

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Alfred Kobsa

University of California, Irvine, CA, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

TU Dortmund University, 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, Saarbruecken, Germany

Mercedes G. Merayo
Edgardo Montes de Oca (Eds.)

Testing Software and Systems

26th IFIP WG 6.1 International Conference, ICTSS 2014
Madrid, Spain, September 23-25, 2014
Proceedings

Volume Editors

Mercedes G. Merayo
Universidad Complutense de Madrid
Facultad de Informática
Dpto Sistemas Informáticos y Computación
Prof. Jose García Santesmases s/n
28040 Madrid, Spain
E-mail: mgmerayo@fdi.ucm.es

Edgardo Montes de Oca
Montimage
39 rue Bobillot
75013 Paris, France
E-mail: edgardo.montesdeoca@montimage.com

ISSN 0302-9743

e-ISSN 1611-3349

ISBN 978-3-662-44856-4

e-ISBN 978-3-662-44857-1

DOI 10.1007/978-3-662-44857-1

Springer Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014948209

LNCS Sublibrary: SL 2 – Programming and Software Engineering

© IFIP International Federation for Information Processing 2014

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. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

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.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

This volume contains the proceedings of the 26th IFIP International Conference on Testing Software and Systems, ICTSS 2014. The conference was held in Madrid, Spain, during September 23–25, 2014. The purpose of the ICTSS conference is to bring together researchers, developers, testers, and users from industry to review, discuss, and learn about new approaches, concepts, theories, methodologies, tools, and experiences in the field of testing of software and systems.

We received 36 submissions. After a careful reviewing process, the Program Committee accepted 11 regular papers and 6 short papers. Therefore, the acceptance rate of the conference stayed close to 47%. The conference program was enriched by the keynotes of Franz Wotawa, on “On the boundary between testing and fault localization”, and Salvador Ignacio Folgado Bellido, on “Advanced solutions for automation of functional test”.

Several people contributed to the success of ICTSS 2014. We are grateful to the Steering Committee for its support. Its chair, Professor Rob Hierons, deserves a special mention for his guidance and valuable advice. We would like to thank the general chair Manuel Núñez, the Program Committee, and the additional reviewers, for their work on selecting the papers. The process of reviewing and selecting papers was significantly simplified through using EasyChair. Finally, the proceedings have been published through Springer-Verlag and we are grateful for the assistance provided by Alfred Hofmann and Anna Kramer.

On behalf of the ICTSS organizers, we welcome all attendants to the conference and hope that you find the conference’s program useful, interesting, and challenging.

September 2014

Mercedes G. Merayo
Edgardo Montes de Oca

Organization

Program Committee

Rui Abreu	University of Porto, Portugal
Bernhard K. Aichernig	TU Graz, Austria
Fevzi Belli	University Paderborn and Izmir Institute of Technology, Turkey
Gregor Bochmann	University of Ottawa, Canada
Ana Cavalli	Institut Mines-Telecom/Telecom SudParis, France
Byoungju Choi	Ewha Womans University, Korea
Khaled El-Fakih	American University of Sharjah, UAE
Mercedes G. Merayo	Universidad Complutense de Madrid, Spain
Angelo Gargantini	University of Bergamo, Italy
Vahid Garousi	Atilim University, Turkey University of Calgary, Canada
Wolfgang Grieskamp	Google, USA
Klaus Havelund	Jet Propulsion Laboratory, California Institute of Technology, USA
Rob Hierons	Brunel University, UK
Teruo Higashino	Osaka University, Japan
Dieter Hogrefe	University of Göttingen, Germany
Guy-Vincent Jourdan	University of Ottawa, Canada
Thierry Jéron	Inria Rennes - Bretagne Atlantique, France
Ferhat Khendek	Concordia University, Canada
Moez Krichen	REDCAD Research Unit, Tunisia
Pascale Le Gall	Ecole Centrale Paris, France
Bruno Legear	Smartesting & Université de Franche-Comté, France
Hareton Leung	Hong Kong Polytechnic University, China
Keqin Li	SAP Product Security Research, France
Wissam Mallouli	Montimage, France
Karl Meinke	Royal Institute of Technology (KTH) Stockholm, Sweden
Zoltan Micskei	Budapest University of Technology and Economics, Hungary
Edgardo Montes de Oca	Montimage, France
Jan Peleska	University of Bremen, Germany
Alexandre Petrenko	CRIM, Canada
Andrea Polini	University of Camerino, Italy
Ina Schieferdecker	FU Berlin/Fraunhofer FOKUS, Germany
Holger Schlingloff	Fraunhofer FOKUS, Germany

Kenji Suzuki	Kennisbron Co., Ltd, Japan
Jan Tretmans	TNO - Embedded Systems Innovation, The Netherlands
Andreas Ulrich	Siemens AG, Germany
Hasan Ural	University of Ottawa, Canada
Margus Veanes	Microsoft Research, USA
Cesar Viho	IRISA/University of Rennes 1, France
Tanja E.J. Vos	Universidad Politecnica de Valencia, Spain
Bachar Wehbi	Montimage, France
Hüsnü Yenigün	Sabancı University, Turkey
Nina Yevtushenko	Tomsk State University, Russia
Cemal Yilmaz	Sabancı University, Turkey

Additional Reviewers

Chai, Ming	Lackner, Hartmut
Gromov, Maxim	Mirtaheri, Seyed M.
Hafaiedh, Khaled B.	Nuñez, Manuel
Kondratyeva, Olga	Rivera, Diego
Kushik, Natalia	Schwarzl, Christian
La, Vinh Hoa	Turker, Uraz Cengiz

**Invited Talk
(Abstracts)**

On the Boundary between Testing and Fault Localization

Franz Wotawa

Graz University of Technology

Abstract. Debugging comprises the activities of fault detection, localization, and correction, which we usually consider to be carried out separately during program development. In testing and here in particular automated test case generation, the question is more on how to generate effective tests that most likely reveal bugs instead of how such tests might help to locate and fix a bug once revealed. In this talk I discuss the relationship between testing and fault localization. Besides giving an introduction into the current state of the art in debugging, I introduce a method for computing tests in order to facilitate debugging. The key idea behind the method is to construct test cases that allow distinguishing bug candidates. In the talk I introduce the basic ideas, empirical results obtained, and focus also on current research questions that has to be tackled in order to further increase automation in fault localization and correction.

Advanced Solutions for Automation of Functional Test

Salvador Ignacio Folgado Bellido

Bull Spain S.A.

Abstract. It is common knowledge that the most efficient solution to obtain high quality systems is to perform test automation. However, does not it sound like unfinished business, unresolved? Is it a utopia to achieve a high degree of test automation? Are we creating a new problem of developing and maintaining evidence? What actual the coverage that we have or that we can get? And what about mobile devices, smartphone, tablets? 80% of organizations attempting to address automation of functional tests fail. The main reason is that the acquisition of a test automation tool does not solve the problem (actually, it generates a new one!). This objective must be addressed based on a sustainable strategy that addresses the reality of the organization (changing their requirements, more frequent deployments, business oriented). This talk discusses Bull's approach on how to carry out automation of functional tests, based on the following principles: reusability, consistency and productivity. I will present data and results of projects (case studies) in order to draw the best strategic approach to functional test automation and also will address the future of testing related to new technologies and platforms.

Table of Contents

Testing Methodologies

A Framework for Genetic Test-Case Generation for WS-BPEL Compositions	1
<i>Antonia Estero-Botaro, Antonio García-Domínguez, Juan José Domínguez-Jiménez, Francisco Palomo-Lozano, and Inmaculada Medina-Bulo</i>	
Evaluating Normalization Functions with Search Algorithms for Solving OCL Constraints	17
<i>Shaukat Ali and Tao Yue</i>	
Lookahead-Based Approaches for Minimizing Adaptive Distinguishing Sequences	32
<i>Uraz Cengiz Türker, Tonguç Ünlüyurt, and Hüsnü Yenigün</i>	
Plan It! Automated Security Testing Based on Planning	48
<i>Franz Wotawa and Josip Bozic</i>	
Minimum Number of Test Paths for Prime Path and Other Structural Coverage Criteria	63
<i>Anurag Dwarakanath and Aruna Jankiti</i>	

Tools and Frameworks

An Approach to Derive Usage Models Variants for Model-Based Testing	80
<i>Hamza Samih, Hélène Le Guen, Ralf Bogusch, Mathieu Acher, and Benoit Baudry</i>	
AUTSEG: Automatic Test Set Generator for Embedded Reactive Systems	97
<i>Mariem Abdelmoula, Daniel Gaffe, and Michel Auguin</i>	
Well-Defined Coverage Metrics for the Glass Box Test	113
<i>Rainer Schmidberger</i>	

Industrial Experiences

Cutting Time-to-Market by Adopting Automated Regression Testing in a Simulated Environment	129
<i>Manuel Palmieri, Antonio Cicchetti, and Anders Öberg</i>	

Testing Robotized Paint System Using Constraint Programming:
 An Industrial Case Study 145
Morten Mossige, Arnaud Gotlieb, and Hein Meling

What Characterizes a Good Software Tester? – A Survey in Four
 Norwegian Companies 161
Anca Deak

Short Contributions

A Customizable Monitoring Infrastructure for Hardware/Software
 Embedded Systems..... 173
Martial Chabot and Laurence Pierre

Towards Testing Self-organizing, Adaptive Systems 180
*Benedikt Eberhardinger, Hella Seebach, Alexander Knapp, and
 Wolfgang Reif*

Design of Prioritized *N*-Wise Testing 186
Eun-Hye Choi, Takashi Kitamura, Cyrille Artho, and Yutaka Oiwa

Change Detection System for the Maintenance of Automated Testing ... 192
Miroslav Bures

On Code Coverage of Extended FSM Based Test Suites:
 An Initial Assessment 198
Khaled El-Fakih, Tariq Salameh, and Nina Yevtushenko

Search-Based Testing for Embedded Telecom Software with Complex
 Input Structures 205
Kivanc Doganay, Sigrid Eldh, Wasif Afzal, and Markus Bohlin

Author Index 211