

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

University of California, Los Angeles, CA, 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

David E. Lightfoot Clemens A. Szyperski (Eds.)

Modular Programming Languages

7th Joint Modular Languages Conference, JMLC 2006
Oxford, UK, September 13-15, 2006
Proceedings

Volume Editors

David E. Lightfoot
Oxford Brookes University
School of Technology
Department of Computing
Oxford, OX33 1HX, UK
E-mail: dlightfoot@brookes.ac.uk

Clemens A. Szyperski
One Microsoft Way
Redmond WA 98052, USA
E-mail: cszypers@microsoft.com

Library of Congress Control Number: 2006932028

CR Subject Classification (1998): D.3, D.2, D.1, D.4, F.3

LNCS Sublibrary: SL 1 – Theoretical Computer Science and General Issues

ISSN 0302-9743
ISBN-10 3-540-40927-0 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-40927-4 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

springer.com

© Springer-Verlag Berlin Heidelberg 2006
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 11860990 06/3142 5 4 3 2 1 0

Preface

On behalf of the Steering Committee we are pleased to present the proceedings of the 2006 Joint Modular Languages Conference (JMLC), organized by Oxford Brookes University, Oxford, UK and held at Jesus College, Oxford. The mission of JMLC is to explore the concepts of well-structured programming languages and software and those of teaching good design and programming style. JMLC 2006 was the seventh in a series of successful conferences with themes including the construction of large and distributed software systems, and software engineering aspects in new and dynamic application areas.

We were fortunate to have a dedicated Program Committee comprising 41 internationally recognized researchers and industrial practitioners. We received 36 submissions and each paper was reviewed by at least three Program Committee members (four for papers with an author on the Program Committee). The entire reviewing process was supported by the OpenConf system. In total, 23 submissions were accepted along with two invited papers and are included in this proceedings volume.

For the successful local organization of JMLC we thank Muneera Masterson, Ali McNiffe and Fiona Parker and other staff and student helpers of Oxford Brookes University as well as Rosemary Frame and Jo Knighton and other staff of Jesus College, Oxford. The proceedings you now hold were published by Springer and we are grateful for their support. Finally, we must thank the many authors who contributed the high-quality papers contained within these proceedings.

September 2006

David Lightfoot
Clemens Szyperski

Organization

JMLC 2006 was the seventh conference in a successful series, with past events held in:

- 1987 in Bled, Slovenia;
- 1990 in Loughborough, UK;
- 1994 in Ulm, Germany;
- 1997 in Linz, Austria;
- 2000 in Zürich, Switzerland;
- 2003 in Klagenfurt, Austria.

Steering Committee

László Böszörményi, University of Klagenfurt, Austria
Michael Franz, UC Irvine, USA
Jürg Gutknecht, ETH Zürich, Switzerland
David Lightfoot, Oxford Brookes University, UK (Program Co-chair
and Local Organizer)
Hanspeter Mössenböck, University of Linz, Austria
Clemens Szyperski, Microsoft, USA (Program Co-chair)
Niklaus Wirth, ETH Zürich emeritus, Switzerland

Program Committee

Jonathan Aldrich, CMU, USA
Pierre America, Philips Research, Netherlands
Uwe Assmann, TU Dresden, Germany
Nick Benton, Microsoft Research Cambridge, UK
László Böszörményi, University of Klagenfurt, Austria
Gilad Bracha, Sun Java Software, USA
Michael E. Caspersen, Aarhus University, Denmark
Craig Chambers, University of Washington, USA
Michael Franz, UC Irvine, USA
K. John Gough, Queensland UT, Australia
Dominik Gruntz, Fachhochschule Aargau, Switzerland
Jürg Gutknecht, ETH Zürich, Switzerland
Thomas Henzinger, EPF Lausanne, Switzerland
Nigel Horspool, University of Victoria, Canada
Zoltán Horváth, Budapest University (ELTE), Hungary
Mehdi Jazayeri, TU Vienna, Austria
Helmut Ketz, Fachhochschule Reutlingen, Germany

Brian Kirk, Robinson Associates, UK
Christoph Kirsch, University of Salzburg, Austria
Jens Knoop, TU Vienna, Austria
Kai Koskimies, TU Tampere, Finland
Liu Ling, University of Shanghai, China
Jochen Ludewig, University of Stuttgart, Germany
Jan Madey, University of Warsaw, Poland
Ole Lehrmann Madsen, Aarhus University, Denmark
Roland Mittermeir, University of Klagenfurt, Austria
Hanspeter Mössenböck, University of Linz, Austria
Pieter Muller, Esmertec, Switzerland
Judit Nyeky, Budapest University (ELTE), Hungary
Martin Odersky, EPF Lausanne, Switzerland
Jens Palsberg, Purdue University, USA
Frank Peschel-Gallee, Microsoft, USA
Gustav Pomberger, University of Linz, Austria
Wolfgang Pree, University of Salzburg, Austria
Paul Reed, Padded Cell Software, UK
Paul Roe, Queensland UT, Australia
Markus Schordan, TU Vienna, Austria
Brian Shearing, The Software Factory, UK
Pat Terry, Rhodes University, South Africa
Fyodor Tkachov, Institute for Nuclear Research (RAS), Russia
Wolfgang Weck, Independent Software Architect, Switzerland
Mark Woodman, Middlesex University, UK

Additional Reviewer

Christian Wimmer, University of Linz, Austria

Sponsoring Institutions

Microsoft Research
Sun Microsystems
Robinson Associates
dpunkt Verlag

Table of Contents

Separating Concerns with Domain Specific Languages	1
<i>Steve Cook</i>	
Event-Based Programming Without Inversion of Control	4
<i>Philipp Haller, Martin Odersky</i>	
Programming Language Concepts for Multimedia Application Development	23
<i>Oliver Lampl, Elmar Stellnberger, László Böszörményi</i>	
Implicit and Dynamic Parameters in C++	37
<i>Christian Heinlein</i>	
Reconciling Virtual Classes with Genericity	57
<i>Erik Ernst</i>	
Oberon Script: A Lightweight Compiler and Runtime System for the Web	73
<i>Ralph Sommerer</i>	
Efficient Layer Activation for Switching Context-Dependent Behavior	84
<i>Pascal Costanza, Robert Hirschfeld, Wolfgang De Meuter</i>	
Object-Oriented Language Processing	104
<i>Pietu Pohjalainen</i>	
A Framework for Modular Linking in OO Languages	116
<i>Sean McDermid, Wilson C. Hsieh, Matthew Flatt</i>	
Flexible Type-Safe Linking of Components for Java-Like Languages	136
<i>Davide Ancona, Giovanni Lagorio, Elena Zucca</i>	
Towards a Formal Semantics for AspectJ Weaving	155
<i>Nadia Belblidia, Mourad Debbabi</i>	
Symbolic Analysis of Imperative Programming Languages	172
<i>Bernd Burgstaller, Bernhard Scholz, Johann Blieberger</i>	
Array-Structured Object Types for Mathematical Programming	195
<i>Felix Friedrich, Jürg Gutknecht</i>	

MetaModelica: A Unified Equation-Based Semantical and Mathematical Modeling Language	211
<i>Adrian Pop, Peter Fritzson</i>	
A Component Language for Structured Parallel Programming	230
<i>Luc Bläser</i>	
Internal and External Token-Based Synchronization in Object-Oriented Languages	251
<i>Franz Puntigam</i>	
A New Component-Oriented Programming Language with the First-Class Connector	271
<i>Bo Chen, ZhouJun Li, HuoWang Chen</i>	
A Component Plug-In Architecture for the .NET Platform	287
<i>Reinhard Wolfinger, Deepak Dhungana, Herbert Prähofer, Hanspeter Mössenböck</i>	
Improve Component-Based Programs with Connectors	306
<i>Joachim H. Fröhlich, Manuel Schwarzinger</i>	
Automatic Object Colocation Based on Read Barriers	326
<i>Christian Wimmer, Hanspeter Mössenböck</i>	
Nearly Optimal Register Allocation with PBQP	346
<i>Lang Hames, Bernhard Scholz</i>	
Fast Profile-Based Partial Redundancy Elimination	362
<i>R. Nigel Horspool, David J. Pereira, Bernhard Scholz</i>	
The Dining Philosophers Problem Revisited	377
<i>Jürg Gutknecht</i>	
A Mobile Agent Service-Oriented Scripting Language Encoded on a Process Calculus	383
<i>Hervé Paulino, Luís Lopes</i>	
A Case Study in Concurrent Programming with Active Objects	403
<i>Ulrike Glavitsch, Thomas M. Frey</i>	
Author Index	415