Semantic Knowledge Model and Architecture for Agents in Discrete Environments
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Agent Technology Roadmap: Current MAS
- lack of Internal Agent Knowledge Model, lack of interconnection with semantic web results (knowledge model representations) and commercial standards

MAS Standards: FIPA, MASIF
- Agent communication, agent platforms
- No standards for internal agent knowledge model with available implementations

JADE Agent System
- Support for ontologies based on FIPA-SL
- No Query engine, No Storage, No Inference

Ontologies in Semantic Web
- Knowledge Representation
- OWL-DL - Description Logic compatible
- Query and Storage Engines available
  - RDF, OWL, SPARQL based

Agent Knowledge Model
- Events, Resources, Actions, Actors, Context
- Applicable in any discrete environment where actors need to be modeled
- Described by Description Logic (compatible with OWL-DL), Graph Representation
- Actor Context updating function/algorithm (Actor Environment State)
- Resources updating function/algorithm (result of fulfilled actor goals)

Software Development Methodology
- Knowledge Modeling: Extending Model with Protégé Editor following CommonKADS models
  - Organizational or Environment Model
  - Task Model
  - Agent or Actor Model
Results
- Ontology in Protégé exportable to OWL
- Concrete Algorithms actors’ context and resources updating

System Design:
- UML Diagrams for concrete Domain
- Use Case, Sequence and Class Diagram

Used Technology
- RDF, OWL, SPARQL
- XML, XML-RPC
- Java, MAS

Used Tools
- JADE
- Jena
- Protégé

Agent Library
- Support for OWL based Agent Knowledge Model
- Support for XML-RPC connection to receive event and send plain XML
- Support for Presentation of Ontological Knowledge (RDF/OWL => plain XML + XSL => HTML)
- Support for agent communication using FIPA ACL with OWL and SPARQL as content languages
- JADE and Jena Integration
- Available on JADE official website to MAS community (years 2005 – 2006: 735 downloads)