Business Modeling based on agents systems modules

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Abstract: - Agent design patterns form the new methodology used to improve the development of software agents. Agent design patterns can help capture solutions to common problems in the design agent. The forms are used in various systems such as knowledge management systems, real-time systems and network management. Agent design patterns for business-based system aims to support various e-commerce paradigm of business-to-business (B2B), business-to-Consumer (B2C) and consumer-to-business (C2B).

In this paper, we proposed a separation-based approach to agent design patterns for B2C e-commerce applications. This approach is mainly composed agent design patterns and business models for e-commerce applications for business forms-based engineering systems. Based on this approach, we derived and an application form, form design facilitator. This design pattern is used to support processes selling/buying- in e-commerce domain.
1. Introduction

One of the most ubiquitous technologies used in e-commerce software agents. Software agents also called "agent-mediated E-commerce" (Guttman et al, 1998); (He et al, 2003), began a crucial role in the field of e-commerce. Software agents are now used to support virtual business processes and enable them to improve the e-market. Software agents are given their importance in the last decade. Increasing the work was done in which intelligent agents to support e-commerce and other Internet-based transactions. Agents are developed and deployed to perform tasks such as switch, monitoring, negotiation, bidding, auction, transfer of goods and ancillary support. The role of agent-based shop is a Comparison Shopping to help the process. These agents collect information from many commercial sites, filter it and provide appropriate responses for both buyers and sellers. Agent metaphors, because of its suitability for open environments, has recently become popular in distributed, large-scale and dynamic applications such as e-commerce and virtual enterprises. Agent design methodology is developed, therefore, re-engineering business processes, and several designs have been introduced for agent design. Kendall, (1999); Vooldridge, (2000) developed an approach called, agent-based models (ABM) approach, which has begun to achieve a better design of agent technology, but has some drawbacks, including limited opportunities for reuse.

In this paper, we developed the approach for deriving agent commerce design patterns for business systems based on that exceeds some deficiencies (ABM) and support reuse of software components and agent. Developed approach uses agent-oriented methodologies of Fingar (1997), which aims to combine the designs maturation agent technology and business engineering to create a new level of research for the award. Forms are considered the cornerstone of our development approach, which is converted to use to re-engineering business processes and achieve better design in the field of software engineering business.

A scheme for business modeling has been shown in figure 1. Based on this figure, it understand that business modeling is algorithmic and with a defined harmony.
2. Research background

In Multi-Agent Systems (MAS) design, agent-based models (ABRM) approach is used as design methodology for developing agent Kendall, (1999); Vooldridge, (2000), Cabri (2001), Cabri et al, (2002) .. This methodology follows the traditional topology and top-down approach that begins by identifying system requirements and the dissolution of the requirements analysis process in certain activities.

In the design phase, activities are tasks that are assigned to a role that performs no interaction with other models to set of capabilities, knowledge and behaviors expected of the agent used in accordance with their needs. The roles of individual mapped agendas installed all the required information by the agent to interact with the system. For example, in e-business systems, customer information is stored in databases. Suppose that the agent in charge sent to the database was located on different hosts. Rather than incorporate the necessary knowledge in the agent, such as the name of the driver and said the statement, the solution is to use a role. This role is embedded in the host and agent assumes that the use of it. The role of embedding enables simplified development of such roles allow
a logical partition to a different agent problems. In Agent-based models (ABRM) approach, models are: model services, acquaintance model, and the security model.

ABRM approach has been proven as a good approach for the development of closed-agent systems and Internet applications (2001). On the other hand, this approach has several limitations and probably less value in open environments, e-commerce. Another problematic issue is when a number of roles increases. This leads to an increase in the number of agents available to service of these roles Cabri, et al, (2002). Therefore, this results in poor re-generate the code and inconsistency in the design.

Also, a framework of Business Re-engineering model could be determined by following the proposed models. In figure 2, aspects and relations in elements of a Business Re-engineering model has been presented. All of the defined relations are definitely proposed by a model of business re-engineering.

![Fig 2. Business Re-engineering model aspects, relations](image)

3. Agent-Oriented Business Engineering Methodology

Agent-oriented business engineering Farhoodi and Fingar, (1997) aims to combine the maturation of the design agent engineering technology to business to build a new area of research for the award of the enterprise-level computing. This methodology has two models:

- Agent-oriented life cycle models.
  This model deals with the modeling domain for agent oriented modeling metaphor providing an active and better analysis models that enable reuse.
- The ontology-based domain models.
  An ontology defines the basic concepts and entities that are assumed to exist in a particular area of interest and relationships that are among them. This is a critical first step in the production of business-based systems. There are three different approaches to business-domain modeling: Business Process Reengineering (BPR), Object-Oriented Technology (OO), and intelligent agents (IA). All these approaches are based on models and offer a variety of techniques to describe the problem domain. The methods involve the BPR process, organization, events, business rules, entities and relationships.

Object-Oriented Technology (OO) methods include classes, objects, attributes, associations, operations, events, inheritance, polymorphism, and categories. They are suitable for modeling software engineering and have the potential for reuse. However, they are not inherently business oriented, and provide a premature commitment to design and implement the strategy.

Intelligent agent technology (IA) can be controlled to improve the modeling of enterprises, and offer new techniques for application development and technical intelligence, intelligent infrastructure services. Agent-oriented perspective enables us to develop a rich and expressive models of the company and provide a basis for adaptive and reusable business software.

Convergence OO (object oriented), IA and BPR results in significant progress in building a model company that is capable of end-to-end integration of business analysis and software systems. It should be noted that the agent-based modeling products business domain object model (BOM) in terms of ontology, and uses ideas and techniques from traditional business analysis (process modeling), Object Oriented, BPR and Artificial Intelligence. Business Object Model (BOM) is an agent-based and is used to support the use of task analysis, modeling and requirements specification and design of a Software Object Model (SOM).

4. Agent Design Patterns
Forms that use a variety of business engineering approaches can be found in various dimensions. However, the samples were classified by the software as follows: Gramma et al, (1995) (Flower, 1997), Lange and Oshima, (1998); Griver et al, (2000); Schelfhout et al, (20 ... 02), Moose, (2002): Design Patterns. These models provide a scheme for refining the subsystems or components of a software system and describe commonly recurring structure of communicating components that solves a general design problem with a particular context, 2) programming patterns. These patterns describe how to implement certain aspects of the components or the relationships between them using the language function, 3) analysis of the patterns. These models focus on the organizational, social and economic aspects of the system, and 4) Implementation of forms. They deal with problems and generic solutions for the implementation of agents and multi-agent systems.

We extend the classification of agent design patterns for business systems based on Papazoglou, (2001) proposal:

1) application agents. These agents work together as part of a distributed flow application that implements a typical range of cross-organizational activities,
2) Personal agents. These agents work directly with customers to help support the management of user profiles, and require the collection of information,
3) general business activities of agents. These agents meet the needs of business partners. These are the search agents, negotiating agents, collection agents, marketing agents and agents of the business transaction (seller agents, buyer agents), and 4) system level support agents. These agents provide security services required to conduct e-business, such as authentication agents, security agents and authorization agents.

Agent design patterns of mobile agents and static agents systems are becoming ubiquitous and complex in the development of business applications. Success in the agent system depends on the development for these principles of software engineering. Design patterns are recognized means that should be promoted. Generally, we can classify the agent design patterns as given below:

- Communication patterns: These patterns deal with the way agents communicate with each other and Deugo Viess, (1999); Deugo et al, (1999); Meira et al, (2000) .. Examples of communication patterns are sample receptionist, secretary of the sample, sample sessions, antenna pattern, Direct coupling of the sample, Modified proxy form, the pattern of communication sessions, Pendants sample, a sample event dispatcher.
- Traveling Forms: These forms will facilitate the management and movement of mobile agents, as well as the quality of their services and routing Lange and Oshima, (1998). Examples of patterns are traveling: Itinerary form template Forwarding, and Ticket sample.
- Test Patterns: These patterns deal with the breakdown of tasks and how these tasks are delegated to one or more agents Lange and Oshima, (1998). Examples of patterns are task: master-slave pattern, and a sample plan.
- Interaction Patterns: These patterns deal with the manner in which agents locate each other and facilitate their interaction Lange and Oshima, (1998). Examples of patterns of interaction are meeting form template Locker, Messenger of the sample, and find an organized group of samples.
- Coordination Forms: These forms are involved in the management of dependencies between the activities of an agent Tolk sdorf, (1998). Examples of forms of coordination are: Pull & Push pattern, the pattern index, a sample of passengers.
- Economy Forms: This deal means on the basis of trade for e-business processes Silva and Delgado (2006); Kostiadiis et al, (1999); Viess, (2002), Faiz and Luai, (2007) and James Faiz. (2004), Faiz, (2008). Examples of patterns of trade are agent company of the sample, the agent as a delegate pattern, common dictionary form, the mediator pattern, Observer Pattern, pattern, and facilitator.

5. Agent Business Systems Engineering (ABSE): The proposed access joins Business systems engineering all software engineering activities and processes that must be made in order to develop useful software in the business sector. Atil and Said (2006) defines a software process as a sequence of
operations required for the construction of various commercial properties (specifications, prototypes, documentation, test cases and codes generation) that constitute a software product.

In ABSE, software engineering processes and business activities are expressed in terms of business and software components that are defined as software and business forms that can be made in accordance with the form life cycle: mining, polishing, and re-use. The sheriff and Hani (2004). Application forms are used to help developers to automate business transactions with the agent design, support for reuse of business domains, and facilitate the processes related to the exposed components.

The first stage involves identifying the business processes in the business sector, which represents the business scenario and formulate business components and actors to engage in business processes. At the end of the analysis phase, the business model was established with the user, and information services domain. The business model includes four dimensions of business. These dimensions are (1) business service: that facilitates users to access business processes, (2) business Actor: using the business service and share information with other business partners, (3) Data aggregation: that makes data from multiple sources to be integrated and presented through multiple channels, and (4) Commercial component: which makes it easy to integrate data and processes across the enterprise and its partners.

6. The application of the proposed scenario

Head design template was performed using ABSE work Faiz, (2008). This model uses a master-slave design pattern for mobile agent systems and procurement of business form. In addition, it also uses an intermediary agent (broker agent) to manage the process of negotiations between the buyer and the seller's agent agents.

The main objective of facilitating the design pattern is to find a mechanism to coordinate the agents for the sale / purchase-based business processes. In a virtual market, and buyers and sellers have to constantly interact to achieve the best deal. This process is the process repeats. Several vendors should be more interaction to achieve the final process to accept or reject the offer of a particular customer. Direct communication with the vendor will result in high network traffic. The use of a facilitator agent allows slave agents to implement this communication at local and reduce network traffic. Thus, the interaction takes place locally at the location of the seller, a representative of the teacher directs the prospective seller engaged in the negotiation process.

7. Summary and Conclusion

In this paper we presented the approach for obtaining application forms for business engineering based on the model scheme. ABSE agent approach for composing and business forms. We believe that success in the pattern-oriented engineering led to the development of better access to engineering agent systems and better design in large areas such as e-commerce. ABSE enables business process reengineering based on the use of an existing agent design patterns and objects. The approach also provides a methodology for the reuse of design and integrate them with business and software components. We used this approach to develop a set of application forms for e-commerce. These patterns support the sale / purchase-based business processes.

Development of new agent-based form design is still in its infancy stage. Future directions may require the development of new projects in the B2C and C2B e-commerce. Processes between these paradigms will need to be classified and re-engineered based on agent-pattern scheme.

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