

Lecture Notes in Artificial Intelligence 5948

Edited by R. Goebel, J. Siekmann, and W. Wahlster

Subseries of Lecture Notes in Computer Science

Matteo Baldoni Jamal Bentahar
M. Birna van Riemsdijk John Lloyd (Eds.)

Declarative Agent Languages and Technologies VII

7th International Workshop, DALT 2009
Budapest, Hungary, May 11, 2009
Revised Selected and Invited Papers

Series Editors

Randy Goebel, University of Alberta, Edmonton, Canada
Jörg Siekmann, University of Saarland, Saarbrücken, Germany
Wolfgang Wahlster, DFKI and University of Saarland, Saarbrücken, Germany

Volume Editors

Matteo Baldoni
University of Turin, Italy
E-mail: baldoni@di.unito.it

Jamal Bentahar
Concordia University, Montreal, Canada
E-mail: bentahar@ciise.concordia.ca

M. Birna van Riemsdijk
Delft University of Technology, Delft, The Netherlands
E-mail: m.b.vanriemsdijk@tudelft.nl

John Lloyd
Australian National University, Canberra ACT, Australia
E-mail: john.lloyd@anu.edu.au

Library of Congress Control Number: 2009943839

CR Subject Classification (1998): I.2.11, C.2.4, D.2.4, D.2, D.3, F.3.1

LNCS Sublibrary: SL 7 – Artificial Intelligence

ISSN 0302-9743
ISBN-10 3-642-11354-0 Springer Berlin Heidelberg New York
ISBN-13 978-3-642-11354-3 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.com

© Springer-Verlag Berlin Heidelberg 2010
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12832613 06/3180 5 4 3 2 1 0

Preface

In the multi-agent systems area, linking theory to practical applications is still a fertile research topic. The aim of the workshop on Declarative Agent Languages and Technologies (DALT 2009), in its seventh edition this year, is to achieve this goal, which needs developing and using advanced declarative technologies and languages, particularly agent programming, communication languages, and reasoning and decision-making mechanisms. Developing these technologies is a particularly challenging issue from many perspectives: formal foundations, practical feasibility, degree of flexibility, etc. In this context, the declarative paradigm is arguably the most appropriate as unlike imperative approaches, the focus is on what the solution should accomplish rather than on describing how to accomplish it. This is because agent computing, as a paradigm, is about describing the logic of computation instead of describing how to accomplish it. DALT is about investigating, studying, and using the declarative paradigm as well as combining declarative and formal approaches with engineering and technology aspects of agents and multi-agent systems.

This volume presents the latest developments in the area of declarative languages and technologies, which aim to provide rigorous frameworks for designing, specifying, implementing and verifying autonomous interacting agents. These frameworks are based on computational logics and other formal methods such as mathematical models and game theoretical approaches. Using such models and approaches facilitates the development of agents that reason and act rationally while at the same time being able to verify the behavior of these agents against their specification. The main theme of DALT 2009 was the further advancement of relevant specification and verification techniques, such as, for instance, modal and epistemic logics, model checking, constraint logic programming, and distributed constraint satisfaction.

As one of the well-established workshops in the multi-agent systems area, DALT 2009 was held as a satellite workshop of the 8th International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS 2009), in Budapest, Hungary. Following the success of DALT 2003 in Melbourne (LNAI 2990), DALT 2004 in New York (LNAI 3476), DALT 2005 in Utrecht (LNAI 3904), DALT 2006 in Hakodate (LNAI 4327), DALT 2007 in Honolulu (LNAI 4897), and DALT 2008 in Estoril (LNAI 5397), DALT 2009 aimed at providing a discussion forum to both (a) support the transfer of declarative paradigms and techniques to the broader community of agent researchers and practitioners; and (b) bring the issue of designing complex agent systems to the attention of researchers working on declarative languages and technologies. DALT has traditionally fostered the development of declarative approaches to engineering agent-based systems and applications in different areas such as the Semantic Web, service-oriented computing, Web services, security, and electronic contracting.

The book includes 15 chapters: one by the invited speaker; 3 from AAMAS 2009 short papers (revised and augmented versions); and 11 from DALT 2009. All the papers were carefully reviewed to check the originality, quality, and technical soundness. The DALT 2009 workshop received 17 papers. After a rigorous reviewing process by at least 3 reviewers, 11 papers were selected by the Program Committee to be published in this volume. Chapter 1: “Playing with Rules” by João Leite is about discussing agent-oriented programming languages by focussing on two languages that use logic rules and rule updates, namely, answer-set programming and evolving logic programming. Chapter 2: “The Refinement of Choreographed Multi-Agent Systems” by Lăcrămioara Aștefănoaei, Mehdi Dastani and Frank S. de Boer is about generalizing a theory of agent refinement to multi-agent systems, where coordination mechanisms and real time are key issues. The proposed refinement is compositional, which reduces the verification process. Chapter 3: “Goal Generation from Possibilistic Beliefs Based on Trust and Distrust” by Célia da Costa Pereira and Andrea Tettamanzi discusses some agents belief behaviors used in a goal generation and adoption framework by focussing on the trustworthiness of the source of information that depends not only on the degree of trust but also on an independent degree of distrust. Chapter 4: “Monitoring Directed Obligations with Flexible Deadlines: a Rule-Based Approach” by Henrique Lopes Cardoso and Eugénio Oliveira introduces, in a B2B cooperation setting, an approach to model contractual commitments through directed obligations with time windows, where authorizations granted at specific states of an obligation life cycle model are considered.

Chapter 5: “Unifying the Intentional and Institutional Semantics of Speech Acts” by Carole Adam, Andreas Herzig, Dominique Longin and Vincent Louis addresses the semantic issue of agent communication languages mixing the mentalist and social approaches. This semantics extends FIPA-ACL with new speech acts along with new institutional features. Chapter 6: “Tableaux for Acceptance Logic” by Mathijs de Boer, Andreas Herzig, Tiago de Lima and Emiliano Lorini presents a modal logic for modeling individual and collective acceptances called acceptance logic and a sound and complete tableau method that automatically decides whether a formula of the logic is satisfiable. Chapter 7: “Ontology and Time Evolution of Obligations and Prohibitions Using Semantic Web Technology” by Nicoletta Fornara and Marco Colombetti formalizes conditional obligations and prohibitions with starting times and deadlines using social commitments and models them in OWL, the logical language used to specify semantic web applications. Chapter 8: “Prioritized Goals and Subgoals in a Logical Account of Goal Change – A Preliminary Report” by Shakil Khan and Yves Lesperance develops a logical framework for goal change considering the dynamics of prioritized goals and subgoals. Lower priority goals are not drop permanently, but they are considered inactive and can become active in the future.

Chapter 9: “Declarative and Numerical Analysis of Edge Creation Process in Trust-Based Social Networks” by Babak Khosravifar, Jamal Bentahar and Maziar Gomrokchi addresses the efficiency issue of the interactions among agents

in a social network by focussing on some trust-based factors. It presents declarative and numerical analysis of the proposed model and its assessment along with empirical evaluation. Chapter 10: “Computing Utility from Weighted Description Logic Preference Formulas” by Azzurra Ragone, Tommaso Di Noia, Francesco M. Donini, Eugenio Di Sciascio and Michael Wellman proposes a framework to compute the utility of a proposal considering a preference set in a negotiation process, where preferences are dealt with as weighted formulas in a decidable fragment of first order logic. Chapter 11: “Explaining and Predicting the Behavior of BDI-Based Agents in Role-Playing Games” by Michal Sindlar, Mehdi Dastani, Frank Dignum and John-Jules Meyer discusses the use of BDI agents to model virtual characters in games. It illustrates how these agents can infer the mental state of other virtual characters by observing others’ actions in a role-playing game. Chapter 12: “Correctness Properties for Multiagent Systems” by Munindar Singh and Amit Chopra discusses the characteristics of some correctness properties for interacting agent-based systems, which are commitment-centered. Examples of these properties are interoperability, which is mapped to commitment alignment and compliance expressed as commitment discharge.

Chapter 13: “Reasoning and Planning with Cooperative Actions for Multi-agents Using Answer Set Programming” by Tran Cao Son and Chiaki Sakama introduces a framework to represent and reason about plans with cooperative actions of an agent operating in a multi-agent system. An extended action language (the action language \mathcal{A}) has been used to formalize the multi-agent planning problem and the notion of joint plans that are computed using answer set programming. Chapter 14: “Social Commitments in Time: Satisfied or Compensated” by Paolo Torroni, Federico Chesani, Paola Mello and Marco Montali formalizes the time evolution of commitments within a framework based on computational logic and on a reactive axiomatization of the event calculus. The framework proposes a new characterization of commitments with time that enables run-time and static verification. Chapter 15: “Verifying Dribble Agents” by Doan Thu Trang, Brian Logan and Natasha Alechina addresses the model-checking problem of programs written in the agent programming language Dribble. An extension of the computation tree logic CTL, which describes transition systems corresponding to a Dribble program, has been proposed and the MOCHA model checker has been used for simulation.

We would like to thank all the authors for their enthusiasm to submit papers to the workshop and revise them for inclusion in this book, the members of the Steering Committee for their valuable suggestions and support, and the members of the Program Committee for their excellent work during the reviewing phase.

November 2009

Matteo Baldoni
Jamal Bentahar
John Lloyd
M. Birna van Riemsdijk

Organization

Workshop Organizers

Matteo Baldoni	University of Turin, Italy
Jamal Bentahar	Concordia University, Canada
John Lloyd	Australian National University, Australia
M. Birna van Riemsdijk	Delft University of Technology, The Netherlands

Program Committee

Thomas Ågotnes	Bergen University College, Norway
Marco Alberti	University of Ferrara, Italy
Natasha Alechina	University of Nottingham, UK
Cristina Baroglio	University of Turin, Italy
Rafael Bordini	University of Durham, UK
Jan Broersen	University of Utrecht, The Netherlands
Federico Chesani	University of Bologna, Italy
Amit Chopra	North Carolina State University, USA
Keith Clark	Imperial College London, UK
James Harland	RMIT University, Australia
Andreas Herzig	Paul Sabatier University, France
Koen Hindriks	Delft University of Technology, The Netherlands
Shinichi Honiden	National Institute of Informatics, Japan
Yves Lespérance	York University, Canada
Alessio Lomuscio	Imperial College London, UK
Viviana Mascardi	University of Genoa, Italy
Nicolas Maudet	University of Paris-Dauphine, France
John-Jules Ch. Meyer	Utrecht University, The Netherlands
Peter Novak	Clausthal University of Technology, Germany
Enrico Pontelli	New Mexico State University, USA
Azzurra Ragone	Polytechnic of Bari, Italy
Chiaki Sakama	Wakayama University, Japan
Guillermo Simari	Universidad Nacional del Sur, Argentina
Tran Cao Son	New Mexico State University, USA
Eugenia Ternovska	Simon Fraser University, Canada
Wamberto Vasconcelos	University of Aberdeen, UK
Marina De Vos	University of Bath, UK
Michael Winikoff	University of Otago, New Zealand

Steering Committee

Matteo Baldoni

Andrea Omicini

M. Birna van Riemsdijk

Tran Cao Son

Paolo Torroni

Pinar Yolum

Michael Winikoff

University of Turin, Italy

University of Bologna-Cesena, Italy

Delft University of Technology,
The Netherlands

New Mexico State University, USA

University of Bologna, Italy

Bogazici University, Turkey

University of Otago, New Zealand

Additional Reviewers

Aaron Hunter

Tommaso Di Noia

Table of Contents

Invited Talk

Playing with Rules	1
<i>João Leite</i>	

Invited Papers

The Refinement of Choreographed Multi-Agent Systems	20
<i>Lăcrămioara Aștefănoaei, Frank S. de Boer, and Mehdi Dastani</i>	
Goal Generation from Possibilistic Beliefs Based on Trust and Distrust	35
<i>Célia da Costa Pereira and Andrea G.B. Tettamanzi</i>	
Monitoring Directed Obligations with Flexible Deadlines: A Rule-Based Approach	51
<i>Henrique Lopes Cardoso and Eugénio Oliveira</i>	

Contributed Papers

Unifying the Intentional and Institutional Semantics of Speech Acts	68
<i>Carole Adam, Andreas Herzig, Dominique Longin, and Vincent Louis</i>	
Tableaux for Acceptance Logic	85
<i>Mathijs de Boer, Andreas Herzig, Tiago de Lima, and Emiliano Lorini</i>	
Ontology and Time Evolution of Obligations and Prohibitions Using Semantic Web Technology	101
<i>Nicoletta Fornara and Marco Colombetti</i>	
Prioritized Goals and Subgoals in a Logical Account of Goal Change – A Preliminary Report	119
<i>Shakil M. Khan and Yves Lespérance</i>	
Declarative and Numerical Analysis of Edge Creation Process in Trust-Based Social Networks	137
<i>Babak Khosravifar, Jamal Bentahar, and Maziar Gomrokchi</i>	
Computing Utility from Weighted Description Logic Preference Formulas	158
<i>Azzurra Ragone, Tommaso Di Noia, Francesco M. Donini, Eugenio Di Sciascio, and Michael P. Wellman</i>	

Explaining and Predicting the Behavior of BDI-Based Agents in Role-Playing Games	174
<i>Michal P. Sindlar, Mehdi M. Dastani, Frank Dignum, and John-Jules Ch. Meyer</i>	
Correctness Properties for Multiagent Systems	192
<i>Munindar P. Singh and Amit K. Chopra</i>	
Reasoning and Planning with Cooperative Actions for Multiagents Using Answer Set Programming	208
<i>Tran Cao Son and Chiaki Sakama</i>	
Social Commitments in Time: Satisfied or Compensated	228
<i>Paolo Torroni, Federico Chesani, Paola Mello, and Marco Montali</i>	
Verifying Dribble Agents	244
<i>Doan Thu Trang, Brian Logan, and Natasha Alechina</i>	
Author Index	263