



UNIVERSITY OF
CALGARY

SENG 609.22– Agent-based Software Engineering

Agent-Mediated Electronic Commerce

Prepared by: HuiMing Luo

Fall 2002

Course Instructor: Dr. Behrouz H. Far

Introduction

“No other aspect of e-business has garnered more attention than e-commerce. After all, consumers are expected to spend roughly \$130 billion online in the next four years.” [1]

Agent technology is becoming more prevalent. Particularly, as the availability of internet and network access, agent-based e-commerce system is increasing significantly recently and posing a challenge for developers to design agent-based system that could make work cheaper, faster, and more effective. Furthermore, agent-based e-commerce system will be same security as the users did with their traditional physical way in the past.

On this paper, I’m going to explain the Definition, Core Agents, Standards and Challenges of e-commerce in sequence, and then introduce a few of current mainstream agent e-commerce system, finally is the conclusion and reference.

Definition

Traditional commerce concerns the establishment of business transactions where participants must meet personally in physical places. Electronic Commerce (EC) uses the information and communication technology enabling the electronic support some stages of the business transaction life cycle.

Agent-Mediated e-commerce is a new online sales channel. It's about using agent and internet technology to streamline your business model, creating savings, and increasing efficiency. It's about lowering costs and establishing closer, more responsive relationships with your customers, suppliers and partners. [1]

The two general goals of e-commerce is:

(1) *Interoperation*

(2) *Automation*

Agent-mediated e-commerce has evolved from consumers conducting basic transactions on the Web, such as online purchase system, to a complete comprehensive Web system encompassing the partners, suppliers and customers transact.

Core Agents

As agent-based e-commerce system is becoming more powerful, functional and comprehensive, more and more components and agents add in. However, in general, an agent mediated e-commerce system includes three below core agents:

- *Sellers*
- *Buyers*
- *Facilitator.*

Seller agent

The seller agent is the most important component of the three. It handles sales on behalf of an organization. It has the following modules:

User interface: Every system has its goals and functions. User interface is a media to enable user achieving all these goals. All functions and actions of the seller agent that user can operate were embedded in this component. User interface facilitates the interaction between an organization and agents. For instance, a user may specify selling strategies and enquire about past transactions and current transactions through this module, sellers have the interface to negotiate buyers.

Transaction control processor: This is the key functional component in a seller agent. It controls a seller agent's behavior. It processes purchase orders from buyer agents. During a transaction, the transaction control processor checks the requirement information that buyer provided with seller's products database management system, if it matches, and then invokes inventory agent to handle the delivery, meanwhile, transaction control processor records the new transaction in the seller agent's transaction records database.

Communication module: This is the seller agent's interface to the network. It executes communication primitives invoked by the transaction control processor. It has the ability to communicate with several buyer agents simultaneously.

Buyer agent

The function of a buyer agent is to retrieve product information and to handle goods or services acquisition. When it receives a purchase request from a user, it engages a facilitator agent to locate the corresponding seller agents. Each purchase request consists of several parameters supplied by the user, such as price, color, date, quantity and warranty etc.

Facilitator agent

A facilitator agent helps buyer agents locate seller agents and vice versa, and triggers relevant agents to cope with the order. A facilitator agent provides 'links' to software agents. It obtains the network address of diverse seller and buyer agents by searching the Web and stores the address and information of the products sold at these addresses. For example, at first, all seller and buyer agents will register at the facilitator agent. When a user starts up the buyer agent, facilitator agent will assist he/she to find sellers, and then it invokes negotiating agent to help them making a deal.

Standards

Security, privacy, communication, and ontology standards are the essential preconditions and features that agents will address effectively to ensure our electronic commerce systems are stable, scalable and have adequate performance times. So as to, Consumers will trust their agents and the environment in which agents carry out their tasks and believe that their agents will not compromise private information, Such as their bank account.

In order to ensure users trust agents system, as agent designers, we can exhibit some existing agent system's behaviors and enable them to clearly explain their actions and functions. In addition, we must be careful not to inflate the users' expectations beyond our agents' capabilities as this can lead to a lack of trust in our systems.

Challenges

Electronic commerce poses a diverse array of challenges and opportunities for agent systems. Although, we already have agent systems playing visible roles in retail markets as well as stock markets, if agent system really works as a mature methodology, some demands need be addressed:

- Firstly, there is currently a lack of common languages and ontologies for agent-based e-commerce interoperation. Therefore, it's urgent that there

needs to be a semantically interoperable language and protocol for coordinating all the agents involved. So far, KQML is a well-known agent language and probably could be the 'silver bullet' for current dilemma.

- In agents system, an agent usually plays different roles, in other words, agent embody heterogeneous functional component to fulfill its mission. It is in these roles that agent system designers have the challenge to accurately identify
- Agents in web commerce system are distributed on different web sites, electronic transactions are realized based on the interaction of agents. For an open registry mechanism, there are other challenges for agents in e-commerce to face, such as tie businesses and e-commerce components together and helping automate supply chain management.
- Agents are introducing an innovative ways of doing business. Obviously, there is a big hole on the current legal document addressing e-commerce business. There is a need of clear legal identification on agent-mediated business deals and contracts. For example, digital contract.

Current Mainstream Agent e-Commerce System

MIT's *Kasbah marketplace* runs simultaneously as service providers and consumers and adopts a centralized approach in that a central marketplace is used to administer agents and schedule transactions. But *Kasbah* agents exist only as long as they are trading; when a deal is completed, agents terminate.

The *AuctionBot* at the University of Michigan acts as a seller or buyer in an auction. It is a centralized system like *Kasbah* in that user visit a dedicated web site to register an account and invoke an *AuctionBot* for auctioning. Like the seller and buyer agents in our system, the *AuctionBot* can be customized by the user once it is created, and it can be used repeatedly so long as a user's account exists.

The *ShopBot* agent at the University of Washington gathers product information of online stores (via their home pages); compares prices, and summarizes results for user. Gathering information via HTML documents has a shortcoming; the accuracy and relevance of information can be compromised by the 'intelligence' of the agent.

Conclusion

E-commerce through internet are spreading out all over the world. More and more individual, organization and corporation are using e-commerce to achieve their

business goals. Agent-based systems are playing an increasing significant role in the processes. However, agent-based e-commerce is a trend and paradigm for next generation's software development. As a software engineering participant, we should understand and try to actively apply it to our coming practice.

Reference

[1] IBM e-business website

<http://www-3.ibm.com/e-business/doc/content/overview/>

[2] Agent-Mediated Electronic Commerce: Issues, Challenges, and some Viewpoints. H. Nwana, J. Rosenschein, T. Sandholm, C. Sierra, P. Maes, and R. Guttman *Proceedings of the Workshop on Agent Mediated Electronic Trading (AMET'98)* Minneapolis, Minnesota, May 1998.

<http://xenia.media.mit.edu/~guttman/research/pubs/agents98.html>

[3] Toolkits for a Distributed, Agent-Based Web Commerce System, Agent-Based Web Commerce System, by Guanghao Yan, Wee-Keong Ng and Ee-Peng Lim, December 6, 1998

<http://www.webdevelopersjournal.com/articles/ecommerce/yan02.html>

[4] [Related Links on Information Agents and Agent-based e-Commerce](#) Related links on Information Agents and Agent-based e-Commerce. Main. Research. Publications. People. Links. Activities. CFP. Resources. Sitemap. AgentLink member.

[5] [DEVELOPMENT OF AGENT-BASED E-COMMERCE SYSTEMS USING SEMIOTIC](#) DEVELOPMENT OF AGENT-BASED E-COMMERCE SYSTEMS USING SEMIOTIC APPROACH AND DEMO TRANSACTION CONCEPT. JOSEPH BARJIS

[6] [Research Group on Agent-based E-commerce Wins Two Best Conference](#) Research Group on Agent-based E-commerce Wins Two Best Conference Paper Awards.

[7] [An XML Framework for Agent-based E-commerce - Glushko, Tenenbaum](#) An XML Framework for Agent-based E-commerce (1999) (Make Corrections) (22 citations) Robert J. Glushko, Jay M. Tenenbaum, Bart Meltzer

[8] [\[PDF\]An Agent-Based Electronic Commerce Marketplace](#) Agent-based e-commerce requirements Agent-based electronic commerce has imposed new demands for software that can work across the Internet in a dynamic