Multi-Agent Oriented Programming

The JaCaMo Platform

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Tutorial Organisation

- Introduction to Multi-Agent Oriented Programming
- Programming Agents
- Programming Agents' Environment
- Programming Agents' Interaction
- Programming Agents' Organisations
- Programming Applications
- Conclusion & Perspectives

Multi-Agent Oriented Programming

Conclusions & Perspectives

Outline

Conclusions and Perspectives

Conclusions

MAOP proposes a seamless integration of different abstractions that brings interesting features to Intelligent Environments:

- ⇝ separation of concerns
  - using the best abstraction level and tools to tackle the specific dimensions, avoiding design pitfalls, such as using agents to implement either non-autonomous entities (e.g., a blackboard agent) or a collection of autonomous entities (group agent)
- ⇝ openness and heterogeneity
  - E.g., heterogeneous agents working in the same organisation, heterogeneous agents working in the same environment, the same agent working in different and heterogeneous organisations, the same agent working in different heterogeneous environments
- ⇝ programming features:
  - Each of the dimension can be addressed explicitly
  - Modularity, extensibility, reusability is possible
  - Extensible set of actions and tools provided to Agents (Reorganization Artifact, Organization Management Artifacts, ...)
  - ... code is cleaner and more understandable ...

MAOP Open Issues & Perspectives

- ⇝ Coordination
  - Integration of Bottom-up AND Top-Down functioning within MAS ⇝ integration of emergence AND Normative dynamics
  - Management of Open Organisations, Multiple Organisations, Organisation of Organisations
  - Management of Situated Organisations (Interactions between E and O dimensions)
  - ⇝ Shift from MAS to MAOS (Multi-AgentOrganization Systems)
- ⇝ Engineering
  - Debugging, Performance, ...
  - Life cycle of MAS (from requirement to maintenance) ⇝ software engineering tools and methods
  - Shift from Agent-Oriented Sofware Engineering to Multi-Agent Oriented Software Engineering where all the dimensions A, E, I, O may guide each step of the process
  - Evaluation & Verification of MAO programmed applications,
  - Integrating with other technologies
  - Handle Scalability, Robustness

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