Lecture Notes in Computer Science 11665

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board Members

David Hutchison
Lancaster University, Lancaster, UK
Takeo Kanade
Carnegie Mellon University, Pittsburgh, PA, USA
Josef Kittler
University of Surrey, Guildford, UK
Jon M. Kleinberg
Cornell University, Ithaca, NY, USA
Friedemann Mattern
ETH Zurich, Zurich, Switzerland
John C. Mitchell
Stanford University, Stanford, CA, USA
Moni Naor
Weizmann Institute of Science, Rehovot, Israel
C. Pandu Rangan
Indian Institute of Technology Madras, Chennai, India
Bernhard Steffen
TU Dortmund University, Dortmund, Germany
Demetri Terzopoulos
University of California, Los Angeles, CA, USA
Doug Tygar
University of California, Berkeley, CA, USA

More information about this series at http://www.springer.com/series/7407

Michele Boreale · Flavio Corradini ·
Michele Loreti · Rosario Pugliese (Eds.)

Models, Languages, and Tools for Concurrent and Distributed Programming

Essays Dedicated to Rocco De Nicola on the Occasion of His 65th Birthday

Springer

Editors
Michele Boreale
Department of Statistics, Computer Science, Applications
University of Florence
Florence, Italy

Michele Loreti
School of Science and Technology
University of Camerino
Camerino, Italy

Flavio Corradini
School of Science and Technology
University of Camerino
Camerino, Italy

Rosario Pugliese
Department of Statistics, Computer Science, Applications
University of Florence
Florence, Italy

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-030-21484-5 ISBN 978-3-030-21485-2 (eBook)
https://doi.org/10.1007/978-3-030-21485-2

LNCS Sublibrary: SL1 – Theoretical Computer Science and General Issues

© Springer Nature Switzerland AG 2019
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.

Cover illustration: The Sower (Sower at Sunset), painted by Vincent van Gogh 1888.
Wikimedia Commons, licensed under CreativeCommons-Lizenz by-sa-2.0-de, URL: https://commons.wikimedia.org/wiki/File:The_Sower.jpg

Photograph on page V: The photograph of the honoree is published with the permission of IMT, Lucca, Italy.

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

Rocco De Nicola

Preface

This Festschrift volume contains the 27 papers written by close collaborators and friends of Rocco De Nicola to celebrate him on the occasion of his 65th birthday.

Rocco De Nicola has made seminal contributions to concurrency theory, semantics of programming languages, distributed systems, and logic in computer science. He is also contributing to a wide variety of other emerging topics in which theoretical foundations can have a tremendous effect on the practice of computing. His many scientific achievements are documented by more than 180 papers he published in international journals, proceedings of high-quality conferences and workshops, and refereed chapters in books with international editors.

The papers gathered in this book present many research ideas that have been influenced by Rocco's work. They testify to his intellectual curiosity, versatility, and tireless research activity, and provide an overview of further developments to come.

The volume consists of six sections. The first one contains a laudatio illustrating the distinguished career and the main scientific contributions by Rocco and a witness of working experiences with Rocco. The remaining five sections comprise scientific papers related to specific research interests of Rocco:

- Observational Semantics
- Coordination Models and Languages
- Logics and Types
- Distributed Systems Modelling
- Security

Each scientific contribution has undergone the scrutiny of two anonymous reviewers. We would like to thank all of them for their assistance.

This volume was presented to Rocco on July 1, 2019, during a two-day symposium held in Lucca at the IMT School for Advanced Studies. During the symposium all papers were presented by one of the authors. The symposium was attended by many other colleagues and friends of Rocco. We thank all of them for having accepted our invitation.

We are grateful to Mirco Tribastone and the System Modelling and Analysis group at IMT for the local organization of the symposium and to the IMT School for Advanced Studies for financial support. We would also like to thank Alfred Hofmann and the Springer LNCS team for their support during the publication of this volume, and the providers of the conference management system EasyChair, which was used to run the submission and review process and to facilitate the preparation of the proceedings.

People who have contributed to the present volume in honour of Rocco have had the opportunity to know him professionally over the years. Many have collaborated with him and in doing so have been fortunate to spend time with him. Each of us has taken something significant from this personal contact. Rocco was, and is, a true "scientific

dad" for several of us and a loyal scientific collaborator for all of us. Passionate about research, curious about the new, never stinting with his knowledge or with his contacts, he has always stimulated new collaborations, both within and without his group. He has always encouraged the dignity and self confidence that any collaborator must have to work well. He made you feel you were a researcher 'at the same level' — part of a team, a real 'school for researchers' for younger colleagues. He could joke when he had to control excessive enthusiasm, be serious and rigorous when he had to arrive at the 'qed'. We have always appreciated his ability to transform competition within the group into a stimulus to do better, to grow faster. Thanks for everything, Rocco!

July 2019

Michele Boreale
Flavio Corradini
Michele Loreti
Rosario Pugliese

Organization

Reviewers

Abd Alrahman, Yehia
Aceto, Luca
Bernardi, Giovanni
Bettini, Lorenzo
Bodei, Chiara
Bruni, Roberto
Cacciagrano, Diletta Romana
Ciancia, Vincenzo
Corradini, Andrea
De Liguoro, Ugo
Dezani, Mariangiola
Fantechi, Alessandro
Ferrari, Gian-Luigi
Gadducci, Fabio
Galletta, Letterio
Giannini, Paola
Gorla, Daniele
Hennessy, Matthew
Inverso, Omar
Labella, Anna
Lanese, Ivan
Lluch Lafuente, Alberto
Massink, Mieke
Melgratti, Hernan
Mezzina, Claudio Antares
Miculan, Marino
Montanari, Ugo
Najm, Elie
Nenzi, Laura
Neykova, Rumyana
Palamidessi, Catuscia
Pérez, Jorge A.
Re, Barbara
Sangiorgi, Davide
Tesei, Luca
Tiezzi, Francesco
Torres Vieira, Hugo
Tribastone, Mirco
Trubiani, Catia
Tuosto, Emilio
Venneri, Betti
Viroli, Mirko
Zavattaro, Gianluigi

Contents

Homage from Friends

From Tuscany to Scotland and Back: A Homage to Rocco de Nicola for His 65th Birthday 3
Ugo Montanari

Building International Doctoral Schools in Computer Science in Italy, De Nicola's Way 7
Luca Aceto, Gianlorenzo D'Angelo, Michele Flammini, Omar Inverso, Ludovico Iovino, and Catia Trubiani

Observational Semantics

An Equational Characterisation of the Must Testing Pre-order for Regular Processes 15
Matthew Hennessy

Testing Equivalence vs. Runtime Monitoring 28
Luca Aceto, Antonis Achilleos, Adrian Francalanza, Anna Ingólfsdóttir, and Karoliina Lehtinen

Reward Testing Equivalences for Processes 45
Rob van Glabbeek

Playing with Bisimulation in Erlang 71
Ivan Lanese, Davide Sangiorgi, and Gianluigi Zavattaro

Genesis and Evolution of ULTraS: Metamodel, Metaequivalences, Metaresults 92
Marco Bernardo

Coordination Models and Languages

X-Klaim Is Back 115
Lorenzo Bettini, Emanuela Merelli, and Francesco Tiezzi

A Distributed Ledger Technology Based on Shared Write-Once Objects 136
Eva Maria Kuehn

Testing for Coordination Fidelity 152
Yehia Abd Alrahman, Claudio Antares Mezzina, and Hugo Torres Vieira

Data-Driven Choreographies à la Klaim 170
Roberto Bruni, Andrea Corradini, Fabio Gadducci, Hernán Melgratti, Ugo Montanari, and Emilio Tuosto

Different Glasses to Look into the Three Cs: Component, Connector, Coordination 191
Farhad Arbab, Marco Autili, Paola Inverardi, and Massimo Tivoli

Logics and Types

From the Archives of the Formal Methods and Tools Lab: Axiomatising and Contextualising ACTL 219
Stefania Gnesi and Maurice H. ter Beek

Featherweight Scribble 236
Rumyana Neykova and Nobuko Yoshida

Embedding RCC8D in the Collective Spatial Logic CSLCS 260
Vincenzo Ciancia, Diego Latella, and Mieke Massink

From Behavioural Contracts to Session Types 278
Alessandro Fantechi, Elie Najm, and Jean-Bernard Stefani

Modal Epistemic Logic on Contracts: A Doctrinal Approach 298
Paolo Bottoni, Daniele Gorla, Stefano Kasangian, and Anna Labella

Types for Progress in Actor Programs 315
Minas Charalambides, Karl Palmskog, and Gul Agha

Event Structure Semantics for Multiparty Sessions 340
Ilaria Castellani, Mariangiola Dezani-Ciancaglini, and Paola Giannini

Distributed Systems Modelling

Process Calculi for Modelling Mobile, Service-Oriented, and Collective Autonomic Systems 367
Martin Wirsing and Rolf Hennicker

Autonomous Systems – An Architectural Characterization 388
Joseph Sifakis

Fluidware: An Approach Towards Adaptive and Scalable Programming of the IoT 411
Giancarlo Fortino, Barbara Re, Mirko Viroli, and Franco Zambonelli

HEADREST: A Specification Language for RESTful APIs 428
Vasco T. Vasconcelos, Francisco Martins, Antónia Lopes, and Nuno Burnay

Security

Revealing the Trajectories of KLAIM Tuples, Statically 437
Chiara Bodei, Pierpaolo Degano, Gian-Luigi Ferrari, and Letterio Galletta

Lightweight Information Flow 455
Flemming Nielson and Hanne Riis Nielson

A Framework for Provenance-Preserving History Distribution and Incremental Reduction 471
Alberto Lluch Lafuente

Utility-Preserving Privacy Mechanisms for Counting Queries 487
Natasha Fernandes, Kacem Lefki, and Catuscia Palamidessi

Author Index 497