Universidad Nacional de San Luis, Argentina

Marcello Bersani

Politecnico di Milano, Italy

Dominik Bork

University of Vienna, Austria

Andrea Burattin

University of Innsbruck, Austria

Nelio Cacho

Federal University of Rio Grande do Norte, Brazil

Alejandro Calderón

University of Cádiz, Spain

Gerardo Canfora

University of Sannio, Italy

Cagatay Catal

Wageningen University, The Netherlands

Ana Cavalli

Telecom SudParis, France

Juan Chagüendo Benavides

Universidad Carlos III de Madrid, Spain

Alexandru Cicortas

West University Timisoara, Romania

Lidia López Cuesta

Universitat Politècnica de Catalunya, Spain

Sergiu Dascalu

University of Nevada, Reno, USA

Cléver Ricardo de Farias

University of São Paulo, Brazil

Martina De Sanctis

Gran Sasso Science Institute, Italy

Steven Demurjian

University of Connecticut, USA

Chiara Di Francescomarino

FBK-IRST, Italy

József Dombi

University of Szeged, Hungary

Gencer Erdogan

SINTEF, Norway

Morgan Ericsson	Linnaeus University, Sweden
Anne Etien	University of Lille, France
João Faria	FEUP, University of Porto, Portugal
Luis Fernandez Sanz	University of Alcalá, Spain
Estrela Ferreira Cruz	Instituto Politecnico de Viana do Castelo, University of Minho, Portugal
Nicolas Ferry	SINTEF, Norway
Mirco Franzago	University of L'Aquila, Italy
Matthias Galster	University of Canterbury, New Zealand
Mauro Gaspari	University of Bologna, Italy
Hamza Gharsellaoui	Arab Open University, Saudi Arabia
Aritra Ghosh	Florida Atlantic University, USA
Paola Giannini	University of Piemonte Orientale, Italy
John Gibson	Mines-Telecom, Telecom SudParis, France
Ana-Belén Gil-González	University of Salamanca, Spain
Gorkem Giray	Independent Researcher, Turkey
Gregor Grambow	Hochschule Aalen, Germany
Christiane Gresse von Wangenheim	Federal University of Santa Catarina (UFSC), Brazil
Hatim Hafiddi	INPT, Morocco
Slimane Hammoudi	ESEO, ERIS, France
Ludovic Hamon	Le Mans Université, France
Jean Hauck	Universidade Federal de Santa Catarina, Brazil
Pedro Henriques	University of Minho, Portugal
Jose Herrera	Universidad del Cauca, Colombia
Mercedes Hidalgo-Herrero	Universidad Complutense de Madrid, Spain
Jose R. Hilera	University of Alcalá, Spain
Andreas Holzinger	Medical University Graz, Austria
Jang-Eui Hong	Chungbuk National University, South Korea
Zbigniew Huzar	Wrocław University of Science and Technology, Poland
Ivan Ivanov	SUNY Empire State College, USA
Judit Jasz	University of Szeged, Hungary
Bo Jørgensen	University of Southern Denmark, Denmark
Maria Jose Escalona	University of Seville, Spain
Hermann Kaindl	University of Seville, Spain, and TU Wien, Austria
Dimitris Karagiannis	University of Vienna, Austria
Carlos Kavka	University of Paris-Sud, France
Dean Kelley	Minnesota State University, USA
Mieczyslaw Kokar	Northeastern University, USA
Jitka Komarkova	University of Pardubice, Czech Republic
Jun Kong	North Dakota State University, USA
Winfried Kühnhauser	Ilmenau University of Technology, Germany
Rob Kusters	The Open University, The Netherlands
Wing Kwong	Hofstra University, USA
Giuseppe Lami	CNR, Italy

Sérgio Lopes	University of Minho, Portugal
David Lorenz	The Open University, Israel
Ivan Lukovic	University of Novi Sad, Serbia
Stephane Maag	Telecom SudPairs, France
Ivano Malavolta	Vrije Universiteit Amsterdam, The Netherlands
Eda Marchetti	ISTI-CNR, Italy
Katsuhisa Maruyama	Ritsumeikan University, Japan
Manuel Mazzara	Innopolis University, Russia
Fuensanta	Carlos III Technical University of Madrid, Spain
Medina-Dominguez	
Francesco Mercaldo	CNR, Italy
Antoni Mesquida Calafat	Universitat de les Illes Balears (UIB), Spain
Gergely Mezei	Budapest University of Technology and Economics, Hungary
Cristian Mihaescu	University of Craiova, Romania
Mattia Monga	Università degli Studi di Milano, Italy
Antao Moura	Federal University of Campina Grande (UFCG), Brazil
Christian Muck	University of Vienna, Austria
Antonio Muñoz	University of Malaga, Spain
Takako Nakatani	The Open University of Japan, Japan
Elena Navarro	University of Castilla-La Mancha, Spain
Joan Navarro	Universitat Ramon Llull - La Salle Campus, Spain
Paolo Nesi	University of Florence, Italy
Rory O'Connor	Dublin City University, Ireland
Flavio Oquendo	European University of Brittany, IRISA-UBS, France
Claus Pahl	Free University of Bozen-Bolzano, Italy
Luis Pedro	University of Aveiro, Portugal
Jennifer Pérez	Universidad Politécnica de Madrid (UPM), Spain
Dana Petcu	West University of Timisoara, Romania
Dietmar Pfahl	University of Tartu, Estonia
Giuseppe Polese	Università degli Studi di Salerno, Italy
Stefano Quer	Politecnico di Torino, Italy
Traian Rebedea	University Politehnica of Bucharest, Romania
Werner Retschitzegger	Johannes Kepler University, Austria
Ralf Reussner	Karlsruhe Institute of Technology (KIT), Germany
Marcela Xavier Ribeiro	Federal University of São Carlos, Brazil
Colette Rolland	Université Paris 1 Panthéon-Sorbonne, France
António Miguel Rosado da Cruz	Instituto Politécnico de Viana do Castelo, Portugal
Gustavo Rossi	Lifia, Argentina
Matteo Rossi	Politecnico di Milano, Italy
Stuart Rubin	University of California, San Diego, USA
Gunter Saake	Institute of Technical and Business Information Systems, Germany
Davide Sangiorgi	Università di Bologna, Italy
Nickolas Sapidis	University of Western Macedonia, Greece

Santonu Sarkar	BITS Pilani Goa, India
Elad Schiller	Chalmers University of Technology, Sweden
Lionel Seinturier	University of Lille, France
Istvan Siket	Hungarian Academy of Science, Research Group on Artificial Intelligence, Hungary
Harvey Siy	University of Nebraska, Omaha, USA
Cosmin Spahiu	University of Craiova, Romania
Anca-Juliana Stoica	Uppsala University, Sweden
Hiroki Suguri	Miyagi University, Japan
Selma Suloglu	Rochester Institute of Technology, USA
Bedir Tekinerdogan	Wageningen University, The Netherlands
Claudine Toffolon	University of Maine, France
Joseph Trienekens	The Open University, The Netherlands
Michael Vassilakopoulos	University of Thessaly, Greece
Dessislava Vassileva	Sofia University, Bulgaria
László Vidács	University of Szeged, Hungary
Yan Wang	Google, USA
Dietmar Winkler	Vienna University of Technology, Austria
Andreas Winter	Carl von Ossietzky University Oldenburg, Germany
Jinhui Yao	Xerox Research, USA
Murat Yilmaz	Dublin City University, Ireland
Jingyu Zhang	Macquarie University, Australia
Zheyang Zhang	Tampere University, Finland

Additional Reviewers

Victoria Döller	University of Vienna, Austria
Vimal Kunnummel	University of Vienna, Austria
Wissam Mallouli	Montimage, France
Damien Pollet	Inria, France
Frederik Reiche	KIT, Germany
Spyros Vosinakis	University of the Aegean, Greece

Invited Speakers

Manfred Reichert	Ulm University, Germany
Michael G. Hinchey	Lero, University of Limerick, Ireland
Hans-Georg Fill	University of Fribourg, Switzerland

Contents

Software Engineering and Systems Development

Equivalence Class Definition for Automated Testing of Satellite On-Board Image Processing	3
<i>Ulrike Witteck, Denis Griebbach, and Paula Herber</i>	
What We Know About Software Architecture Styles in Continuous Delivery and DevOps?.	26
<i>Maya Daneva and Robin Bolscher</i>	
Analysing the Performance of Mobile Cross-platform Development Approaches Using UI Interaction Scenarios	40
<i>Stefan Huber, Lukas Demetz, and Michael Felderer</i>	
Quantitative Analysis of Mutant Equivalence	58
<i>Amani Ayad, Imen Marsit, Sara Tawfig, Ji Meng Loh, Mohamed Nazih Omri, and Ali Mili</i>	
Distributed Frames: Pattern-Based Characterization of Functional Requirements for Distributed Systems	81
<i>Roman Wirtz, Maritta Heisel, and Marvin Wagner</i>	
Efficient Diagnosis of Reconfigurable Systems with Incorrect Behavior and Faulty Components: A Case Study on SGrids.	108
<i>Yousra Hafidi, Laid Kahloul, and Mohamed Khalgui</i>	

Software Systems and Applications

GA-PPI-Net: A Genetic Algorithm for Community Detection in Protein-Protein Interaction Networks	133
<i>Marwa Ben M'barek, Amel Borgi, Sana Ben Hmida, and Marta Rukoz</i>	
From Formal Test Objectives to TTCN-3 for Verifying ETCS Complex Software Control Systems	156
<i>Rabea Ameur-Boulifa, Ana Cavalli, and Stephane Maag</i>	
Service Robots: A Unified Framework for Detecting, Opening and Navigating Through Doors.	179
<i>Tatsuya Harada, Antonio Tejero-de-Pablos, Stefano Quer, and Francesco Savarese</i>	

Two-Stage Game Theoretic Approach for Energy Management
in Networked Microgrids 205
Ilyes Naidji, Olfa Mosbahi, Mohamed Khargui, and Abdelmalik Bachir

Author Index 229