

Lecture Notes in Artificial Intelligence 3392

Edited by J. G. Carbonell and J. Siekmann

Subseries of Lecture Notes in Computer Science

Dietmar Seipel Michael Hanus
Ulrich Geske Oskar Bartenstein (Eds.)

Applications of Declarative Programming and Knowledge Management

15th International Conference
on Applications of Declarative Programming
and Knowledge Management, INAP 2004
and 18th Workshop on Logic Programming, WLP 2004
Potsdam, Germany, March 4-6, 2004
Revised Selected Papers



Springer

Series Editors

Jaime G. Carbonell, Carnegie Mellon University, Pittsburgh, PA, USA
Jörg Siekmann, University of Saarland, Saarbrücken, Germany

Volume Editors

Dietmar Seipel

Universität Würzburg, Institut für Informatik
Am Hubland, 97074 Würzburg, Germany
E-mail: seipel@informatik.uni-wuerzburg.de

Michael Hanus

Christian-Albrechts-Universität Kiel
Institut für Informatik und Praktische Mathematik
Olshausenstr. 40, 24098 Kiel, Germany
E-mail: mh@informatik.uni-kiel.de

Ulrich Geske

Fraunhofer FIRST
Kekulestr. 7, 12489 Berlin, Germany
E-mail: geske@first.fhg.de

Oskar Bartenstein

IF Computer Japan Limited
5-28-2 Sendagi, Bunkyo-ku, Tokyo, 113-0022, Japan
E-mail: oskar@ifcomputer.co.jp

Library of Congress Control Number: 2005923659

CR Subject Classification (1998): I.2.4, I.2, D.1.6

ISSN 0302-9743

ISBN-10 3-540-25560-5 Springer Berlin Heidelberg New York

ISBN-13 978-3-540-25560-4 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

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: 11415763 06/3142 5 4 3 2 1 0

Preface

This volume contains a selection of papers presented at the 15th International Conference on Applications of Declarative Programming and Knowledge Management, INAP 2004, and the 18th Workshop on Logic Programming, WLP 2004, which were held jointly in Potsdam, Germany, from March 4th to 6th, 2004.

Declarative programming is an advanced paradigm for the modeling and solving of complex problems. This specification method has become more and more attractive in recent years, for example, in the domains of databases, for the processing of natural language, for the modeling and processing of combinatorial problems, and for establishing knowledge-based systems for the Web.

The INAP conferences provide a forum for intensive discussions of applications of important technologies around logic programming, constraint problem solving, and closely related advanced software. They comprehensively cover the impact of programmable logic solvers in the Internet society, its underlying technologies, and leading-edge applications in industry, commerce, government, and social services.

The Workshops on Logic Programming are the annual meeting of the Society for Logic Programming (GLP e.V.). They bring together researchers interested in logic programming, constraint programming, and related areas like databases and artificial intelligence. Previous workshops have been held in Germany, Austria, and Switzerland.

The topics of the selected papers of this year's joint conference concentrate on three currently important fields: knowledge management and decision support, constraint programming and constraint solving, and declarative programming and Web-based systems.

During the last couple of years a lot of research has been conducted on the use of declarative programming for the management of knowledge-based systems and for decision support. Reasoning about knowledge wrapped in rules, databases, or the Web allows us to explore interesting hidden knowledge. Declarative techniques for the transformation, deduction, induction, visualization, or querying of knowledge, or data mining techniques for exploring knowledge have the advantage of high transparency and better maintainability compared to procedural approaches.

The problem when using knowledge to find solutions for large industrial tasks is that these problems have an exponential complexity, which normally prohibits the fast generation of exact solutions. One method that has made substantial progress over the last few years is the constraint programming paradigm. The declarative nature of this paradigm offers significant advantages for software engineering both in the implementation and in the maintenance phases. Different interesting aspects are in discussion: how can this paradigm be improved or com-

bined with known, classical methods; how can practical problems be modelled as constraint problems; and what are the experiences of applications in really large industrial planning and simulation tasks?

An emerging topic in knowledge management is the use of the World Wide Web to distribute, store, and use knowledge. This spans vision, technology, and the application of non-monolithic cooperating Web-based systems. With respect to declarative programming, representation languages, transformation, and search procedures are of interest, and they are easily adaptable to the fast-changing content and structure of the Web, for example, in W3C Web services and queries. Other aspects are commercial Web-based consulting or the use of the Web as a platform for concurrent engineering or program development for effective distributed collaborative design.

The two conferences INAP 2004 and WLP 2004 were jointly organized at the University of Potsdam, Germany by the following institutions: the Society for Logic Programming (GLP e.V.), the Hasso Plattner Institute for Software Systems Engineering (HPI), and the Fraunhofer Institute for Computer Architecture and Software Technology (FhG FIRST). We would like to thank all authors who submitted papers and all conference participants for the fruitful discussions. We are grateful to the members of the Program Committee and the external referees for their timely expertise in carefully reviewing the papers, and we would like to express our thanks to the Hasso Plattner Institute for hosting the conference at the modern campus in the traditional atmosphere of Potsdam.

December 2004

Dietmar Seipel, Michael Hanus,
Ulrich Geske, Oskar Bartenstein



Organization

Program Chair

Dietmar Seipel

University of Würzburg, Germany

Organization

Ulrich Geske

Fraunhofer FIRST, Berlin, Germany

Thomas Linke

University of Potsdam, Germany

Wolfgang Severin

University of Potsdam, Germany

Armin Wolf

Fraunhofer FIRST, Berlin, Germany

Program Committee of INAP

Sergio A. Alvarez

Boston College, USA

Roman Barták

Charles University, Prague, Czech Republic

Oskar Bartenstein

IF Computer Japan, Japan

Joachim Baumeister

University of Würzburg, Germany

James P. Delgrande

Simon Fraser University, Canada

Robin Drogemüller

CSIRO, Australia

Shuichi Fukuda

Tokyo Metropolitan Institute of Technology, Japan

Rita Gavriloiu

Learning Lab Lower Saxony, Hannover, Germany

Nicola Henze

University of Hannover, Germany

Ulrich Geske

Fraunhofer FIRST, Germany

Geun-Sik Jo

Inha University, Korea

Thomas Linke

University of Potsdam, Germany

Steve Prestwich

4C/UCC, Ireland

Georg Ringwelski

4C/UCC, Ireland

Carolina Ruiz

Worcester Polytechnic Institute, USA

Torsten Schaub

University of Potsdam, Germany

Dietmar Seipel

University of Würzburg, Germany (Chair)

Paul Tarau

Binnet Corporation, USA

Armin Wolf

Fraunhofer FIRST, Germany

Akihiro Yamamoto

Kyoto University, Japan

Osamu Yoshie

Waseda University, Japan

Program Committee of WLP

Slim Abdennadher

German University Cairo, Egypt

Christoph Beierle

FernUniversität in Hagen, Germany

VIII Organization

| | |
|--------------------|---|
| François Bry | University of München, Germany |
| Jürgen Dix | Technical University of Clausthal, Germany |
| Uwe Egly | Technical University of Vienna, Austria |
| Thomas Eiter | Technical University of Vienna, Austria |
| Burkhard Freitag | University of Passau, Germany |
| Thom Frühwirth | University of Ulm, Germany |
| Norbert E. Fuchs | University of Zürich, Switzerland |
| Ulrich Geske | Fraunhofer FIRST, Berlin, Germany |
| Michael Hanus | Christian Albrechts University Kiel, Germany (Chair) |
| Petra Hofstedt | Technical University of Berlin, Germany |
| Steffen Hölldobler | Technical University of Dresden, Germany |
| Ulrich Neumerkel | Technical University of Vienna, Austria |
| Dietmar Seipel | University of Würzburg, Germany |
| Armin Wolf | Fraunhofer FIRST, Berlin, Germany |

External Referees for INAP and WLP

| | |
|-----------------|-------------------|
| Christian Anger | Martin Atzmueller |
| Matthias Beck | Bernd Braßel |
| Ole Boysen | Tom Carchrae |
| Mona Gharib | Bernd Heumesser |
| Marbod Hopfner | Kathrin Konczak |
| Horst Reichel | Maged F. El Sayed |
| Armagan Tarim | Manfred Widera |
| Stefan Woltran | |

Table of Contents

Knowledge Management and Decision Support

| | |
|---|-----|
| Optimizing the Evaluation of XPath Using Description Logics <i>Peter Baumgartner, Ulrich Furbach, Margret Gross-Hardt, Thomas Kleemann</i> | 1 |
| Declaratively Querying and Visualizing Knowledge Bases in XML <i>Dietmar Seipel, Joachim Baumeister, Marbod Hopfner</i> | 16 |
| SQL-Based Frequent Pattern Mining with FP-Growth <i>Xuequn Shang, Kai-Uwe Sattler, Ingolf Geist</i> | 32 |
| Incremental Learning of Transfer Rules for Customized Machine Translation <i>Werner Winiwarter</i> | 47 |
| Quality Measures and Semi-automatic Mining of Diagnostic Rule Bases <i>Martin Atzmueller, Joachim Baumeister, Frank Puppe</i> | 65 |
| An Evaluation of a Rule-Based Language for Classification Queries <i>Dennis P. Groth</i> | 79 |
| Deductive and Inductive Reasoning on Spatio-Temporal Data <i>Mirco Nanni, Alessandra Raffaetà, Chiara Renso, Franco Turini</i> | 98 |
| Mining Semantic Structures in Movies <i>Kimiaki Shirahama, Yuya Matsuo, Kuniaki Uehara</i> | 116 |
| Solving Alternating Boolean Equation Systems in Answer Set Programming <i>Misa Keinänen, Ilkka Niemelä</i> | 134 |

Constraint Programming and Constraint Solving

| | |
|--|-----|
| Effective Modeling with Constraints <i>Roman Barták</i> | 149 |
|--|-----|

| | |
|--|-----|
| A Local Search System for Solving Constraint Problems of Declarative Graph-Based Global Constraints <i>Markus Bohlin</i> | 166 |
| Realising the Alternative Resources Constraint <i>Armin Wolf, Hans Schlenker</i> | 185 |
| Integrating Time Constraints into Constraint-Based Configuration Models <i>Ulrich John, Ulrich Geske</i> | 200 |
| Distributed Constraint-Based Railway Simulation <i>Hans Schlenker</i> | 215 |
| Declarative Programming and Web-Based Systems | |
| Concurrent Engineering to Wisdom Engineering <i>Shuichi Fukuda</i> | 227 |
| Web Services Based on PROLOG and XML <i>Bernd D. Heumesser, Andreas Ludwig, Dietmar Seipel</i> | 245 |
| A Contribution to the Semantics of Xcerpt, a Web Query and Transformation Language <i>François Bry, Sebastian Schaffert, Andreas Schroeder</i> | 258 |
| DialogEngines – Dialog Agents for Web-Based Self Service Consulting <i>Oskar Bartenstein</i> | 269 |
| Towards Ubiquitous Maintenance – Defining Invocation of Plant Maintenance Agents in Real Workspace by Spatial Programming <i>Hiroki Takahashi, Osamu Yoshie</i> | 278 |
| A Pragmatic Approach to Pre-testing Prolog Programs <i>Christoph Beierle, Marija Kulaš, Manfred Widera</i> | 294 |
| Author Index | 309 |