

*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*

Madhu Sudan

*Microsoft Research, Cambridge, MA, USA*

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*

Judith Bishop Antonio Vallecillo (Eds.)

# Objects, Models, Components, Patterns

49th International Conference, TOOLS 2011  
Zurich, Switzerland, June 28-30, 2011  
Proceedings

Volume Editors

Judith Bishop  
Microsoft Research  
One Microsoft Way, Redmond, WA 98052-6399, USA  
E-mail: jbishop@microsoft.com

Antonio Vallecillo  
University of Málaga  
ETSI Informática  
Bulevar Louis Pasteur, 35, 29071 Málaga, Spain  
E-mail: av@lcc.uma.es

ISSN 0302-9743 e-ISSN 1611-3349  
ISBN 978-3-642-21951-1 e-ISBN 978-3-642-21952-8  
DOI 10.1007/978-3-642-21952-8  
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: Applied for

CR Subject Classification (1998): F.3, D.2, D.3, D.1, C.2, D.2.4

LNCS Sublibrary: SL 2 – Programming and Software Engineering

© Springer-Verlag Berlin Heidelberg 2011

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

The use of general descriptive names, registered names, trademarks, 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.

*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

Now that object technology is mainstream, it can be studied in combination with other technologies devoted to achieving high-quality software. TOOLS Europe is a long-standing conference that brings together researchers, practitioners and students to discuss all aspects of object technology and related fields, in particular model-based development, component-based development, language implementation and patterns, in a holistic way. TOOLS Europe has a strong practical bias, without losing sight of the importance of correctness and performance.

The 49th International Conference on Objects, Models, Components and Patterns (TOOLS Europe 2011) was held during June 28–30, 2011 at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland, organized by the Chair of Software Engineering.

TOOLS Europe 2011 received 68 abstract submissions of which 66 were submitted as full papers. The Program Committee suggested 19 papers for presentation and inclusion in these proceedings. This corresponds to a 28% acceptance rate, which indicates the level of competition that occurred during the selection process. All submissions were peer-reviewed by at least three members of the Program Committee. Submissions and the reviewing process were administered by EasyChair, which greatly facilitated these tasks. Continuing with the tradition started by Jan Vitek last year, a face-to-face PC meeting was held in Zurich on Saturday March 19 to discuss all papers and decide the final program. Twelve members attended in person and the other 19 joined by Skype. The meeting significantly contributed to a better analysis of the papers and a more thorough selection process.

The TOOLS Europe 2011 keynote speakers were Oscar Nierstrasz and Frank Tip. Abstracts of their talks are included in these proceedings. We thank them very much for accepting our invitation and for their enlightening talks.

Finally, we would like to acknowledge the work of the many people that made this conference possible. In the first place we would like to thank the Publicity Chair, Esther Guerra, for handling so efficiently all the dissemination activities and for taking care of the website. We would also like to thank the authors for their submissions, whether accepted or not, and the Program Committee members and their subreviewers for their thorough and professional reviews. Alfred Hofmann and the Springer team were really helpful with the publication of this volume. Finally, we would like to warmly thank the TOOLS series General Chair, Bertrand Meyer, and the local organizing team, “Max” Pei Yu, Hans-Christian Estler and Claudia Günthart, from the ETH in Zurich, for their continuous support and great help with all logistic issues.

# Organization

## Program Committee

|                     |  |
|---------------------|--|
| Uwe Assmann         | TU Dresden, Germany                              |
| Alexandre Bergel    | University of Chile, Chile                       |
| Lorenzo Bettini     | Università di Torino, Italy                      |
| Judith Bishop       | Microsoft Research, USA                          |
| William R. Cook     | University of Texas at Austin, USA               |
| Juan De Lara        | Universidad Autonoma de Madrid, Spain            |
| Wolfgang De Meuter  | Vrije Universiteit Brussel, Belgium              |
| Julian Dolby        | IBM T.J. Watson Research Center, USA             |
| Sophia Drossopoulou | Imperial College London, UK                      |
| Catherine Dubois    | ENSIIE-CEDRIC, France                            |
| Stephane Ducasse    | INRIA Lille, France                              |
| Gregor Engels       | University of Paderborn, Germany                 |
| Erik Ernst          | University of Aarhus, Denmark                    |
| Benoît Garbinato    | University of Lausanne, Switzerland              |
| Jesús García-Molina | Universidad de Murcia, Spain                     |
| Angelo Gargantini   | University of Bergamo, Italy                     |
| Jeff Gray           | University of Alabama, USA                       |
| Thomas Gschwind     | IBM Research, Switzerland                        |
| Matthias Hauswirth  | University of Lugano, Switzerland                |
| Nigel Horspool      | University of Victoria, Canada                   |
| Gerti Kappel        | Vienna University of Technology, Austria         |
| Doug Lea            | State University of New York at Oswego, USA      |
| Welf Löwe           | Linnaeus University, Sweden                      |
| Peter Müller        | ETH Zurich, Switzerland                          |
| James Noble         | Victoria University of Wellington, New Zealand   |
| Aditya Nori         | Microsoft Research, India                        |
| Nathaniel Nystrom   | University of Texas at Arlington, USA            |
| Manuel Oriol        | University of York, UK                           |
| Richard Paige       | University of York, UK                           |
| Ralf Reussner       | Karlsruhe Institute of Technology (KIT), Germany |
| Peter Thiemann      | Universität Freiburg, Germany                    |
| Nikolai Tillmann    | Microsoft Research, USA                          |
| Laurence Tratt      | Middlesex University, UK                         |
| Antonio Vallecillo  | Universidad de Málaga, Spain                     |
| Arie Van Deursen    | Delft University of Technology, The Netherlands  |
| Jan Vitek           | Purdue University, USA                           |
| Jules White         | Vanderbilt University, USA                       |
| Manuel Wimmer       | Vienna University of Technology, Austria         |

## Additional Reviewers

Arcaini, Paolo  
Balzer, Stephanie  
Bieniussa, Annette  
Bono, Viviana  
Brosch, Franz  
Burger, Erik  
Burroughs, Neil  
Capecchi, Sara  
Cech, Sebastian  
Christ, Fabian  
Delaware, Ben  
Denker, Marcus  
Dietl, Werner  
Dolby, Julian  
Espinazo-Pagán, Javier  
Figueiredo, Eduardo  
Geisen, Silke  
Gonzalez Boix, Elisa  
Grau, Brigitte  
Heidegger, Phillip  
Heidenreich, Florian  
Jacob, Ferosh  
Karol, Sven  
Koziolk, Anne  
Kuehne, Thomas

Küster, Martin  
Liegl, Philipp  
Liu, Qichao  
Loh, Alex  
Lombide Carreton, Andoni  
Luckey, Markus  
Marr, Stefan  
Marshall, Stuart  
Mayrhofer, Dieter  
Mostinckx, Stijn  
Nagel, Benjamin  
Noorshams, Qais  
Pearce, David  
Pena, Vanessa  
Pierantonio, Alfonso  
Riccobene, Elvinia  
Scholliers, Christophe  
Schreiber, Hendrik  
Sánchez Cuadrado, Jesús  
Thywissen, John A.  
Troya, Javier  
Van Der Storm, Tijs  
Van Der Straeten, Ragnhild  
Wende, Christian  
Wieland, Konrad

# Table of Contents

|  |     |
|--|-----|
| Synchronizing Models and Code (Invited Talk) . . . . .   | 1   |
| <i>Oscar Nierstrasz</i>  |     |
| Finding and Fixing Bugs in Web Applications (Invited Talk) . . . . .   | 2   |
| <i>Frank Tip</i>   |     |
| Test Suite Quality for Model Transformation Chains . . . . .   | 3   |
| <i>Eduard Bauer, Jochen M. Küster, and Gregor Engels</i>   |     |
| Automated Translation of Java Source Code to Eiffel . . . . .  | 20  |
| <i>Marco Trudel, Manuel Oriol, Carlo A. Furia, and Martin Nordio</i>   |     |
| A Generic Solution for Syntax-Driven Model Co-evolution . . . . .  | 36  |
| <i>Mark van den Brand, Zvezdan Protić, and Tom Verhoeff</i>  |     |
| From UML Profiles to EMF Profiles and Beyond . . . . .   | 52  |
| <i>Philip Langer, Konrad Wieland, Manuel Wimmer, and Jordi Cabot</i>   |     |
| Domain-Specific Profiling . . . . .  | 68  |
| <i>Alexandre Bergel, Oscar Nierstrasz, Lukas Renggli, and Jorge Ressa</i>  |     |
| Metamodel Dependencies for Executable Models . . . . .   | 83  |
| <i>Carlos Rodríguez, Mario Sánchez, and Jorge Villalobos</i>   |     |
| KlaperSuite: An Integrated Model-Driven Environment for Reliability<br>and Performance Analysis of Component-Based Systems . . . . . | 99  |
| <i>Andrea Ciancone, Antonio Filieri, Mauro Luigi Drago,<br/>Raffaella Mirandola, and Vincenzo Grassi</i>                             |     |
| Unifying Subjectivity . . . . .  | 115 |
| <i>Daniel Langone, Jorge Ressa, and Oscar Nierstrasz</i>   |     |
| An Overview of ALIA4J: An Execution Model for Advanced-Dispatching<br>Languages . . . . .  | 131 |
| <i>Christoph Bockisch, Andreas Sewe, Mira Mezini, and Mehmet Akşit</i>   |     |
| A Heuristic Approach for Computing Effects . . . . .   | 147 |
| <i>Phillip Heidegger and Peter Thiemann</i>  |     |
| Systems Evolution and Software Reuse in Object-Oriented<br>Programming and Aspect-Oriented Programming . . . . .                     | 163 |
| <i>Adam Przybyłek</i>  |     |
| Lifted Java: A Minimal Calculus for Translation Polymorphism . . . . .   | 179 |
| <i>Matthias Diehn Ingesman and Erik Ernst</i>  |     |

|  |            |
|--|------------|
| Location Types for Safe Distributed Object-Oriented Programming . . . .                            | 194        |
| <i>Yannick Welsch and Jan Schäfer</i>  |            |
| Static Dominance Inference . . . . .   | 211        |
| <i>Ana Milanova and Jan Vitek</i>  |            |
| A Case of Visitor versus Interpreter Pattern . . . . .   | 228        |
| <i>Mark Hills, Paul Klint, Tijs van der Storm, and Jurgen Vinju</i>                                |            |
| Computational REST Meets Erlang . . . . .  | 244        |
| <i>Alessandro Sivieri, Gianpaolo Cugola, and Carlo Ghezzi</i>                                      |            |
| Efficient Retrieval and Ranking of Undesired Package Cycles in Large<br>Software Systems . . . . . | 260        |
| <i>Jean-Rémy Falleri, Simon Denier, Jannik Laval,<br/>Philippe Vismara, and Stéphane Ducasse</i>   |            |
| Seuss: Better Class Responsibilities through Language-Based<br>Dependency Injection . . . . .      | 276        |
| <i>Niko Schwarz, Mircea Lungu, and Oscar Nierstrasz</i>  |            |
| Extensive Validation of OCL Models by Integrating SAT Solving<br>into USE . . . . .                | 290        |
| <i>Mirco Kuhlmann, Lars Hamann, and Martin Gogolla</i>   |            |
| <b>Author Index . . . . .</b>  | <b>307</b> |