Lecture Notes in Computer Science

3599

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

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

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

New York University, NY, USA

Doug Tygar

University of California, Berkeley, CA, USA

Moshe Y. Vardi

Rice University, Houston, TX, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Uwe Aßmann Mehmet Aksit Arend Rensink (Eds.)

Model Driven Architecture

European MDA Workshops: Foundations and Applications, MDAFA 2003 and MDAFA 2004 Twente, The Netherlands, June 26-27, 2003 and Linköping, Sweden, June 10-11, 2004 Revised Selected Papers



Volume Editors

Uwe Aßmann
Technische Universität Dresden
Fakultät Informatik
Institut für Software- und Multimediatechnik
01062 Dresden, Germany
E-mail: uwe.assmann@inf.tu-dresden.de

Mehmet Aksit
Arend Rensink
University of Twente
Department of Computer Science
P.O. Box 217, 7500 AE Enschede, The Netherlands
E-mail: {rensink,aksit}@ewi.utwente.nl

Library of Congress Control Number: 2005930489

CR Subject Classification (1998): C.2, D.2, D.3, F.3, C.3, H.4

ISSN 0302-9743

ISBN-10 3-540-28240-8 Springer Berlin Heidelberg New York ISBN-13 978-3-540-28240-2 Springer Berlin Heidelberg New York

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.

Springer is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2005 Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India Printed on acid-free paper SPIN: 11538097 06/3142 5 4 3 2 1 0

Preface

Model-Driven Architecture (MDA) is an initiative proposed by the Object Management Group (OMG) for platform-generic software development. MDA separates the specification of system functionality from the implementation on a specific platform. It is aimed at making software assets more resilient to changes caused by emerging technologies. While stressing the importance of modeling, the MDA initiative covers a wide spectrum of research areas. Further efforts are required to bring them into a coherent approach based on open standards and supported by matured tools and techniques.

This volume contains the selected papers of two workshops on "Model-Driven Architecture – Foundations and Applications" (MDAFA): MDAFA 2003 held at the University of Twente, Twente, The Netherlands, June 26–27, 2003, and MDAFA 2004 held at Linköping University, Linköping, Sweden, June 10–11, 2004. The goal of the workshops was to understand the foundations of MDA, to share experience in applying MDA techniques and tools, and to outline future research directions. The workshops organizers encouraged authors of accepted papers to re-submit their papers to a post-workshop reviewing process; 15 of these papers were accepted to appear in this volume on MDA.

Our special thanks go to the program committee, which was willing to review the papers a second time, and to our assistants Henrik Larsson and Bodil Mattson-Kihlström, who took a great share of the workshop organization. We would also like to thank the supporters of the workshop, in particular the OMG, for taking part in the enthusiasm about scientific workshops on MDA. One of the invited speakers of MDAFA 2004, Dr. Liping Zhao from the Victoria University of Manchester, contributed her paper "Designing Application Domain Models with Roles" to the volume, which sheds new light on the relationship of MDA and role modeling. Thanks a lot.

In autumn 2004, the workshop joined forces with other European workshops on MDA, creating the new European Conference on Model-Driven Architecture – Foundations and Applications (ECMDA-FA, http://www.ecmda-fa.org). It will take place for the first time on Nov. 7–10, 2005 in Nuremberg, Germany, and is planned as a yearly conference, collecting papers on the foundations and applications of MDA. See you in Nuremberg!

June 2005

Uwe Aßmann, Arend Rensink, Mehmet Aksit

Organization

Referees

Mehmet Aksit, University of Twente, The Netherlands Jesper Andersson, University of Växjö, Sweden Uwe Aßmann, Technische Universität Dresden, Germany Klaas van den Berg, University of Twente, The Netherlands Jorn Bettin, SoftMetaWare, The Netherlands Jean Bézivin, University of Nantes, France Jan Bosch, University of Groningen, The Netherlands Francois Bry, Munich University, Germany Paul Clements, Software Engineering Institute, USA Krzysztof Czarnecki, University of Waterloo, Canada Pär Emanuelson, Ericsson, Sweden Gregor Engels, University of Paderborn, Germany Peter Fritzson, University of Linköping, Sweden Wolfgang Hesse, University of Marburg, Germany James Hunt, Aicas, Germany Reiner Hähnle, Chalmers University of Technology, Sweden Jean-Marc Jezequel, IRISA, France Anneke Kleppe, Klasse Objecten, The Netherlands Antonio Kung, Trialog, Paris, France Tom Mens, University of Mons-Hainaut, Belgium Arend Rensink, University of Twente, The Netherlands Kristian Sandahl, University of Linköping, Sweden Bedir Tekinerdogan, University of Twente, The Netherlands Gerd Wagner, Technical University Eindhoven, The Netherlands Andrew Watson, Vice President and Technical Director at OMG, USA Kasper Østerbye, Copenhagen, Denmark Steffen Zschaler, Technische Universität Dresden, Germany

Sponsoring Institutions

- Object Management Group (OMG, http://www.omg.org)
- REWERSE Network of Excellence of the European 6th framework programme (Reasoning on the Web, http://www.rewerse.net), in particular working group I3 "Composition and Typing for Reasoning Languages on the Web"
- HIDOORS EU project (High Integrity Distributed Object-Oriented Real-Time Systems, http://www.hidoors.org)

VIII Organization

- RISE project (Research on Integrational Software Engineering, http://www.ida.liu.se/~rise), financed by Swedish Stiftelsen för Strategisk Forskning (SSF)
- SWEBPROD project (Semantic Web for Production, http://www.ida.liu.se/~rise/SwebProd), financed by Vinnova Sweden.

Model-Driven Architecture, MDA, UML, XMI, OMG, and their corresponding logos are registered trademarks or trademarks of the Object Management Group, Inc. in the United States, in the European Union, and in other countries.

Table of Contents

Designing Application Domain Models with Roles Liping Zhao	1
Model Bus: Towards the Interoperability of Modelling Tools Xavier Blanc, Marie-Pierre Gervais, Prawee Sriplakich	17
Modeling in the Large and Modeling in the Small Jean Bézivin, Frédéric Jouault, Peter Rosenthal, Patrick Valduriez	33
Model-Driven Development of Reconfigurable Mechatronic Systems with Mechatronic UML Sven Burmester, Holger Giese, Matthias Tichy	47
Model Transformation Language MOLA Audris Kalnins, Janis Barzdins, Edgars Celms	62
A Graphical Notation to Specify Model Queries for MDA Transformations on UML Models Dominik Stein, Stefan Hanenberg, Rainer Unland	77
Describing Horizontal Model Transformations with Graph Rewriting Rules *Alexander Christoph	93
Open MDA Using Transformational Patterns Mika Siikarla, Kai Koskimies, Tarja Systä	108
"Weaving" MTL Model Transformations Raul Silaghi, Frédéric Fondement, Alfred Strohmeier	123
MISTRAL: A Language for Model Transformations in the MOF Meta-modeling Architecture Ivan Kurtev, Klaas van den Berg	139
Integrating Platform Selection Rules in the Model Driven Architecture Approach Bedir Tekinerdoğan, Sevcan Bilir, Cem Abatlevi	159
Platform-Independent Modelling in MDA: Supporting Abstract Platforms João Paulo Almeida, Remco Dijkman, Marten van Sinderen,	
Luís Ferreira Pires	174

X Table of Contents

Context-Driven Model Refinement	
Dennis Wagelaar	189
A UML Profile for OWL Ontologies	
Dragan Djurić, Dragan Gašević, Vladan Devedžić,	
Violeta Damjanović	204
•	
Developing a UML Profile for Modelling Knowledge-Based Systems	
Mohd Syazwan Abdullah, Chris Kimble, Richard Paige, Ian Benest,	
Andy Evans	220
Author Index	235