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Auotomated Negotiation in a B2B Environment

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Abstract—Automated negotiation is one of the predominant feature of present day e-commerce applications. Most of the e-commerce platforms are nowadays using automated negotiation strategies to deal with enormous amount of decision making to come to the most viable solutions to complex negotiation queries. The research in automated negotiation is focused largely on theory about negotiation protocol and strategy. E-commerce is constantly evolving with new aspects every day. B2B based ecommerce applications is also gaining speed and as such the requirement for automated agents based negotiation in a B2Benvironment is envisaged, by large sized ecommerce platforms. This paper discusses implementation of automated negotiation for a B2B environment. This paper points out that making the automated negotiation system as a software service is a feasible way for the practical application of the automated negotiation system. It then discusses a roadmap for the development of automated negotiation system using the software agent technology.
Keywords—component; formatting; style; styling; insert (key words).

I. INTRODUCTION

Software agents and particularly multi-agent systems are emergent technology, expected to have a significant impact in realizing the vision of a globally spread and information rich services network to support dynamical discovery and interaction of digital enterprises. The agent paradigm is expected to give a boost to all e-business areas including e-commerce, logistics, marketing, manufacturing, tourism, negotiation etc. There are several organizations that have successfully implemented agent and have been successfully using the various agents models. Agents have been seen to be the next breakthrough in software development, resulting in multi-agent platforms and innovation in e-business applications. However, it is currently appreciated that agent technologies have not achieved yet that level of maturity as required by advanced e-business applications [10]. Many difficult research challenges remain to be dealt with and much work is needed to adapt relevant existing agent technologies to the requirements of the new generation of e-business systems. The objective of this paper is to find out main domains that can benefit from implementation of multi agent systems and to work out the basic model of the E-commerce Platform targeted at online trading, auction systems, e-markets and private trade exchanges.

Electronic commerce is affecting each level of business around the world, in a profound manner. It is changing the way, the businesses interact with their consumers, as well as the way businesses interact with each other. Negotiation in any business is a key aspect, whether it is between two businesses or whether it is between the business and end consumer. In the dynamic environment of online shopping it becomes inevitable to discard the traditional human based negotiation methodologies and define and design automatic negotiations to deal with the dynamic and humongous nature of web based traffic.

The multi-agent systems focus on systems in which there are many intelligent agents which continuously interact with each other on various issues. Agents can be as software programs running on a system, network and implemented to achieve a goal or purpose. They are designed to work independently in their operation and capable of interacting with other agents, either in collaboration or in competition. This means that a number of groups of agents can work together, each carrying out their own plans and functions, while maintaining an eye on other agents. This provides a powerful technique for designing software applications for complex and distributed business processes environment [3]. Typically, talking about multi-agent systems research relates to software agents. However, the agents in a multi-agent system could be equally can have robots, humans or human teams as well as multi-agent system may contain combined human-agent teams. This dynamic nature of agent distribution motivates research by groups working on the standardization of dynamic and collaborative multi-agent systems. Some of the groups involves in this research are the Foundation for Intelligent Physical Agents (FIPA), the Object Management Group (OMG), the Knowledge-able Agent-oriented System (KAoS), and the General Magic group. Several researchers have also

attempted to provide a meaningful classification of the attributes that agents might have. A list of common agent attributes is shown below:

Adaptivity: refers to the ability to learn and improve with experience.

Autonomy: which is the ability to act without any interference from the outside, including human intervention.

Activity: means the ability to show its own initiative.

Collaborative behavior: can be termed as the ability to work with other agents to achieve a common goal.

Mobility: means the ability to migrate in a self-directed way from one host platform to another.

Reactivity: is the ability to selectively sense and act.

Temporal continuity: means persistence of identity and state over long periods of time.E-Commerce plays a pivotal role in the Web, Involving different aspects (i.e. technological economic, legal, etc.) depending on the characteristics of the E- Commerce transaction. Negotiation is the process whereby two or more agents seek a mutual agreement and commitment on the delivery of a service. Quality, time and cost are three typical parameters which would form the basis for negotiation. The main goal of this work is to conceive, design, implement, and evaluate different models of negotiation between autonomous agents, built to assist the users in automated negotiation for e-commerce.

II. AGENTS IN E-COMMERCE PLATFORM

In practice, multi-agent systems are created from scratch by software developers with the help of researchers. The research which has been done over the years have clearly demarcated a framework have arisen, that implements common standards [10]. These frameworks save developers, time and also aid in the standardization of development process. Software agents lie at the heart of the platform, automating the business processes that match the specifications of buyers and sellers. The bellow shown e-commerce platform can be associated to a number of business activities and market conditions. The platform supports a modular approach and a number of modules related to different business activities like auction, tender and negotiations. The modular approach which is most widely used, provides the flexibility to implement the most appropriate solution and to have the option of adding additional modules as required. It can be delivered as a buy-side, sell-side, broker or marketplace solution. E-commerce platform modules are Core module (Market Owner's Module); Software agents (E-Commerce Platform Agents); Auction module; Sourcing module; Negotiation module [6].

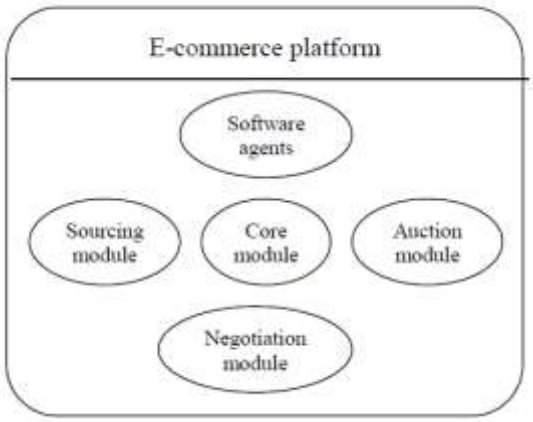

Fig 1: E-Commerce Platform Module

Market Owner's Module: The core module is at the center of the platform and helps to be configured and branded to meet the basic business requirements and processes. This various requirements includes setting business rules and terminology, user groups and access permissions, language, currencies and preferred communications media - email, SMS, WAP, Fax or telex. The core module also contains an indexed list of products in a hierarchical manner.

E-Commerce Platform Agents: The network agents in an ecommerce environment can work at different levels. These can be agents for buyers, sellers, brokers and market owners in order to achieve business goals. There can be various tasks associated with all these processes namely searching, monitoring, sorting and arranging. Agents can also assist in more complex tasks including analysis, decision-making and negotiation.

Auction Module: The auction module provides an effective way to sell a wide range of products, particularly time sensitive or perishable goods. There are a number of auction formats viz. English, Japanese, Dutch, Vickery and Sealed Bid. Additional auction types can be easily added to meet specific requirements, according to the auction procedure. Once bidding and winning

parameters are defined, software agents can be instructed to set up, or take part in an auction-making, accepting or rejecting bids, monitoring progress and alerting their owners of developments.

Sourcing Module: The sourcing module has been designed with the buyer in focus. It pertains to the task of making buying experience easier. Buyers can state their requirements and depending on those requirements they are approached from prospective sellers. If the criterion of buyer matches with a number of sellers then they can start the process of either auction or negotiation whichever is mutually agreed between buyer and prospective seller. From, the sellers end in the same module, the software agents can be used to keep monitoring the requirements of buyers and accordingly take appropriate calls.

Negotiation Module: The negotiation module incorporates automated handling of several processes involved in buying and selling. Complex negotiations are carried though the agents, keeping in perspective the various factors such as pricing, delivery and payment. The agents are capable of carrying out multiple negotiations with different clients at the same time thus reaching at the most feasible of the solutions. Once a negotiation strategy is defined, software agents can submit requests, counter offers and complete deals on their owners' behalf, reporting back on progress [7]. In order to build an E-commerce platform the Agent Business Analysis process should be done. Agent Business Analysis Process deals with and automates the roles and interactions that are involved in providing the client's service to be understood. This type of understanding enables to identify and define the specific value added functions that comes into play when agents in delivering the service. This kind of analysis helps in understanding the client requirements for business, as to where to deploy the agents and at what level. The below are some of the Business analysis types:

Stage 1: Roles-based Business Analysis.

This stage maps out the roles in the client's business process in the agreed area. The starting point is a consideration of the human roles and the information resources that each role will be using. The interactions between these human roles are identified and added to form a role and interaction model.

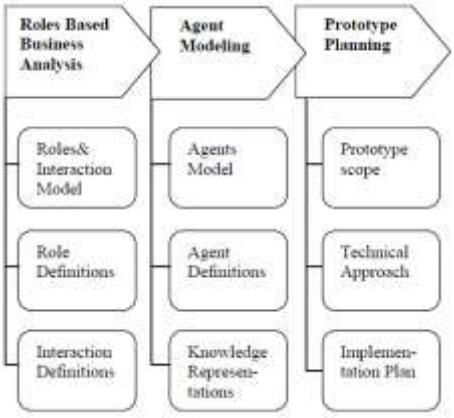

Fig 2: Agent Based Business Analysis

Stage 2: Agent Modeling.

This stage identifies what kind of agents is required to perform the roles in the Roles and Interaction Model. A role can be implemented in a single agent, a group or single agent may embrace and perform multiple roles. It is important to understand the business benefit that comes from deciding to use an agent to perform a specific role or a number of roles. This is because some roles may be better implemented using standard on-agent solutions. The resulting Agent Model illustrates the boundaries and limitations of the agent system, the population of agents required to realize these business goals and the communication links between the agents. For agents to understand and respond to their environment they must share a common language describing the business terms and concepts. This need incorporates another key element of the Agent Definition process, therefore a consideration of the Knowledge Representations they will use.

Stage 3: Prototype Planning

Prototype planning stage defines the most appropriate functionality for the agent prototype. It is essential to consider that the functionality included in a prototype is aligned with the client's business objectives rather than driven by technical capabilities. A key input to defining the prototype goal is therefore the evaluation criteria that will be applied to the prototype. Today's business environment is highly connected, global and extremely competitive. There is increasing demand for faster response to market challenges and opportunities. In turn, this demands greater flexibility in business processes. The multi-agent software is the correct approach to creating responsive and adaptable business solutions to meet these demands. Multi-agent systems are designed for handling rapidly changing and intuitively dynamic business processes. They continue to operate even when there is incomplete information, but need that a decision must still be made by the most effective method. Properly integrated into a business process

they can offer flexible and intelligently adaptable systems support, which will consistently outperform traditional systems. Thus, any organization with complex and distributed business processes can benefit from multi-agent technology.

III. MULTI-AGENT SYSTEM ARCHITECTURE

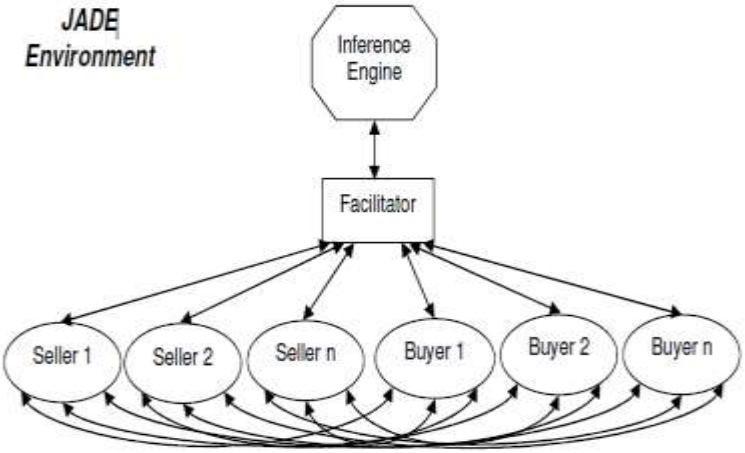

Figure 3: Conceptual Architecture

The control structure of the agent is composed of two phase. The first phase is dedicated to the control of agent activity which do not depends on other agent, while the second phase is given to negotiation and a reaching agreement. The step for the first phase are:

- Generate desires, based on beliefs.
- Generate candidate plans for achieving desires.
- Generate intention, as the best possible plan.
- If it has capabilities then execute intention.
- If it hasn't capabilities then negotiate.

The steps for the second phase are:

- Receive offers from other agents.
- Update beliefs and planning knowledge.
- Update desires and intentions
- Generate counteroffers and send them to the other agents.

The architecture begins with studying the requirement specifications at various stages. The below diagram shows an example of requirement specifications in our test example.

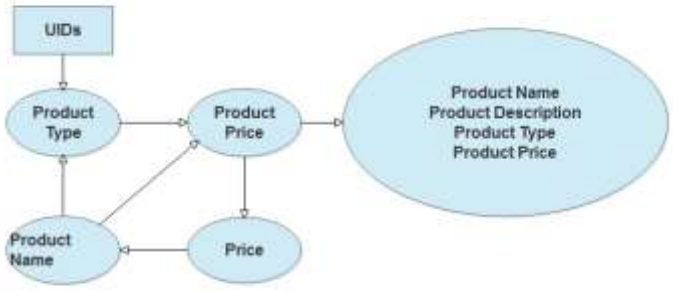

Figure 4: A view requirements specification

In this research work the B2B e-commerce application, there are three agents involved i.e. the client agent, associate agent and administrator agent. Associate agent only send proposal to administrator. Proposal consists information about product, quantity, price of product and MRP of product. If administrator approves the proposal then the product of associate listed in product list of application. If in any case admin not approve the proposal of associate, associate can resend proposal after the alteration in the proposal. If any proposal consists of a new product which is not listed in product list of application, then new product automatically listed through associate agent.

The working of the agents used is explained with the help of UML diagrams as below:

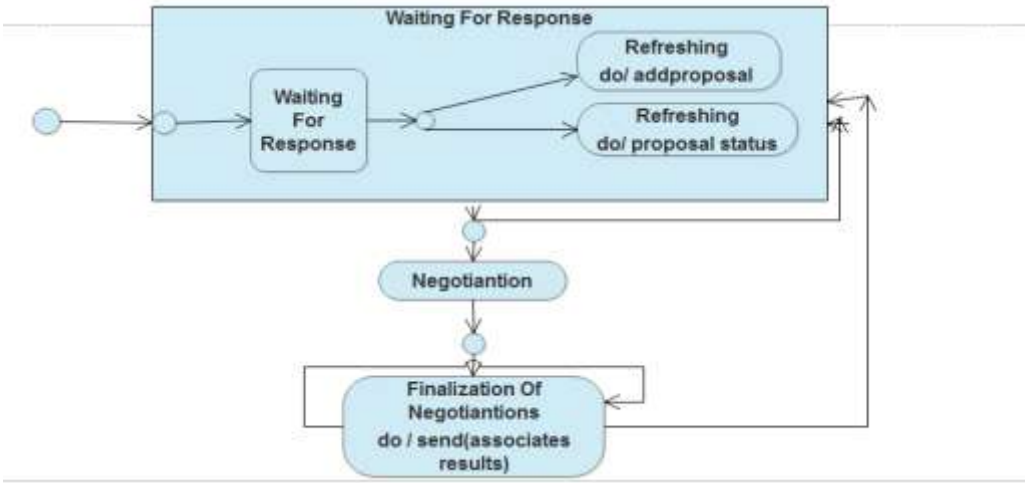

Figure 4: UML state chart diagram for Agent Co-ordination

An Admin Agent in this application the main role is admin and associate. Admin manage the order of the users as well as management of products and overall control management of the system. The associate send the proposals through associate interface to the admin. Admin filters the product in the proposal according to quality of product, quantity of products price of product and brand of product. Admin approve those proposals which are best among then. After the approval of proposal product of proposal listed in product list of application.

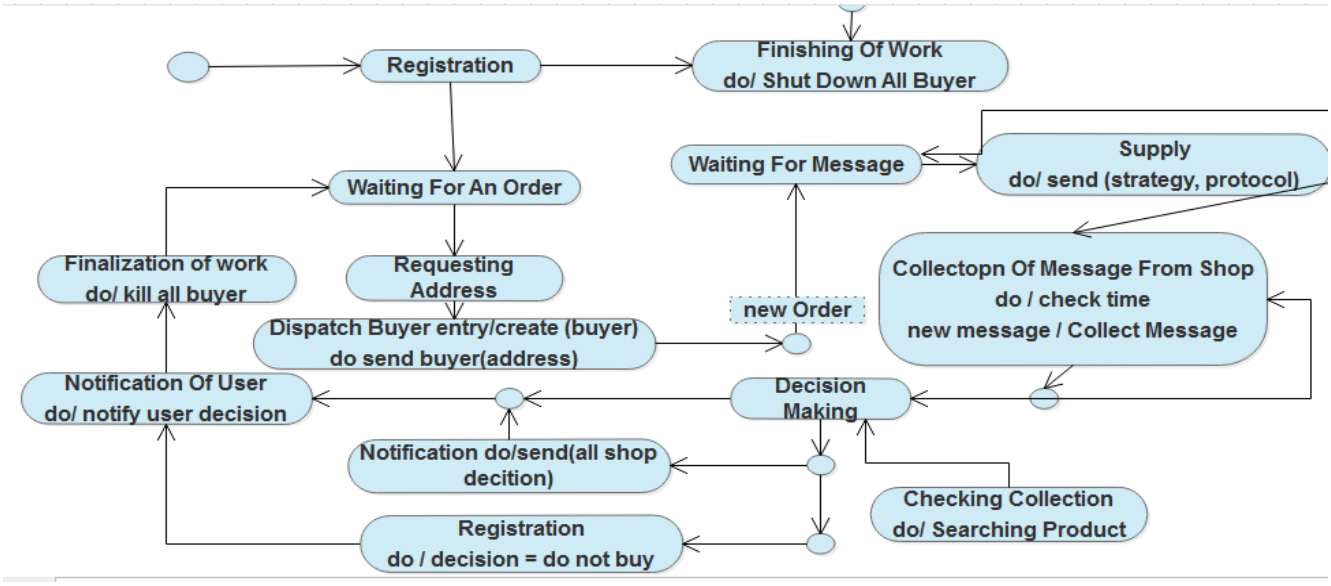

Figure 6: UML state chart diagram of the Client agent

The application interacts with the clients i.e. the small business owners or retailers through the client agent. The retailer can log into through his own panel. The operations are controlled automatically by client agents as shown in the above diagram. A Client agent manages all the frontend user management of the applications. There can be two kinds of users- visitors who just browse over the application without placing an order and second the clients who place an order. The client agents manage the operations like registration of the client on the application, managing price negotiations, checking the inventory, updating the inventory, facilitating the payment options etc. For a visitor user the agents may store the consumer behavior or search history.

CONCLUSION

Multi-agent systems have been designed to handle changing and dynamic business processes. Today numerous agent-based modeling toolkits have been developed. They enable individuals to develop agent-based applications. More and more such toolkits are coming into existence, and each toolkit has a variety of characteristics. Each organization can choose the agent based modeling toolkit that will match its goals, business-processes and opportunities. Any organization with complex and distributed business processes can benefit from multi-agent technology. The various terminologies related to the multi agent system were taken into consideration and the current trends were studies in this paper. The e-commerce platform discussed an overview of the various aspects of an agent modeling. The findings in this paper can be further used to investigate the role of agents in a real time application.

REFERNCES

[1] Lin R., Kraus S., Can Automated Agents Proficiently Negotiate with Humans?, Communications of the ACM, 53, 1, 78-88, 2010

[2] Naroditskiy V., Polukarov M., Jennings N.R., "Optimal Payments in Dominant-strategy Mechanisms for Single-parameter Domains", ACM Transactions on Economics and Computation, 1, 4, 1-21, 2013

[3] P. Stone, M. Veloso. Multi-agent Systems: A Survey from a Machine Learning Perspective. Carnegie Mellon University.Pittsburgh, 2007.p. 97.

[4] Trascau M., Tartareanu T.A., Benea M.T., Radu S., Establishing Social Order Through Norm Emergence, Proceedings of the 5-th International Conference on Computational Collective Intelligence, Technologies and Applications, Craiova, Romania, 2013

[5] Soh L.-K., Li X.," Adaptive, Confidence-Based Multiagent Negotiation Strategy, Proceedings of the 3-rd International Joint Conference on Autonomous Agents and Multiagent Systems", AAMAS'04, 1048-1055, 2004.

[6] Choi H.R., Kim H.S., Hong S.G., Park Y.J., Park Y.S., Kang M.H., Implementation of Framework for Developing Multi-Agent based Automated Negotiation Systems, Proceedings of the 7-th International Conference on Electronic Commerce, ICEC'05, 306-315, 2005

[7] E. Crawford, M. Veloso, Learning to Select Negotiation Strategies in Multi-Agent Meeting Scheduling, Working notes of the Multiagent Learning Workshop, Proceedings of the AAAI, 584-595, 2005

[8] J. Brzostowski, Kowalczyk R., Adaptive Negotiation with On-line Prediction of Opponent Behaviour in Agent-based Negotiations, Proceedings of the IEEE/WIC/ACM International Conference on Intelligent Agent Technology IAT'06, 2006

[9] R.Y.K Lau., M.Tang,O.Wong , An Evolutionary Learning Approach for Adaptive Negotiation Agents, International Journal of Intelligent Systems, 21, 41-72, 2006.

[10]C.Badica, A. Badita, Rule-Based Framework for Automated Negotiation: Initial Implementation, Proceedings of the RuleML, 193-198, 2005

[11] Mu-kun Cao, Robert Chi ,Ying Liu," Service oriented automated negotiation system architecture",Service Systems and Service Management, 2009. ICSSSM '09.

