Lecture Notes in Computer Science 2852

Edited by G. Goos, J. Hartmanis, and J. van Leeuwen

Springer
Berlin
Heidelberg
New York
Hong Kong
London
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Tokyo

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Formal Methods for Components and Objects

First International Symposium, FMCO 2002
Leiden, The Netherlands, November 5-8, 2002
Revised Lectures

Springer

Volume Editors

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Cataloging-in-Publication Data applied for

A catalog record for this book is available from the Library of Congress.

Bibliographic information published by Die Deutsche Bibliothek
Die Deutsche Bibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data is available in the Internet at <http://dnb.ddb.de>.

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

ISSN 0302-9743
ISBN 3-540-20303-6 Springer-Verlag Berlin Heidelberg New York

Springer-Verlag Berlin Heidelberg NewYork
a member of BertelsmannSpringer Science+Business Media GmbH

www.springeronline.com

Printed in Germany

Typesetting: Camera-ready by author, data conversion by Olgun Computergrafik
Printed on acid-free paper SPIN: 10961087 06/3142 5 4 3 2 1 0

Preface

Large and complex software systems provide the necessary infrastucture in all industries today. In order to construct such large systems in a systematic manner, the focus in the development methodologies has switched in the last two decades from functional issues to structural issues: both data and functions are encapsulated into software units that are integrated into large systems by means of various techniques supporting reusability and modifiability. This encapsulation principle is essential to both the object-oriented and the more recent component-based sofware engineering paradigms.

Formal methods have been applied successfully to the verification of medium-sized programs in protocol and hardware design. However, their application to large systems requires the further development of specification and verification techniques supporting the concepts of reusability and modifiability.

In order to bring together researchers and practioners in the areas of software engineering and formal methods, we organized the 1st International Symposium on Formal Methods for Components and Objects (FMCO) in Leiden, The Netherlands, November 5–8, 2002. The program consisted of invited tutorials and more technical presentations given by leading experts in the fields of Theoretical Computer Science and Software Engineering. The symposium was attended by more than 100 people.

This volume contains the contributions of the invited speakers to FMCO 2002. We believe that the presented material provides a unique combination of ideas on software engineering and formal methods which we hope will be an inspiration for those aiming at further bridging the gap between the theory and practice of software engineering.

The very idea to organize FMCO arose out of the NWO/DFG bilateral project Mobi-J. In particular we acknowledge the financial support of the NWO funding of Mobi-J. Additional financial support was provided by the Lorentz Center, the IST project Omega (2001-33522), the Dutch Institute for Programming Research and Algorithmics (IPA), the Royal Netherlands Academy of Arts and Sciences (KNAW), the Centrum voor Wiskunde en Informatica (CWI), and the Leiden Institute of Advanced Computer Science (LIACS).

July 2003

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(Editors)

The Mobi-J Project

Mobi-J is a project founded by a bilateral research program of the Dutch Organization for Scientific Research (NWO) and the Central Public Funding Organization for Academic Research in Germany (DFG).

The partners of the Mobi-J projects are:

- Centrum voor Wiskunde en Informatica (F.S. de Boer)
- Leiden Institute of Advanced Computer Science (M.M. Bonsangue)
- Christian-Albrechts-Universität, Kiel (W.-P. de Roever)

This project aims at the development of a programming environment which supports component-based design and verification of Java programs annotated with assertions. The overall approach is based on an extension of the Java language called Mobi-J with the notion of a component which provides for the encapsulation of its internal processing of date and composition in a network by means of mobile asynchronous channels.

The activities of Mobi-J include the organization of international symposia funded by the NWO and Ph.D. research funded by DFG. By means of regular meetings the partners discuss intensively Ph.D. research involving Mobi-J-related topics. Mobi-J also maintains contacts with other German universities, including the universities of Oldenburg and Munich, and a close collaboaration with the European IST project OMEGA.

The Omega Project

The overall aim of the European IST project Omega (2001-33522) is the definition of a development methodology in UML for embedded and real-time systems based on formal verification techniques. The approach is based on a formal semantics of a suitable subset of UML, adapted and extended where needed with a special emphasis on time-related aspects.

The Omega project involves the following partners:

VERIMAG (France, Coordinator)
Centrum voor Wiskunde en Informatica (The Netherlands)
Christian-Albrechts-Universität (Germany)
University of Nijmegen (The Netherlands)
Wiezmann Institute (Israel)
OFFIS (Germany),
EADS Launch Vehicles (France)
France Telecom R&D (France)
Israel Aircraft Industries (Israel)
National Aerospace Laboratory (The Netherlands)

Table of Contents