Lecture Notes in Computer Science 10221

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

Editorial Board

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, 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
Gerhard Weikum
Max Planck Institute for Informatics, Saarbrücken, Germany

More information about this series at http://www.springer.com/series/7408

Goetz Botterweck · Claudia Werner (Eds.)

Mastering Scale and Complexity in Software Reuse

16th International Conference on Software Reuse, ICSR 2017
Salvador, Brazil, May 29–31, 2017
Proceedings

Springer

Editors
Goetz Botterweck
Lero - University of Limerick
Limerick
Ireland

Claudia Werner
Federal University of Rio de Janeiro
Rio de Janeiro
Brazil

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-319-56855-3 ISBN 978-3-319-56856-0 (eBook)
DOI 10.1007/978-3-319-56856-0

Library of Congress Control Number: 2017936356

LNCS Sublibrary: SL2 – Programming and Software Engineering

© Springer International Publishing AG 2017
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, express 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.

Printed on acid-free paper

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

Foreword

This volume contains the proceedings of the International Conference on Software Reuse (ICSR 16) held during May 29–31, 2017, in Salvador, Brazil.

The International Conference on Software Reuse is the premier international event in the software reuse community. The main goal of ICSR is to present the most recent advances and breakthroughs in the area of software reuse and to promote an intensive and continuous exchange among researchers and practitioners.

The conference featured two keynotes by Mark Harman, University College London, and Thomas Zimmermann, Microsoft Research. We received 34 submissions (excluding withdrawn submissions). Each submission was reviewed by three Program Committee members. The committee decided to accept 11 papers, out of which eight full papers and three short ones, resulting in an acceptance rate of 32.3%. The program also included invited talks, a workshop, a doctoral symposium, and two tutorials. Abstracts of all these are also included in this volume. The program was complemented by tool demos and doctoral symposium.

This conference was a collaborative work that could only be realized through many dedicated efforts. First of all, we would like to thank Eduardo Almeida and Ivan Machado for their work as general chair and local chair, respectively. Rafael Capilla organized the workshop and tutorial program. Deepak Dhungana organized the demonstrations and tools track. Rohit Gheyi was Doctoral Symposium Chair. Tassio Vale and Alcemir Santos both served as Web chairs, while Crescencio Lima and Iuri Souza served as financial chairs. We would also like to thank Paulo Silveira for his work as proceedings chair.

We would also like to thank Fapesb, Secretaria de Ciência, Tecnologia e Inovação, Governo do Estado da Bahia, and CAPES for their financial support of the conference, which was paramount to holding the conference in Salvador, Brazil.

Last but not least, as program co-chairs of ICSR 2017, we would like to sincerely thank all authors who submitted papers to the conference for their contributions. We also thank the members of the Program Committee and the additional reviewers for their detailed and timely reviews as well as their participation in the discussions of the submissions.

February 2017

Goetz Botterweck
Claudia Werner

Organization

General Chair

Eduardo Santana de Almeida	Federal University of Bahia and RiSE Labs, Brazil

Program Co-chairs

Goetz Botterweck	Lero - University of Limerick, Ireland
Claudia Werner	Federal University of Rio de Janeiro, Brazil

Doctoral Symposium Chair

Rohit Gheyi	Federal University of Campina Grande, Brazil

Workshops and Tutorials Chair

Rafael Capilla	King Juan Carlos University, Spain

Tool Demonstrations Chair

Deepak Dhungana	Siemens, Austria

Program Committee

Mathieu Acher	Inria, France
Colin Atkinson	University of Mannheim, Germany
Paris Avgeriou	University of Groningen, The Netherlands
Ebrahim Bagheri	Ryerson University, Canada
Maurice H. Ter Beek	ISTI-CNR, Italy
David Benavides	Universidad de Sevilla, Spain
Jan Bosch	Chalmers, Sweden
Regina Braga	Federal University of Juiz de Fora, Brazil
Jim Buckley	University of Limerick, Ireland
Rafael Capilla	Universidad Rey Juan Carlos, Madrid, Spain
Andrea Capiluppi	Brunel University, UK
Sholom Cohen	SEI, USA
Florian Daniel	Politecnico di Milano, Italy
Davide Falessi	Cal Poly, USA
John Favaro	Intecs SpA, Italy
William B. Frakes	Virginia Tech, USA
Harald Gall	University of Zurich, Switzerland

Oliver Hummel	IQSER, Germany
Kyo C. Kang	Samsung, South Korea
Georgia Kapitsaki	University of Cyprus, Cyprus
Jens Krinke	University College London, UK
Uirá Kulesza	Federal University of Rio Grande do Norte (UFRN), Brazil
Patricia Lago	Vrije Universiteit Amsterdam, The Netherlands
Jaejoon Lee	Lancaster University, UK
Daniel Lucré Dio	Federal University of São Carlos, Brazil
Hidehiko Masuhara	Tokyo Institute of Technology, Japan
John Mcgregor	Clemson University, USA
Hong Mei	Beijing Institute of Technology and Peking University, China
Tom Mens	University of Mons, Belgium
Maurizio Morisio	Politecnico di Torino, Italy
Denys Poshyvanyk	College of William and Mary, USA
Jeffrey Poulin	USA
Rick Rabiser	CDL MEVSS, JKU Linz, Austria
Julia Rubin	The University of British Columbia, Canada
Ina Schaefer	Technische Universität Braunschweig, Germany
Klaus Schmid	University of Hildesheim, Germany
Christa Schwanninger	Siemens Healthcare GmbH, Germany
Norbert Siegmund	University of Passau, Germany
Murali Sitaraman	Clemson University, USA
Ioannis Stamelos	Aristotle University of Thessaloniki, Greece
Uwe Zdun	University of Vienna, Austria

Keynote Abstracts

Alice in Dataland: Reuse for Data Science in Software Teams

Thomas Zimmermann

Microsoft Research, Redmond, USA
tz@acm.org

Abstract. Data is changing the world and how we build software. Running software produces large amounts of raw data about development processes and customer usage of software. In this talk, I will motivate the need for data analytics and show how data scientists work in a large software companies such as Microsoft helping software teams to infer actionable insights. I will highlight opportunities related to software reuse for researchers, practitioners, and educators.

Bio. Thomas Zimmermann is a Senior Researcher in the Research in Software Engineering (RiSE) group at Microsoft Research, Redmond, USA. His research interests include software productivity, software analytics, recommender systems, and games research. He is best known for his research on systematic mining of software repositories to conduct empirical studies and to build tools to support developers and managers. His work received several awards, including Ten Year Most Influential Paper awards at ICSE'14 and MSR'14, five ACM SIGSOFT Distinguished Paper Awards, and a CHI Honorable Mention. He currently serves as General Chair for SIGSOFT FSE'16 and as Program Co-Chair for ICSME 2017. He is Co-Editor in Chief of the Empirical Software Engineering journal and serves on the editorial boards of several journals, including the IEEE Transactions on Software Engineering. He received his PhD in 2008 from Saarland University in Germany. His homepage is http://thomas-zimmermann.com.

Software Transplantation for Reuse

Mark Harman

University College London, London, UK
mark.harman@ucl.ac.uk

Abstract. This talk describe recent advances in automated software transplantation and genetic improvement, focusing on their potential for reuse. Transplantation automatically transfers code from one system, a donor, into another unrelated system, the host, transforming it in order to transfer functionality from donor to host. Genetic improvement automatically improves operational characteristics of existing systems, such as execution time, memory requirements, and energy consumption.

This keynote is based on joint work with Earl Barr, Bobby Bruce, Yue Jia, Bill Langdon, Alexandru Marginean, Justyna Petke, Federica Sarro, Fan Wu and Yuanyuan Zhang in the CREST centre at UCL. CREST's work on automated transplantation won an ACM distinguished paper award (at ISSTA 2015) and the gold medal for human competitive results at the GECCO 2016 Humie awards.

Bio. Mark Harman is professor of Software Engineering in the Department of Computer Science at University College London, where he directs the CREST centre and is Head of Software Systems Engineering. He is widely known for work on source code analysis and testing and co-founded the field of Search Based Software Engineering (SBSE). SBSE research has rapidly grown over the past five years and now includes over 1600 authors, from nearly 300 institutions spread over more than 40 countries.

Contents

Documentation Reuse and Repositories

DevRec: A Developer Recommendation System for Open Source Repositories 3
Xunhui Zhang, Tao Wang, Gang Yin, Cheng Yang, Yue Yu, and Huaimin Wang

Documentation Reuse: Hot or Not? An Empirical Study 12
Mohamed A. Oumaziz, Alan Charpentier, Jean-Rémy Falleri, and Xavier Blanc

Software Product Lines

A Preliminary Assessment of Variability Implementation Mechanisms in Service-Oriented Computing 31
Loreno Freitas Matos Alvim, Ivan do Carmo Machado, and Eduardo Santana de Almeida

No Code Anomaly is an Island: Anomaly Agglomeration as Sign of Product Line Instabilities 48
Eduardo Fernandes, Gustavo Vale, Leonardo Sousa, Eduardo Figueiredo, Alessandro Garcia, and Jaejoon Lee

ReMINDER: An Approach to Modeling Non-Functional Properties in Dynamic Software Product Lines 65
Anderson G. Uchôa, Carla I.M. Bezerra, Ivan C. Machado, José Maria Monteiro, and Rossana M.C. Andrade

Variability Management and Model Variants

Clustering Variation Points in MATLAB/Simulink Models Using Reverse Signal Propagation Analysis 77
Alexander Schlie, David Wille, Loek Cleophas, and Ina Schaefer

Discovering Software Architectures with Search-Based Merge of UML Model Variants 95
Wesley K.G. Assunção, Silvia R. Vergilio, and Roberto E. Lopez-Herrejon

Tracing Imperfectly Modular Variability in Software Product Line Implementation 112
Xhevahire Tërnava and Philippe Collet

Verification and Refactoring for Reuse

Composition of Verification Assets for Software Product Lines of Cyber Physical Systems 123
Ethan T. McGee, Roselane S. Silva, and John D. McGregor

Engineering and Employing Reusable Software Components for Modular Verification 139
Daniel Welch and Murali Sitaraman

Refactoring Legacy JavaScript Code to Use Classes: The Good, The Bad and The Ugly 155
Leonardo Humberto Silva, Marco Tulio Valente, and Alexandre Bergel

Tools Demonstrations

DyMMer-NFP: Modeling Non-functional Properties and Multiple Context Adaptation Scenarios in Software Product Lines 175
Anderson G. Uchôa, Luan P. Lima, Carla I.M. Bezerra, José Maria Monteiro, and Rossana M.C. Andrade

Identification and Prioritization of Reuse Opportunities with JReuse 184
Johnatan Oliveira, Eduardo Fernandes, Gustavo Vale, and Eduardo Figueiredo

Doctoral Symposium

EcoData: Architecting Cross-Platform Software Ecosystem Applications 195
Marcelo França

Investigating the Recovery of Product Line Architectures: An Approach Proposal. 201
Crescencio Lima, Christina Chavez, and Eduardo Santana de Almeida

Towards a Guideline-Based Approach to Govern Developers in Mobile Software Ecosystems 208
Awdren de Lima Fontão, Arilo Dias-Neto, and Rodrigo Santos

Erratum to: Towards a Guideline-Based Approach to Govern Developers in Mobile Software Ecosystems E1
Awdren de Lima Fontão, Arilo Dias-Neto, and Rodrigo Santos

Tutorials

Building Safety-Critical Systems Through Architecture-Based Systematic Reuse 217
John D. McGregor and Roselane S. Silva

Reusable Use Case and Test Case Specification Modeling 219
Tao Yue and Shaukat Ali

Workshop

2nd Workshop on Social, Human, and Economic Aspects of Software (WASHES): Special Edition for Software Reuse 223
Rodrigo Santos, Eldanae Teixeira, Emilia Mendes, and John McGregor

Author Index 225