



Integrating Ontologies into Multi-Agent System for Club Membership

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Abstract— *Ontology and MAS have received much attention in recent years for their so many advantages in complex environments. Current Web content has been designed for direct human processing and thus lack of computer processing elements. Semantic Web aims at computer processable information. we have used the Integrated of multiagents system for club membership. In the era of Semantic Web, the ontology has established as a powerful tool to enable knowledge sharing and it is an important means in Semantic Web to achieve the semantic interoperability among heterogeneous distributed systems.. This paper focuses on the representation of both Ontology and Multiagent system structure towards system integration for club membership. we have discuss about the holiday planning package for customers and also check that which one is best package for customers. Intelligent software agents that are running on can help to provide the best package based on your requirement. Ontology is used throughout the multi-agent system to assist the interactions among different agents as well as to improve the quality of the service provided by each agent. This paper focuses on the utilization of combining both Ontology and Multi-Agent System (MAS) structure towards system integration for club Membership. In this paper, I include system prototype for ontology based multi-agent system. I have used Web Ontology Language (OWL) for the development of domain ontology for the club and KQML as an agent communication language. Finally I have developed ontology-based multiagent system for the club Membership by taking the benefits of both renowned technologies.*

Keywords— *Ontology, OWL, KQML, Multi-Agent System, Semantic Web*

I. INTRODUCTION

Multi Agent System

An agent is a software program that automatically performs tasks on behalf of the user. A multi-agent system is a system composed of multiple interacting intelligent agents. One of the current factors fostering multi-agent development is the increasing popularity of the Internet, which provides the basis for an open environment where agents interact with each other to reach their individual or shared goals.

The agent paradigm is successfully employed in those applications where autonomous, loosely-coupled, heterogeneous, and distributed systems need to interoperate in order to achieve a common goal. In a multi-agent system the agents communicate between them in order to fulfill the global goal or their local goals. Also, ontology has established as a powerful tool to enable knowledge sharing, and a growing number of applications have benefited from the use of ontology as a means to achieve semantic interoperability among heterogeneous, distributed systems. Both ontology and agent technologies are central to the semantic web, and their combined use will enable the sharing of heterogeneous, autonomous knowledge sources in a capable, adaptable and extensible manner.

This is particularly important for multi-agent systems, where the content of messages exchanged among agents must conform to some ontology in order to be understood. Through the collaboration between different agents, my aim is to achieve a highly efficient, flexible, customizable system that provides better communication, interaction and management among all others engaged in the Club Management. Ontology is used throughout the club membership multi-agent system to assist the interactions among different agents as well as to improve the quality of the service provided by each agent.

II. AGENT COMMUNICATION

ACL(Agent communication Language) is used to achieved Agent communication. Both the sender (agent) and the receiver (agent) are involves in this communication. Once a message is received by the receiver, it then gets interpreted and the receiver takes corresponding action based on the meaning of that message. To ensure the interoperability among different agents, both the representation and semantics of the message have to follow a standardized way. Knowledge Query Multiple Language (KQML) is a FIPA standard language is used to communicate with the agent.

System Prototype for Ontology base Multi Agent System

The overall architecture of the multi-agent system for Club Membership is presented in Figure 1. I have followed the FIPA agent management specification (FIPA SC00023K 2004), which is one of the most widely adopted agent

management standards available. The Foundation for Intelligent Physical Agents (FIPA) is a non-profit organization who dedicates their efforts to the standardization of agent-based technologies and multi-agent systems.

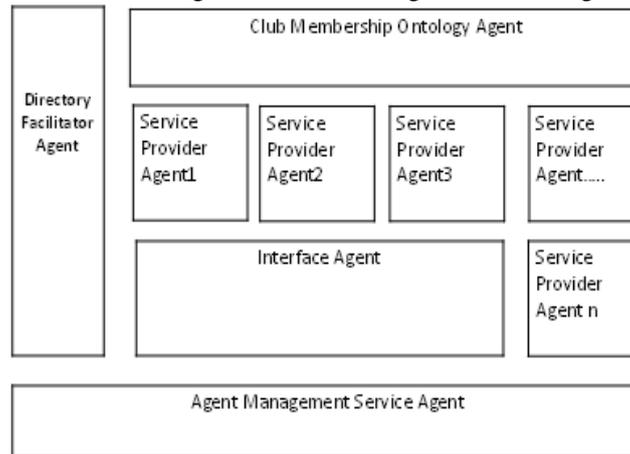


Figure 1. Multi-Agent System

As shown in Figure 1, the system consists of five major components: Agent Management Service Agent, Directory Facilitator Agent, Ontology Agent, Service Provider Agents, and Interface Agent. All those agents collaborate together to provide an accommodation service platform for end users.

Within the five types of agents, both the **Agent Management Service Agent** and the Directory Facilitator Agent come from the FIPA agent management specification. As part of the FIPA agent management specification, the main responsibility of the Agent Management Service Agent is to manage the basic operation of an agent platform (FIPA SC00023K 2004). Such responsibilities include creation and/or deletion of agents, query platform profile, authentication of agents, as well as the registration and/or deregistration of agents.

The role of the **Directory Facilitator Agent** is to maintain a list of service registries of each agent. Similar to the "Yellow Pages", the Directory Facilitator Agent stores information on services that other agents offer. It provides a directory searching service allowing agents to quickly and correctly locate the agent that they need to cooperate with in order to complete a certain request. Thus, to provide an accurate directory search service, all services within the directory are required to be labelled meaningfully

Ontologies define the concepts and relationships used to describe and represent an area of knowledge. Ontologies are used to classify the terms used in a particular application, characterize possible relationships, and define possible constraints on using those relationships.

Other than the **Service Capability Ontology**, I have also introduced a Domain Ontology to assist the interactions among different service provider agents. An Ontology Agent is introduced to manage all the ontologies used for the Club Membership multi-agent system. Its goal is to maintain the ontologies used by different agents, and inform related agents about updates for a particular ontology. Once the notification process finishes, it sends the new ontology to the agent via an agent communication protocol.

SPA(Service Provider agent) act as the core of this multi-agent system. SPA act as a mediator between the service providers and the multi-agent system. From each provider they collect information. Besides, they can also perform information updates based on requests received from other agents. The translation of information from one data structure into a consistent data structure involves an ontology based transformation mechanism..

Finally the **Interface Agent** is used to connect end users or external systems together with the multi-agent system. It reacts to different request made by the end user or external system, and translates these commands into agent understandable requests, and sends them to the appropriate agents. This translation process also involves the utilization of the Service Capability Ontology as well as the Domain Ontology.

III. INTRODUCTION OF THE SYSTEM

Tourism has become the world's largest industry and has experienced consistent growth over the past few years. The World Tourism Organization predicts that by 2020, tourist arrivals around the world will increase over 200%. Tourism has become a highly competitive business all over the world. Competitive advantage is increasingly driven by the advancement of information technology and innovation. Currently, the Internet is the primary source of tourist destination information for travelers. With the recent advances in hardware and software technologies, the Internet is quickly evolving towards wireless adoption.

Now a day's user wants to plan holiday year after year and for that they are looking for comforts for booking a hotel and etc. As a result, planning vacations and package tours is much difficult. Many studies have introduced a variety of tourist information systems for disparate purposes. These systems provide plan your holiday year after year. This system provide 25 years holiday planning Package. Whenever a user wants to go he can go base with him and his family comforts. The user can go in any month and any season for his holiday. This club membership Multi Agent System can provide Free Accommodation in the country as well as outside the country with a variety of facilities that are not included in the normal holiday plan.

That offers state-of-the-art clubbing facilities, innovative family holiday packages and star-studded entertainment events Besides, intelligent software agents can run on these can provide assistance for tourist to plan the trip Package.. Together with the traditional information agents such as a Club Membership Agent, Company Agent, they form a Multi-Agent Information System (MAIS) for proactive and best package to the user..

Ontology has been developed for the purpose of different businesses. It defines the terms used to present a domain of knowledge that is shared by people, databases, and applications.

Ontology, particularly encoder knowledge, possibly spanning different domains, describes their relationship. With the help of ontology, user needs and preferences could be better understood, and the appropriate information and services resources could be planed from the Semantic Web .

Preferences and support requirements are different from user to user and they often don't change holiday planning trip. The user cannot be flexibly associated with central facilities. A Club Membership Multi Agent System, therefore, can provide Package for his holiday Planning.. With the assistance of the increasingly powerful network, a system can provide effective coordination and integration of disparate information and service resources, anytime and anywhere. Intelligent software agents that are running on can help to provide the best package based on your requirement. With this system you can plan your vacation without any fear of booking and charges on that booking in different season.

A fix package can give you free accommodation of 7 days every year with real-time online booking. Accomodation is based on Package .The package is relayed with your seasons. Three different seasons are there and three different accommodation type. but we can offers a wide range of member centric facilities including real-time online Holiday Booking & Payment Gateway, state-of-the-art Club Houses, luxuriously furnished and fully equipped guest cottages, suites and rooms, multi-cuisine restaurants which serve some of the finest global delicacies, lounge & resto-bars, modern gyms with Spa, Massage, Steam & Sauna facilities, floating spa, jungle safari, Ayurvedic & Naturopathy therapies, Yoga facilities, banquet & conference facilities, wedding halls, swimming pools, variety of outdoor & indoor games, children play area etc.

This system can help you to select the best package among different company. So you can compare with yourself and select best among them. User can also identify that which one has the best facility from that.

IV. ONTOLOGY IN OWL LANGUAGE

In Club memebrship ontology, I have defined the following OWL classes for Club Membership Enviornmanr.

- <owl: class rdf:ID="Company"/>
- <owl: class rdf:ID="Agent"/>
- <owl: class rdf:ID="Hotel"/>
- <owl: class rdf:ID="Rate"/>
- <owl: class rdf:ID="Reservation"/>

In OWL, I can also define the relationship between the classes. Following are the statements in OWL, which expressed the relationship between classes of Club Memebrship

Agent Communication with knowledge query and manipulation language(KQML)

Agent communication is achieved through the exchange of asynchronous Agent communication Language (ACL) messages. There are two major parties involved in this scenario, the sender (agent) and the receiver (agent). Once a message is received by the receiver, it then gets interpreted and the receiver takes corresponding action based on the meaning of that message. To ensure the interoperability among different agents, both the representation and semantics of the message have to follow a standardized way. Knowledge Query Multiple Language (KQML) is a FIPA standard language is used to communicate with the agent.

V. CONCLUSIONS

This paper is aimed at applying ontology based Multiagent approach to provide different services like Providing membership and scheduling in club memebrship.Also, it discovers a seamless information processing system across an organization that the user can access from any location. This system leverages the power of both ontology and Multi-agent system. In this system, I have developed here many agents. They are ommunicating via one of the most popular agent communication language, KQML. In QML, I am passing academic institute ontology as a parameter. The combined use of Ontologies and Multi-agent technologies enable the sharing of heterogeneous, autonomous knowledge sources in a capable, adaptable and extensible manner. The idea offered by KQML is that of having specialized agents, called *facilitators*, which with the use of the appropriate KQML performatives can help agents find other agents (or be found by other agents) that can perform desired task for them.

In this research I can develop a club membership multi agent system is capable of to select the best package for Accommodation .That's why is more user friendly. The amount of manual intervention decrease and machine understandable logic linking of data is achieved. The System can be further redefined by Comparing.

I have also shown how ontology helps agents to improve planning as well as help user to better understand and specify their requirements and preferences. Despite the considerable efforts toward the construction of MAIS ontologies for agent interoperation, difficulties and challenges are still open

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