

Developing Multi-Agent based Advising and Booking System for Transportation in Pathein

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Abstract

Information in today's business environment has become the prime ingredient of a successful business enterprise. With growth in distributed computing, Internet, WWW, e-commerce, etc..., more and more applications must operate in open system, where the components change over time, and there is a lot of information available from multiple sources, much of it unstructured. The use of agent technology is a very useful tool to find a solution to everyday problems in order to improve the quality of life of people. The agent paradigm let us create system which can offer complex and sophisticated services to different users. Multi-Agent System (MAS) architectures now appear to be more appropriate than traditional ones for building latest generation software that is typically concurrent, distributed and dynamic. In this paper, an implementation of advising and booking system based on multi-agent for transportation services on the internet will be proposed. This system consists of railway, roadway and waterway transportation. If user want to book for these transportations, the user selects only the destination place, the information agent can find the available transporters (such as by train, by bus) to travel this place. This system will help the user to find required information and to booking departure tickets from Pathein. The system provides assistance to the users in travelling by bus, train, ship through agent user interaction. This system implemented by using XML, J2EE and MySQL server 5.0.

1. Introduction

A multi-agent system (MAS) is one composed of multiple interacting software components known as agents, which are typically capable of cooperating to solve problems that are beyond the abilities of any individual member. The characteristics and expectations in news areas of information technology, like e-business, knowledge management, peer-to-peer computing, or web service, are deeply

modifying software engineering. To address those new need, the use of MAS architecture that appears to be more flexible, modular, and robust than traditional ones.

Multi-Agent System could be seen as a social organization of autonomous software entities (agents) that can flexibly achieve agreed –upon intentions by interacting with one another. On-line reservation systems, violate several principles are necessary for a bidding system to benefit both the buyer and the seller. These principles are offers should be evaluated and selected on multiple criteria, not just price. The negotiation should be a non-binding arrangement, allowing the buyer to make multiple offers, increasing the chance of a successful match. Sellers should have the tools to evaluate bids based on complex criteria, not just immediate revenue.

Multi-agent systems have entered the realm of market economy; determined efforts have been undertaken by the state for remarkable by the state for remarkable progress in the transportation sector. Transportation plays a vital role in the development program of a nation. This system mainly focus is to booking the ticket use of computers on the Internet. This system helps the customers to find their preferences information.

In this system, section 1 represents introduction, section 2 is the related work, section 3 is the multi-agent system, section 4 is multi-agent based advising and booking system, section 5 describes system implementation and its result and section 6 is conclusion.

2. Related Work

With the growth the Internet in the 1990s came electronic commerce (e-commerce), and the rapid international expansion of 'dot com' companies. It was quickly realized that e-commerce represents a natural – and potentially very lucrative –application domain for multi-agent systems. The idea is that agents can partially automate many of stages of electronic commerce, from finding a product to buy,

through to actually negotiating the terms of agreement (Noirega and Sierra, 1990). This area of agent-mediated electronic commerce perhaps the largest single application area for agent technology by the turn of the century, and gave an enormous impetus (commercial, as well as scientific) to the areas of negotiation and auctions agent systems.

Nowadays, agents are a very promising technology for information retrieval. They are capable of autonomous, reactive and proactive behavior, endowed with the ability to interact with other agents and are well suited for intricate, fast-changing, and constrained environments such as electronic marketplaces. Software agents offer parties. Agent-based personalized information filtering and retrieval improve the retrieval effectiveness of search tools [1].

The information agent architecture is well suited for developing distributed intelligent design systems when existing engineering tools are encapsulated as agents and connected to the system for providing special services, and the system consists of a small number of agents [2]. An agent-based approach means that IR systems can be more scalable, flexible, extensible interoperable and route information, broker requests, and share metadata. The ability of the proposed agent is to satisfy its attributes such as natural language interface, concept searching criteria and the learning of concept-words association [4]. Content-based search is more appropriate for the cases where users feel that they can provide prototype multimedia content which is similar to the content they are looking for. In addition, this system is expected to provide high assurance coupled with applicable information and timeliness [5]. The main desirable attributes of such a system should be flexibility, reliability, and reaction time.

3. Multi-Agent System

Multi-agent systems are systems composed of multiple interacting computing elements, known as agents. An agent is a computer system that is capable of independent action on behalf of its user owner. A multi-agent system is one that consists of a number of agents, which interact with one another, typically by exchanging messages through same computer network infrastructure [6]. Multi-agent system consists of two important capabilities:

- Autonomous action
- Interacting with other agents

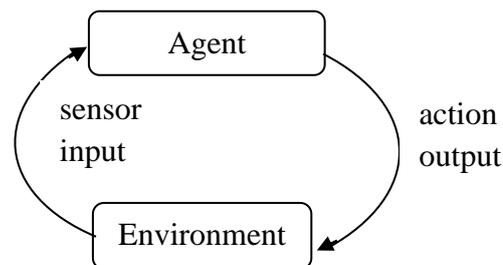


Figure1. An agent in its environment

3.1. Information agent

Information agents are cooperative agents whose main goal is to collaborate and assist task agents like mobile agents in training information from heterogeneous data sources. Information agent technology is one of the major key technologies for the information management environment. An information agent has access to one or multiple, heterogeneous and distributed information sources, proactively searches for and maintains relevant information on behalf of its human users or other agents preferably just-in-time. The information agents collect information from multiple often heterogeneous sources and forward information to possibly multiple sources. This agent on mobile computing environment should adaptively provide information based on the changing location of mobile users. The agent has to obtain user's location dynamically, and responds this user the information depending upon the user's position.

3.2. Intelligent Agent

Intelligent agent technology provides a mechanism for information systems to act on behalf of the users to search, acquire, and store information. The properties of intelligent agent are mobility, veracity, benevolence, rationality, learning and adaption. Intelligent agents are able to perceive their environment and respond in a timely fashion to changes that occur in it. These agent are capable of flexible autonomous action in order to meet their design objectives and will learn adapt to changing circumstances. These agents have capabilities to learn from past experience so it can be trained to be more successful in the future.

3.3 Properties of Agent

Reactivity: Agents perceive their environment (which may be the physical world), a user via a graphical user interface, a collection of other agents,

the Internet, or perhaps all of these combined, and respond in a timely fashion to changes that occur in it. This may entail that an agent spends most of time in a kind of sleep from which it will awake if certain changes in its environment give rise to it.

Pro-activity: Agents do not simply act in response to their environment; they are able to exhibit goal-directed by taking the initiative.

Social ability: Agents interact with other agents and (possibly) humans via some kind of agent communication language.

such a way as to prevent its goals being achieved- least insofar as its beliefs permit;

4. Multi-Agent based Advising and Booking System

Multi-Agent based advising and booking system implements for the following objectives:

- To develop how multi-agent technology works in E-Commerce Area
- To easy customers in booking ticket around the network with the use of agent technology
- To implement online booking models using agent technology.
- To reduce cost and time consuming and compare the fare of the different gates.

4.1 Proposed System

This system is an implementation of online booking system using multi-agent technology. This is aimed to offer traveler information about the destination as much as possible. If traveler wishes to compare the fare of different transport to his destination, he has to visit lots of web sites to get the result. But now, the traveler can get the schedule and fare list of bus, train and ship to his destination with the application of this system. With the use of this system, the less information you input, the more information you will get.

This system consists of two kinds of agents: information agent and reservation agent.

Information agent: Information agent acts as user interface agent. When user selects the destination place, information agent can give the available types of transporter and other information. Information agent communicates with reservation agent in order to get the required data.

Reservation agent: Reservation agent displays the available seat when receives information from the information agent. If the web user does not have the ID, the reservation agent generates the register page to make the register. If the user has the user ID, reservation agent permits to use this system easily.

4.2 Types of Agent Communication Mechanisms

An agent needs to interact with its surroundings environment or other agents will use mechanisms, which are synchronous and asynchronous. The communication partner can be either addressed directly (RPC, Streams, Message Passing) or indirectly and all these mechanisms can be either local or remote. The different mechanisms can be described as:

- **Method Invocation:** It involves an object/agent calling the method of another object/agent and communicating by means of passing parameters and accepting a return value. Although synchronous, asynchronous and deferred synchronous are possible, yet it is most suitable in case of synchronous communication. It is achieved by direct reference to the method (in case the invoked object exists in the same address space) or LPC (Local Procedure Call) and RPC (Remote Procedure Call) depending upon the local or remote of the invoked object.
- **Message Passing:** In the case, the communication takes by passing a message to the other agent/object. The message is passed by invoking a well-known method of the object, in asynchronous manner. The message encapsulates the protocol, which is then parsed and interpreted by receiving object.
- **Black Board:** Black Board interactions occur via shared-data spaces, which are local to each hosting EEs into which the agents store and retrieve messages. There is a need for a common message format/identifier understood by each agent to exchange information via a blackboard. The messages need not be aware of the location of the agent or the time when the agent is going to read the message. This leads to temporal uncoupling, a desirable feature as in most applications.
- **Tuple Spaces:** These are the extension of blackboard model where the information is stored in tuple-space and is retrieved by associative (or pattern-matching) mechanisms.

- Steams: the communication takes place by opening a stream connection between the two entities. In many cases, this is done by opening socket connections.

5. System Implementation

This system involves three-way travel types such as by bus, by train and by ship. The database contains the data associated with bus, train and ship. Firstly, the system classified whether the user is the admin or the ordinary user using ID number and password. If the ordinary users, they can choose the destination place, and then the system advises the available transporters and detail information by using the information agent’s properties.

If user’s favorite gate names is not available to booking, the information agent advises the user. After that, the system shows the available seats of user’s favorite gate and transporter. This process performs by the reservation agent. If the user’s favorite gates and transporter is not available, the reservation agent helps to choice another gates from the system. If user’s preference is OK, the system shows the booking date, price, departure time and tell the rules of booking process. Finally, the booking process is finished successfully.

5.1 System design

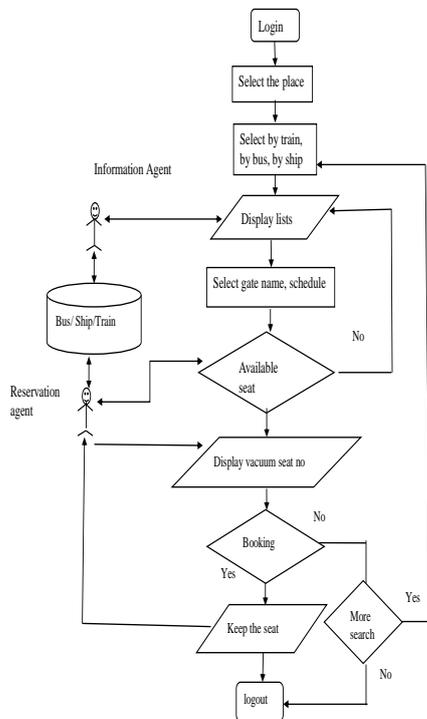


Figure 2. System flow diagram

5.2 Implementation of the Interface Design

For example, if user wants to travel by bus, user must be done the following steps to booking. In the same way, user can book the ship and train transportation processes.

Step1, the user can visit this web page to choose the destination place. After choosing the destination place, information agent search available transportation types for this destination place. And then, user can compare the cost and departure time for her/his journey.

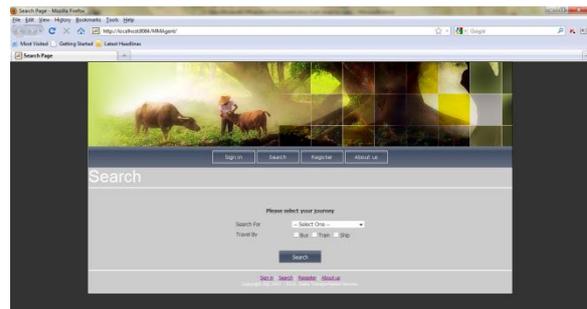


Figure 3. Web page of the system

User can see gate name, price and departure time about the transporter types that can travel the user’s favorite destination.

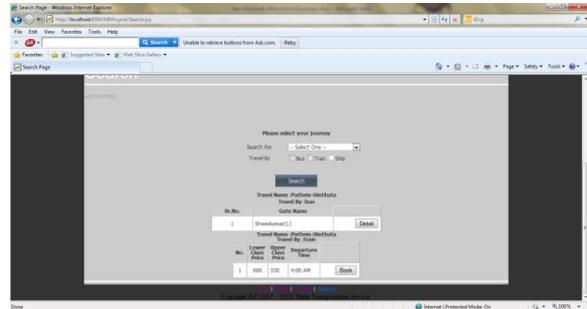


Figure 4. Search page

Step2, if user wants to know the detail gate information, clicks the “detail” button and the following page will appear.

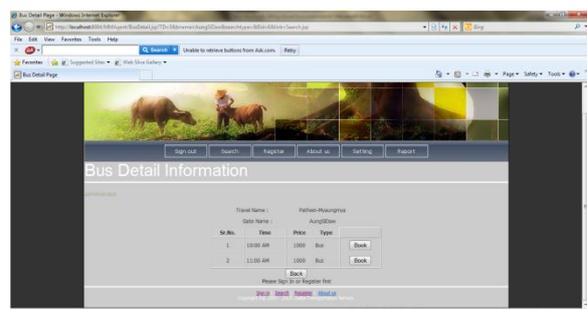


Figure 5. Detail information page

Step3, if the user clicks the “book” button, the register page will appear for the user who doesn’t have the user ID.

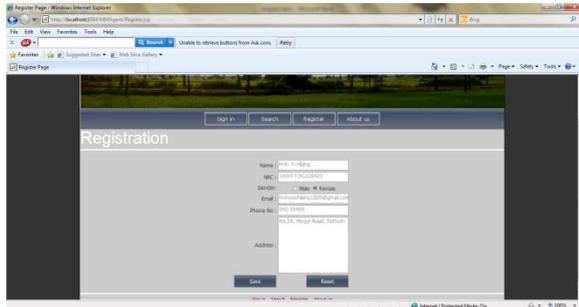


Figure 6. Register Page

Step4, user must fill the register form correctly and can get the user ID.

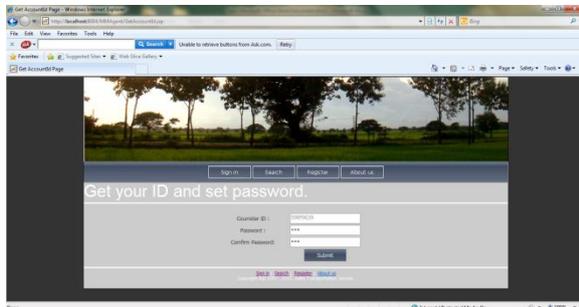


Figure 7. Getting ID Page

If the user get the private ID, can make booking process step by step successfully as follows:



Figure 8. Booking Page

Final step, user may choose the booking date and can check the favorite seat available or not by clicking “CheckAvailable” button. User can visible vacuum seat numbers with green colors in the seating plan.

After all steps, the successful booking page will appear. And then, user can sign out to let out from the system.



Figure 9. Final result of the system

6. Conclusion

The main goal of this paper is to develop the e-commerce system. This goal has been achieved with a design of multi-agent system architecture. By using this system, multiple users can access the same information of the gates from the any terminal. This system gives the required information for the user’s decision about the booking process. And then, this system reduces the effort, time consuming and can compare the cost for the user’s journey.

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