

# Chapter 11

## Combining Ontology with Intelligent Agent to Provide Negotiation Service

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### ABSTRACT

*Agent and Ontology are distinct technologies that arose independent of each other, having their own standards and specifications. The semantics web is one of the popular research areas these days, and is based on the current Web, which adds more semantics to it for the purpose of building the Ontology of Web content. In this regard, application program on Web can make the purpose of cross-platform calculation come true by taking advantage of Ontology. However, agent is a theory able to enhance abstraction of software itself, and as it is known, negotiation protocol is the basic principle in the electronic commerce which has a direct impact on the efficiency of the negotiation. This study examines the communication architecture with negotiation protocol on the Semantic Web. Precisely speaking, agents make computing with Ontology, and the authors define an agent's communication ontology for this communication framework and semantic web use Ontology to describe the negotiation protocol. In this context, the buyer or seller will be able to improve semantic cognitive in process of negotiation. Also, it can provide an intelligent platform for the information exchange on the same understanding about the content of communication in the electronic negotiation service.*

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Agent-mediated negotiation is one of new technology that now plays an increasing role in electronic commerce application. With the increasing automation of e-commerce applications, we will see the use of software agents that cooperate to perform business transactions.

MAS is a powerful paradigm in nowadays distributed systems such as negotiation system, however its disadvantage is that it lacks the interconnection with semantic web standards such as OWL. OWL was developed as a W3C Web Ontology Language, which is used to describe the ontology semantics. Semantic web is a recent and promising research area, the application of ontology-based modeling and reasoning to semantic web, which is these days often realized using intelligent architectures.

The principle of cognitive science is intelligent entity on the interaction with their environment. This theory makes software shift from object paradigm to intelligence agent paradigm, and thus constructs the software into an object with mental model.

In related research we often take interaction of agents as methods to resolve business problems. But in the process of the interaction of multi-agent, agent must take the same communication language and use common understanding about the content of communication. But in the open environment, the object that agent communicate with is different time by time and every agent may have different understanding about the same thing. Multi-agent system will become complicate when the interaction among agents get more times. With the technology of agent and semantic web gradually in-depth development, agent and multi-agent systems has been applied on semantic web technology. A lot of theory about agent issues needs further study. Such as agent should have what kind of structure, capacity constraints, it can be interacting with other agent on open and dynamic semantic web or intelligent Web environment.

Cooperative transactions require peer-to-peer protocols which based on inter-agent communica-

tion. This paper proposes a novel approach to negotiation, in which the negotiation protocol to adopt is not coded within the agents but it is expressed in terms of a common shared ontology that is shared by the agents in order to participate to a negotiation session. The negotiation ontology is defined in a way general enough to support a wide variety of market mechanisms, thus being particularly suitable for flexible applications such as electronic commerce. The paper describes the negotiation process and provides a prototype system that implements this vision using JADE agent platform.

The purpose of our study is to apply agent technique to semantics web, and our method is to make application program of semantic web be able to make intelligent computing by utilizing agents. Moreover, agents can realize the information integration among platforms of agents by making capital of Ontology on Semantics Web.

The rest of the document is organized as follows. First, we resume the related work and summarize the software framework for automated negotiations introduced in and show how it fits into our e-commerce model. Then we describe the negotiation service and present the process of negotiation server in negotiation environment. Next, we describe the communicative act ontology with owl and present the results of experiments. Finally, we present conclusions and put forward future work.

SweetDeal (Grosz, 2004) is a rule-based approach to representation of business contracts that enables software agents to create, evaluate, negotiate, and execute contracts with substantial automation. The contract rules are represented in the Situated Courteous Logic Programs knowledge representation encoded in RuleML, the leading approach to Semantic Web rules. The system of SweetDeal is the first to combine emerging Semantic Web standards for knowledge representation of rules (RuleML) with ontologies (DAML+OIL/OWL) with each other, and moreover for a practical e-business application domain, and further to do so with process knowledge.

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