Applications of
Declarative Programming
and Knowledge Management

18th International Conference on
Applications of Declarative Programming
and Knowledge Management (INAP 2009)
Évora, Portugal, November 2009
Post-Conference Proceedings

LNAI 6547
Preface

This volume contains a selection of papers, revised and extended, which were presented at the 18th International Conference on Applications of Declarative Programming and Knowledge Management, INAP 2009, which was held in Évora, Portugal, from November 3rd to 5th, 2009.

Declarative programming is an advanced paradigm for modeling and solving complex problems. It has become more and more attractive over the last years, e.g., in the database domain, for natural language processing, for modeling and processing combinatorial problems, and for establishing knowledge–based systems for the Web.

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

The topics of the selected papers of this year’s conference concentrate on three currently important fields: foundations and extensions of logic programming, databases and query languages, declarative programming with logic languages, and applications thereof.

During the last couple of years, a lot of research has been conducted on the usage of declarative programming for querying databases and web-based knowledge structuring and querying. Reasoning about knowledge wrapped in rules, databases, or the Web leads to the exploration of interesting and hitherto implicit knowledge. Declarative techniques for the transformation, deduction, induction, visualisation, or querying of knowledge have the advantage of high transparency and better maintainability compared to more traditional procedural approaches.

Another area of active research is the extension of the logic programming paradigm and its integration with other programming concepts. The successful extension of logic programming with constraints has been already mentioned. Other extensions aim to increase the expressivity of logic languages by including new logical constructs like contextual operators, temporal annotations, or tabling. The integration of logic programming with other programming paradigms has been mainly investigated for the case of functional programming. This combination is beneficial from a software engineering point of view: well–known functional programming techniques for improving the structure and quality of the developed software, e.g., types, modules, higher–order operators, or lazy evaluation, can be also used for logic programming in an integrated language.
The INAP 2009 conference was organized at the University of Évora, Portugal, by the following institutions: the University of Évora, the Society for Logic Programming (GLP e.V.), and the Portuguese A.I. Society (APPIA.) The conference took place over three days, with invited presentations by Terrance Swift and António Porto, which are part of this volume. We would like to thank all authors who submitted papers and all conference participants for the intense and fruitful discussions throughout the conference. We are grateful to the members of the programme committee and the external referees for their timely expertise in carefully reviewing the papers, and we would like to acknowledge the University of Évora for hosting the conference.

January 2011          Dietmar Seipel, Salvador Abreu
Program Chairs

Salvador Abreu University of Évora, Portugal
Dietmar Seipel University of Würzburg, Germany

Program Committee

Salvador Abreu University of Évora, Portugal (co-chair)
Sergio A. Alvarez Boston College, USA
Philippe Codognet JFLI/CNRS, Japan
Daniel Diaz University of Paris-I (Sorbonne), France
Ulrich Geske University of Potsdam, Germany
Gopal Gupta University of Texas at Dallas, USA
Petra Hofstedt Technical University of Berlin, Germany
Ulrich Neumerkel Technical University of Vienna, Austria
Vitor Nogueira University of Évora, Portugal
Enrico Pontelli New Mexico State University, USA
Irene Rodrigues University of Évora, Portugal
Carolina Ruiz Worcester Polytechnic Institute, USA
Vitor Santos Costa University of Porto, Portugal
Dietmar Seipel University of Würzburg, Germany (co-chair)
Terrance Swift CENTRIA, Portugal
Hans Tompits Technical University of Vienna, Austria
Masanobu Umeda Kyushu Institute of Technology, Japan
Armin Wolf Fraunhofer FIRST, Germany
Osamu Yoshie Waseda University, Japan

Local Organization

Vitor Nogueira University of Évora, Portugal
Vasco Pedro University of Évora, Portugal
Pedro Salgueiro University of Évora, Portugal
VIII

**External Referees**

<table>
<thead>
<tr>
<th>Dirk Kleeblatt</th>
<th>Florian Lorenzen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johannes Oetsch</td>
<td>Paulo Quaresma</td>
</tr>
<tr>
<td>Judith Rohloff</td>
<td>Christian Schneiker</td>
</tr>
<tr>
<td>Ludwig Krippahl</td>
<td>Tran Cao Son</td>
</tr>
</tbody>
</table>
Table of Contents

Invited Talks

Design Patterns for Tabled Logic Programming .......................... 1
Terrance Swift

An Alternative High-level Approach to Interaction with Databases ...... 20
António Porto

Foundations and Extensions of Logic Programming

ISTO: a Language for Temporal Organisational Information Systems .... 40
Vitor Nogueira, Salvador Abreu

Programming Patterns for Logtalk Parametric Objects .................. 52
Paulo Moura

Stable Model Implementation of Layer Supported Models by Program Transformation ......................................................... 70
Luis Moniz Pereira, Alexandre Miguel Pinto

Towards Computing Revised Models for FO Theories ..................... 85
Johan Wittocx, Broes De Cat, Marc Denecker

Adaptive Reasoning for Cooperative Agents ............................. 102
Luis Moniz Pereira, Alexandre Miguel Pinto

Databases and Query Languages

Extending XQuery for Semantic Web Reasoning .......................... 117
Jesus Manuel Almendros–Jimenez
Reference Model and Perspective Schemata Inference for Enterprise Data Integration .................................................. 135
Valéria Magalhães Pequeno, João Carlos Gomes Moura Pires

JSquash: Source Code Analysis of Embedded Database Applications for Determining SQL Statements........................ 153
Dietmar Seipel, Andreas M. Böhm, Markus Fröhlich

Applications

Elder Care by Means of Intention Recognition and Evolution Prospection 171
Luis Moniz Pereira, Anh Han The

Knowledge Management Strategy and Tactics for Forging Die Design Support ....................................................... 189
Masanobu Umeda, Yuji Mure

Searching in Protein State Space .............................................. 206
Dietmar Seipel, Jörg Schultz

Network Monitoring with Constraint Programming: Preliminary Specification and Analysis........................................ 224
Pedro Salgueiro, Salvador Abreu

Author Index ........................................................................... 241
Design Patterns for Tabled Logic Programming

Terrance Swift
An Alternative High-level Approach to Interaction with Databases

António Porto
ISTO: a Language for Temporal Organisational Information Systems

Vitor Nogueira, Salvador Abreu
Programming Patterns for Logtalk Parametric Objects

Paulo Moura
Stable Model Implementation of Layer Supported Models by Program Transformation

Luis Moniz Pereira, Alexandre Miguel Pinto
Towards Computing Revised Models for FO Theories

Johan Wittoox, Broes De Cat, Marc Denecker
Adaptive Reasoning for Cooperative Agents

Luis Moniz Pereira, Alexandre Miguel Pinto
Extending XQuery for Semantic Web Reasoning

Jesus Manuel Almendros-Jimenez
Reference Model and Perspective Schemata
Inference for Enterprise Data Integration

Valéria Magalhães Pequeno, João Carlos Gomes Moura Pires
JSquash: Source Code Analysis of Embedded Database Applications for Determining SQL Statements

Dietmar Seipel, Andreas M. Böhm, Markus Fröhlich
Elder Care by Means of Intention Recognition
and Evolution Prospection

Luis Moniz Pereira, Anh Han The
Knowledge Management Strategy and Tactics for Forging Die Design Support

Masanobu Umeda, Yuji Mure
Searching in Protein State Space

Dietmar Seipel, Jörg Schultz
Network Monitoring with Constraint Programming: Preliminary Specification and Analysis

Pedro Salgueiro, Salvador Abreu
Author Index

Abreu, Salvador, 40, 224
Almendros–Jimenez, Jesus Manuel, 117
Böhm, Andreas M., 153
De Cat, Broes, 85
Denecker, Marc, 85
Fröhlich, Markus, 153
Gomes Moura Pires, João Carlos, 135
Magalhães Pequeno, Valéria, 135
Moura, Paulo, 52
Mure, Yuji, 189
Nogueira, Vitor, 40
Pereira, Luis Moniz, 70, 102, 171
Pinto, Alexandre Miguel, 70, 102
Porto, António, 20
Salgueiro, Pedro, 224
Schultz, Jörg, 206
Seipel, Dietmar, 153, 206
Swift, Terrance, 1
The, Anh Han, 171
Umeda, Masanobu, 189
Wittocx, Johan, 85