

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, 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

Gerhard Weikum

Max Planck Institute for Informatics, Saarbrücken, Germany

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

Arend Rensink · Jesús Sánchez Cuadrado (Eds.)

Theory and Practice of Model Transformation

11th International Conference, ICMT 2018


Held as Part of STAF 2018

Toulouse, France, June 25–26, 2018

Proceedings

Editors

Arend Rensink 
University of Twente
Enschede
The Netherlands

Jesús Sánchez Cuadrado 
University of Murcia
Murcia
Spain

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-319-93316-0 ISBN 978-3-319-93317-7 (eBook)
<https://doi.org/10.1007/978-3-319-93317-7>

LNCS Sublibrary: SL2 – Programming and Software Engineering

© Springer International Publishing AG, part of Springer Nature 2018

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 the registered company Springer International Publishing AG
part of Springer Nature
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Foreword

Software Technologies: Applications and Foundations (STAF) is a federation of leading conferences on software technologies. It provides a loose umbrella organization with a Steering Committee that ensures continuity. The STAF federated event takes place annually. The participating conferences and workshops may vary from year to year, but they all focus on foundational and practical advances in software technology. The conferences address all aspects of software technology, from object-oriented design, testing, mathematical approaches to modeling and verification, transformation, model-driven engineering, aspect-oriented techniques, and tools. STAF was created in 2013 as a follow-up to the TOOLS conference series that played a key role in the deployment of object-oriented technologies. TOOLS was created in 1988 by Jean Bézivin and Bertrand Meyer and STAF 2018 can be considered its 30th birthday.

STAF 2018 took place in Toulouse, France, during June 25–29, 2018, and hosted: five conferences, ECMFA 2018, ICGT 2018, ICMT 2018, SEFM 2018, TAP 2018, and the Transformation Tool Contest TTC 2018; eight workshops and associated events. STAF 2018 featured seven internationally renowned keynote speakers, welcomed participants from all around the world, and had the pleasure to host a talk by the founders of the TOOLS conference Jean Bézivin and Bertrand Meyer.

The STAF 2018 Organizing Committee would like to thank (a) all participants for submitting to and attending the event, (b) the Program Committees and Steering Committees of all the individual conferences and satellite events for their hard work, (c) the keynote speakers for their thoughtful, insightful, and inspiring talks, and (d) the Ecole Nationale Supérieure d'Electrotechnique, Electronique, Hydraulique et Télécommunications (ENSEEIH), the Institut National Polytechnique de Toulouse (Toulouse INP), the Institut de Recherche en Informatique de Toulouse (IRIT) for hosting us and for their support. A special thanks goes to all the members of the Software and System Reliability Department of the IRIT laboratory and the members of the INP-Act SAIC, coping with all the foreseen and unforeseen work to prepare a memorable event.

June 2018

Marc Pantel
Jean-Michel Bruel

Preface

This volume contains the papers presented at ICMT 2018: the 11th International Conference on Model Transformation held during June 25–26, 2018, in Toulouse, France, as part of the STAF 2018 (Software Technologies: Applications and Foundations) conference series. ICMT is the premier forum for researchers and practitioners from all areas of model transformation.

Modeling is a key element in reducing the complexity of software systems during their development and maintenance. Model transformations are essential for elevating models from documentation elements to first-class artifacts. Transformations also play a key role in analyzing models to reveal conceptual flaws or highlight quality bottlenecks and in integrating heterogeneous tools into unified tool chains.

Model transformation encompasses a variety of technical spaces, including modelware, grammarware, dataware, and ontoware, a variety of model representations, e.g., trees vs. graphs, and a variety of transformation paradigms including rule-based transformations, term re-writing, and manipulations of objects in general-purpose programming languages. Moreover, in other fields such as compiler construction, the use of transformations is likewise essential. Identifying means to reuse and share knowledge between fields is also of interest.

The study of model transformation includes foundations, structuring mechanisms, and properties, such as modularity and composability, transformation languages, techniques, and tools. An important goal of the field is the development of high-level model transformation languages, providing transformations that are amenable to higher-order model transformations or tailored to specific transformation problems. At the same time, usable and scalable verification techniques for model transformations are essential for the practical development of the field. Another key challenge is the efficient execution of model queries and transformations by scalable transformation engines. Novel algorithms as well as innovative (e.g., distributed) execution strategies and domain-specific optimizations are sought in this respect. Model transformations have become artifacts that need to be managed in a structured way, resulting in developing methodology and tools to deal with versioning, (co-)evolution, reuse, etc. Correctness of model transformations has to be guaranteed as well.

This year ICMT 2018 received 24 submissions. Each submission was reviewed by three Program Committee members. After an online discussion period, the Program Committee accepted nine papers as part of the conference program. These papers included research, application, and tool demonstration papers presented in the context of four sessions on verification of model transformations, model transformation tools, transformation reuse, and graph transformations. In addition, we had an invited paper by our keynote speaker, Markus Voelter, about the design and evolution of KernelF.

A lot of people contributed to the success of ICMT 2018. We are grateful to the Program Committee members and reviewers for the timely delivery of thorough reviews and constructive discussions under a very tight review schedule. We also thank

Markus Voelter for his excellent keynote talk. Last but not least, we would like to thank the authors, who constitute the heart of the model transformation community, for their enthusiasm and hard work.

The organization of STAF made for a successful conference. We thank the local organizers, and in particular the general chairs, Marc Pantel and Jean-Michel Bruel; and we thank the Ecole Nationale Supérieure d'Electrotechnique, Electronique, Hydraulique et Télécommunications (ENSEEIH), the Institut National Polytechnique de Toulouse (Toulouse INP), and the Institut de Recherche en Informatique de Toulouse (IRIT) for hosting us and for their support.

June 2018

Arend Rensink
Jesús Sánchez Cuadrado

Organization

Program Committee

Anthony Anjorin	Paderborn University, Germany
Rubby Casallas	University of Los Andes, Colombia
Marsha Chechik	University of Toronto, Canada
Antonio Cicchetti	Mälardalen University, Sweden
Benoit Combemale	IRIT, University of Toulouse, France
Davide Di Ruscio	Università degli Studi dell'Aquila, Italy
Juergen Dingel	Queen's University, Canada
Gregor Engels	University of Paderborn, Germany
Martin Gogolla	Database Systems Group, University of Bremen, Germany
Esther Guerra	Universidad Autónoma de Madrid, Spain
Soichiro Hidaka	Hosei University, Japan
Ludovico Iovino	Gran Sasso Science Institute, Italy
Frédéric Jouault	TRAME Team, ESEO, France
Timo Kehrer	Humboldt-Universität zu Berlin, Germany
Dimitris Kolovos	University of York, UK
Leen Lambers	Hasso-Plattner-Institut, Universität Potsdam, Germany
Yngve Lamo	Western Norway University of Applied Sciences, Norway
Tanja Mayerhofer	Vienna University of Technology, Austria
Richard Paige	University of York, UK
Bernhard Rumpe	RWTH Aachen University, Germany
Houari Sahraoui	University of Montreal, Canada
Andy Schürr	TU Darmstadt, Germany
Eugene Syriani	University of Montreal, Canada
Gabriele Taentzer	Philipps-Universität Marburg, Germany
Massimo Tisi	Inria, France
Mark Van Den Brand	Eindhoven University of Technology, The Netherlands
Hans Vangheluwe	University of Antwerp, Belgium, and McGill University, Canada
Daniel Varro	Budapest University of Technology and Economics, Hungary
Edward Willink	Willink Transformations Ltd., UK
Manuel Wimmer	Business Informatics Group, Vienna University of Technology, Austria
Vadim Zaytsev	University of Amsterdam, The Netherlands
Steffen Zschaler	King's College London, UK

Additional Reviewers

Bertram, Vincent
Bousse, Erwan
Burgueno, Loli
Cleophas, Loek
Eikermann, Robert
Kuhlmann, Mirco
Kästner, Andreas

Leblebici, Erhan
Michael, Judith
Neubauer, Patrick
Rabbi, Fazle
Sohr, Karsten
Zolotas, Athanasios

Contents

Invited Paper

The Design, Evolution, and Use of KernelF: An Extensible and Embeddable Functional Language	3
<i>Markus Voelter</i>	

Full Papers

Virtual Network Embedding: Reducing the Search Space by Model Transformation Techniques	59
<i>Stefan Tomaszek, Erhan Leblebici, Lin Wang, and Andy Schürr</i>	
Schema Transformations and Query Rewriting in Ontological Databases with a Faceted Interface	76
<i>Tadeusz Pankowski</i>	
Model Transformation Reuse Across Metamodels: A Classification and Comparison of Approaches	92
<i>Jean-Michel Bruel, Benoit Combemale, Esther Guerra, Jean-Marc Jézéquel, Jörg Kienzle, Juan de Lara, Gunter Mussbacher, Eugene Syriani, and Hans Vangheluwe</i>	
Systematic Recovery of MDE Technology Usage	110
<i>Juri Di Rocco, Davide Di Ruscio, Johannes Härtel, Ludovico Iovino, Ralf Lämmel, and Alfonso Pierantonio</i>	
Technical Debt in Model Transformation Specifications	127
<i>Kevin Lano, Shekoufeh Kolahdouz-Rahimi, Mohammadreza Sharbaf, and Hessa Alfraihi</i>	
CoqTL: An Internal DSL for Model Transformation in Coq	142
<i>Massimo Tisi and Zheng Cheng</i>	
A Formal Framework for Prototyping Executable Semantics in ATL	157
<i>Artur Boronat</i>	

Tool Demonstration Papers

Scalable Queries and Model Transformations with the Mogwai Tool	175
<i>Gwendal Daniel, Gerson Sunyé, and Jordi Cabot</i>	

NMF: A Multi-platform Modeling Framework 184
 Georg Hinkel

Author Index 195