

Jean-Louis Giavitto
Pierre-Etienne Moreau (Eds.)

Rule-Based Programming

4th International Workshop, RULE 2003
Valencia, Spain, June 9, 2003
Proceedings

Volume Editors

Jean-Louis Giavitto
Université d'Evry Val d'Essone, Evry, FRANCE
Email: giavitto@lami.univ-evry.fr

Pierre-Etienne Moreau
INRIA Lorraine & LORIA, Villers-lès-Nancy, FRANCE
Email: Pierre-Etienne.Moreau@loria.fr

Proceedings of the 4th International Workshop on Rule-Based Programming, RULE'03
Valencia, Spain, June 9, 2003



UNIVERSIDAD
POLITECNICA
DE VALENCIA



APPSEM



ISBN:

Depósito Legal:

Impreso en España.

Technical Report DSIC-II/11/03,
<http://www.dsic.upv.es>
*Departamento de Sistemas Informáticos y Computación,
Universidad Politécnica de Valencia, 2003.*

Foreword

This volume contains the pre-proceedings of the Fourth International Workshop on Rule-Based Programming (RULE2003).

This year, RULE 2003 is part of a federation of colloquia known as the Federated Conference on Rewriting, Deduction and Programming (RDP 2003) which includes the 14th International Conference on Rewriting Techniques and Applications (RTA), the 6th Conference on Typed Lambda Calculi and Applications (TLCA), the 5th Workshop on First-order Theorem Proving (FTP), as well as several other workshops. The colloquia and affiliated workshops will run from June 8 to June 14, 2003 and will be held in Valencia, Spain. Details about the affiliated conferences and workshops will appear at the URL www.dsic.upv.es/~rdp03

Previous RULE meetings were held in Montréal (2000), Firenze (2001) and Pittsburgh (2002); their proceedings were published by Elsevier and by the ACM/SIGPLAN. The final version of this volume will be published as volume 86.2 in the series Electronic Notes in Theoretical Computer Science (ENTCS). This series is published electronically through the facilities of Elsevier Science B.V. and its auspices. The volumes in the ENTCS series can be accessed at URL www.elsevier.nl/locate/entcs.

The rule-based programming paradigm is characterized by the repeated, localized transformation of a shared data object such as a term, graph, proof, or constraint store. The transformations are described by rules which separate the description of the sub-object to be replaced (the pattern) from the calculation of the replacement. Optionally, rules can have further conditions that restrict their applicability. The transformations are controlled by explicit or implicit strategies.

The basic concepts of rule-based programming appear throughout computer science, from theoretical foundations to practical implementations. Term rewriting is used in semantics in order to describe the meaning of programming languages, as well as in the implementation of program transformation systems. It is used implicitly or explicitly to perform computations, e.g., in Mathematica, OBJ, or ELAN, or to perform deductions, e.g., by using inference rules to describe or implement a logic, theorem prover or constraint solver. Extreme examples of rule-based programming include the mail system in Unix which uses rules in order to rewrite mail addresses to canonical forms, or the transition rules used in model checkers.

Rule-based programming is currently experiencing a renewed period of growth with the emergence of new concepts and systems that allow a better understanding and better usability. On the theoretical side, after the in-depth study of rewriting concepts during the eighties, the nineties saw the emergence of the general concepts of rewriting logic and of the rewriting calculus. On the practical side, new languages such as ASM, ASF+SDF, BURG, Claire, ELAN,

Maude, and Stratego, new systems such as LRR and commercial products such as Ilog Rules and Eclipse have shown that rules are a useful programming tool.

The practical application of rule-based programming prompts research into the algorithmic complexity and optimization of rule-based programs as well as into the expressivity, semantics and implementation of rules-based languages.

The purpose of this workshop is to bring together researchers from the various communities working on rule-based programming to foster fertilisation between theory and practice, as well as to favour the growth of this programming paradigm.

Program Committee

Program co-chairs:

- Jean-Louis Giavitto (CNRS & Université d'Evry Val d'Essone)
- Pierre-Etienne Moreau (LORIA & INRIA-Lorraine)

Program Committee:

- James Cordy (Queen's University at Kingston, Canada)
- Olivier Danvy (BRICS, Denmark)
- Steven Eker (SRI International, USA)
- Thom Fruehwirth (Ulm University, Germany)
- Berthold Hoffmann (Bremen University, Germany)
- Herbert Kuchen (Muenster University, Germany)
- Oege de Moor (Oxford University Computing Laboratory, England)
- Przemek Prusinkiewicz (Calgary University, Canada)
- Patrick Viry (ILOG, France)

Acknowledgements

We would like to thank the program committee members for their help in evaluating the papers and also Marc Aiguier (LaMI) and Guy Narbonni (IMPLEX) that have done additional reviews and Olivier Michel for its help in the preparation of this document. Furthermore, we would like to thank the RDP organizing committee for taking care of the local organization of our workshop. We thank Elsevier for publishing these proceedings in the Electronic Notes in Theoretical Computer Science (ENTCS) and Professor Michael Mislove for providing and adapting the style files for ENTCS.

We are also grateful to our respective institution for their support: CNRS, INRIA Lorraine, LORIA, and Université d'Evry.

Jean-Louis Giavitto,
Pierre-Etienne Moreau.

Contents

OnDemandOBJ: A Laboratory for Strategy Annotations	1
Translating <i>Combinatory Reduction Systems</i> into the <i>Rewriting Calculus</i>	16
Deductive Generation of Constraint Propagation Rules	33
Typing rule-based transformations over topological collections	50
A Tool Support for Reusing ELAN Rule-Based Components	67
On-demand Evaluation by Program Transformation	83
Domain-Specific Optimisation with User-Defined Rules in CodeBoost	106
Design and implementation of the L+C modeling language	122