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Declarative Agent Languages and Technologies III

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Selected and Revised Papers

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Preface

The workshop on Declarative Agent Languages and Technologies is a well-established venue for researchers interested in sharing their experiences in the areas of declarative and formal aspects of agents and multi-agent systems, and in engineering and technology. Today it is still a challenge to develop technologies that can satisfy the requirements of complex agent systems. The design and development of multi-agent systems still calls for models and technologies that ensure predictability, enable feature discovery, allow for the verification of properties, and guarantee flexibility. Declarative approaches are potentially a valuable means for satisfying the needs of multi-agent system developers and for specifying multi-agent systems.

DALT 2005, the third edition of the workshop, was held in Utrecht, The Netherlands, in July 2005, in conjunction with AAMAS 2005, the Fourth International Joint Conference on Agents and Multiagent Systems. Over 30 persons attended the workshop confirming the success of the previous editions in Melbourne 2003 (LNAI 2990) and New York 2004 (LNAI 3476). The workshop series is a forum of discussion aimed both at supporting the transfer of declarative paradigms and techniques into the broader community of agent researchers and practitioners, and at bringing the issues of designing real-world and complex agent systems to the attention of researchers working on declarative programming and technologies.

A twofold process led to this volume. On the one hand, the best papers presented at the workshop were selected after a further, meticulous reviewing process. On the other hand, an open call was issued for contributions that were not submitted to the original workshop call for papers, that resulted in a few other papers added, chosen through a very strict reviewing process. As a result, this volume contains 14 papers and it is organized in four parts corresponding to the main topics of DALT: *agent programming and beliefs*, *architectures and logic programming*, *knowledge representation and reasoning*, and *coordination and model checking*. Each paper was reviewed by at least three members of the Programme Committee in order to supply the authors with rich feedback that could stimulate the research.

Part I - Agent Programming and Beliefs

The first part of this volume contains three papers. The first work, "Beliefs in Agent Implementation", by Winkelhagen, Dastani, and Broersen, extends the language 3APL with beliefs represented as explicit modal operators. A proof procedure is also presented which is shown to be sound. The second work, "Modelling Uncertainty in Agent Programming", by Kwisthout and Dastani, tackles the uncertainty of agent beliefs modelling it by means of Dempster-Shafer theory, reporting complexity results. The last work, "Complete Axiomatizations of Finite Syntactic Epistemic States", by Ågotnes and Walicki, discusses a formal model of knowledge as explicitly computed sets of formulae, extending the

epistemic language with an operator which expresses what an agent knows *at most*.

Part II - Architectures and Logic Programming

The second part contains four papers. The first, "An Architecture for Rational Agents", by Lloyd and Sears, proposes an agent architecture in which agents have belief bases that are theories in a multi-modal, higher-order logic. Machine learning techniques are used to update the belief base. The second paper, "LAIMA: A Multi-Agent Platform Using Ordered Choice Logic Programming", by De Vos, Crick, Padget, Brain, Cliffe, and Needham, introduces a deductive reasoning multi-agent platform based on an extension of answer set programming. Agents are represented as ordered choice logic programs. The third work, "A Distributed Architecture for Norm-Aware Agent Societies", by García-Camino, Rodríguez-Aguilar, Sierra, and Vasconcelos, describes a distributed architecture that accounts for a "social layer" in which rules are used for representing normative positions. Last but not least, "About Declarative Semantics of Logic-Based Agent Languages", by Costantini and Tocchio, provides a declarative semantics to logic-based agent-oriented languages, focussing on DALI as a case of study and paying particular attention to communication among agents.

Part III - Knowledge Representation and Reasoning

This part consists of five papers. The first paper, "Goal Decomposition Tree: An Agent Model to Generate a Validated Agent Behaviour", by Simon, Mermet, and Fournier, presents the Goal Decomposition Tree agent model, which allows both the specification and validation of agent behavior. The second paper, "Resource-Bounded Belief Revision and Contraction", by Alechina, Jago, and Logan, is set in the context of the AGM postulates and presents a linear time belief contraction operation that satisfies all but one of these postulates for contraction. The third paper, "Agent-Oriented Programming with Underlying Ontological Reasoning", by Moreira, Vieira, Bordini, and Hübner, defines a version of the BDI agent-oriented programming language AgentSpeak which is based on description logic. The authors use as a running example the well-known smart meeting-room scenario. The fourth paper, "Dynagent: An Incremental Forward-Chaining HTN Planning Agent in Dynamic Domains", by Hayashi, Tokura, Hasegawa, and Ozaki, presents an agent algorithm that integrates forward-chaining HTN planning, execution, belief updates, and plan modifications. By this approach agents are enabled to deal with dynamic worlds. The fifth paper, "A Combination of Explicit and Deductive Knowledge with Branching Time: Completeness and Decidability Results", by Lomuscio and Woźna, introduces a combination of Computational Tree Logic and an epistemic logic, which encompasses an epistemic operator to represent explicit knowledge. The properties of the obtained logic, such as decidability, are presented.

Part IV - Coordination and Model Checking

The last part of the volume contains two papers. "An Intensional Programming Approach to Multi-agent Coordination in a Distributed Network of Agents", by Wan and Alagar, presents an extension of Lucx and discusses the Intensional Programming Paradigm, with the aim of providing a programming model for coordinated problem solving in a multi-agent system. The last work in this collection, "A Tableau Method for Verifying Dialogue Game Protocols for Agent Communication", by Bentahar, Moulin, and Meyer, proposes a tableau-based model checking technique for verifying dialogue game protocols, defined using a social commitment-based framework for agent communication called Commitment and Argument Network.

DALT is now looking forward to its fourth meeting, which will take place in May 2006 in Hakodate, Japan, again as an AAMAS workshop, and will be chaired by Matteo Baldoni and Ulle Endriss. Besides the traditional DALT topics, the next edition will pay particular attention to the impact of the development of declarative approaches to application areas such as the *semantic web*, *web services*, *security*, and *electronic contracting*.

January 2006

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Organization

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