

Development of Framework for E-Commerce Environment

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Abstract— E-Commerce could be considered as one of the major fields that empowers with the upcoming technology. Many applications are being built to simplify almost every business activity that involves in particular transactions. ‘Event planning’ could be considered as one of the key areas that act as a centralized business terminal for many other business process like hotels, studios, music and DJ hiring, vehicle hiring, floral arrangements etc. Currently many websites provide information on mentioned services separately but no service application to cater the need of a centralized environment. The ‘e – Event Planning Framework’ is an intelligent system to provide the customers with optimized solutions in accordance with their need. The system has the ability to be customized according to each users’ needs and provide the most customized solution to tailor user requirements. The system therefore has the ability to filter the packages and process the package selected by the user using multi-agent technologies.

Keywords— E Commerce, Agent Technology, Event Planning

I. INTRODUCTION

With the exploitation of internet and the growth of the e-commerce the traditional business is showing a rapid development with the improvement in technology. They tend to reach the customers globally with the minimum cost. So the concept of web business has been able to take over the traditional businesses to an electronic platform (Zeng, 2009) (Florea, n.d.) With this, the world wide web and the internet are becoming an important channel for retail commerce and business transactions. People would prefer not to drive from one store to another to search the best or worthiest products. It has come to an era where people buying online goods is increasing considerably. But still there are non- automated purchasing done and which causes the customers to visit the places to obtain their details.

One such hugely expanding business is the ‘Event planning’ business. Unless the customers hire an Event planner it

would be a real headache to plan a wedding by the customers themselves, more over they would have to dedicate their time, take leaves from the offices and have road trips in searching for best optimum packages available for your wedding. Even if the carry on a desk research they will have to analyze the packages manually by visiting each and every site. So the problem lies here with the citizens becoming busy and occupied with their professional lives, The Event planning integrates many other businesses like hotels, photography, music, flowers and decorations etc. It would be efficient and an effective methodology if there was an automated methodology to filter the best packages for you on your budget.

The system is an e commerce website where the customers are free to find packages adhering to their budget and need intelligently. The system would use technologies as multi agent technology to complete this task. (Kularbphettong et al., 2010) (Skylogiannis, 2005)As many researches mentions the process of negotiation is considered an important feature in buying and selling at all times, when it comes to automated negotiation, creating and developing intelligent autonomous agents is also a hot topic at present. The agents act in this scenario should possess different goals and also the capabilities that matches their goals. All the agents should possess the ability to make decisions, act proactively, process users requirements correctly etc.

II. A SURVEY ON MULTI-AGENT TECHNOLOGY AND E-COMMERCE SYSTEMS

Today, agent based technologies are considered as the most promising methodology in deploying enterprise wide and world wide applications that must cooperate and interoperate with other heterogeneous systems.

The term ‘Agent’ is defined differently by various researches and developers. as mentioned in the research done on “intelligent agents: a data mining perspective” (christa et al., 2012) agents are software or hardware entities that can act in place of the user and perform some

function. to go through such a process, the author argues that the agents should poses a certain amount of intelligence. he also describes what is tensed as intelligence in the perspective of an agent, that is an agent should possess the ability to receive events by sensing, and classify and recognize the occurred event according to the situation and then proceed in logical operations to perform certain mechanisms. a mapping has been done by the ibm compares different agents with their intelligence. here the agency is referred to as the degree of autonomy the software agent should poses in representing the user.

It is mentioned in an research conducted by researches on "hybrid system based on multi-agent system in the data preprocessing stage"(kularbphetong et al., 2010) , the characters possessed by an agent, according to the researches an agent should always be reactive, pro-active, autonomous, object-oriented and social ability. The agents are designed to act on behalf the user and perform a specific task for them. According to the researchers it is mentioned that a multi-agent system is one of the promising means to help in reducing cost, increasing efficiency, reducing errors and achieving optimal deal. The particular project has been developed using jade (java agent development environment) according to the authors the platform of jade is described in the following manner a container is a running instance and it contains several agents. a set of active containers together forms a platform. in a similar research carried on "an agent-based online shopping system in e-commerce" also describes how they have developed the framework using the multi agent technology(zeng, 2009), in this framework there are a number of agents with various tasks assigned to them, the interface agent is responsible for the communication between the system and the customer. 'the buyer agent' migrate to the market place and searches for sellers, offers etc. then the 'expert agent' is responsible to provide knowledge based decision support. i.e. the system collects information from different experts and present them in different predesigned forms. this system also contains evaluation agent to compare and filter the offers received by considering quality, reliability, brand name, service etc. there is also a collaboration agent who compares customer feedback patterns using data mining techniques to represent the results by mathematical models. All the agents in the said system are interacting with each other. They are not active together at the same time. but activates themselves automatically when needed.

On a thesis written on "multi-agent systems in e-commerce environment"(florea, n.d.), it explains the need of negotiation agents in the e commerce environment. As

mentioned by the author the negotiation process is an important aspect to be considered in the process of decision making where some agents together find a solution through interaction to reach a common goal. The author further mentions that in order to model automated negotiation protocols and negotiation strategies should be identified separately. The protocol is a set of rules between negotiation participants, to specify the requirements that stands their interaction. The strategy is the behavior of participants to achieve a pre identified outcome. This behavior must be consisting a negotiation protocol, and should aim at maximizing individual performance of each negotiation agent used in the process.

Another experimental development done on the automobile industry explains how the three-layer architecture has been used for product search and retrieval (pérez et al., 2004). This architecture users three agents at three layers for client handling, server handling and for handling the operations with the internet.

A case study done on the TAGA trading agent environment has tested the semantic web technology in Multi-Agent Systems (Zou et al., 2003). It is about a Travel Agent Game on the foundation of FIPA (The Foundation for Intelligent Physical Agents) technology. The agents and services use FIPA supported languages, protocols and service interfaces to create the travel market framework and provide stable communication environment where messages expressed in semantic languages can be exchanged. This framework uses six agents performing various tasks an Auction Agent, a Service Agent, a Travel Agent, a Bulletin Board Agent, a Customer Agent and a Market Oversight Agent. The authors have further mentioned that FIPA standards offer mature specifications for multi agent systems communication and interactions on the emphasis of Agent Communication Languages (ACLs) together with protocols. They have used OWL (Web Ontology Language) as the content language. The reasons for selecting OWL over RDF(Resource Description Framework) are OWL's expressive power as a knowledge representation language seems to be adequate for many if not most needs of current agent based systems. , OWL offers better support for using terms drawn from multiple ontologies than do current popular ACL content languages. As a semantic web language, it is designed to fit into and integrate with web-based information and service systems. OWL has the potential to be a widely accepted and used representation language, enhancing the potential for interoperability among many systems.

It can be concluded that the agent technology has been in practice from early stages of this decade. Many applications

that were developed under the e-commerce platform has included data-mining technology as well. Mainly Java and Jade platforms has been used in the developing these applications and which undergo the FIPA specification. Though out the business platforms it could be seen that agents are used to communicate with the customers as well as they perform negotiation with vendors. However, a systems complexity could be either increased or decreased in the way we use the agents and assign them tasks. There have been many applications that has used ACL to simplify the process and some applications has used the agents to perform datamining algorithms for the same tasks. In the end most of the applications has optimised their solutions through this evolving technological platform.

III. DESIGN OF THE SOLUTION

The following High-level use case diagram describes the overall functionalities of the solution. Accordingly the system will register the users and provide separate accounts for them to get updates on their event. They can request the needed services and the system will contact different service providers and their packages that tally with the customers budget. The customers can confirm and if needed ask for negotiation from the suppliers. After receiving the services the customers could share their experiences with the public users which refers to the framework.

An important feature of this system is that it could customise according to each users' need. Not all the users request for every service available. They request the services according to their need. i.e. one may prefer to spend fifty percent of their budget on food while some may spend less on food. Some customers might prefer to have photographers and some might want to video the certain event. Therefore, this application should pose the ability to address each of the users' requirements in an effective manner. And also the budget allocation methodologies of the users may differ from one person to another. While one customers prefer to have the best hall in the town and gives less priority for other services, another customer will need the best musical group or photography that is available. Therefore, the system is trying to meet these aspects of the problem as much as possible.

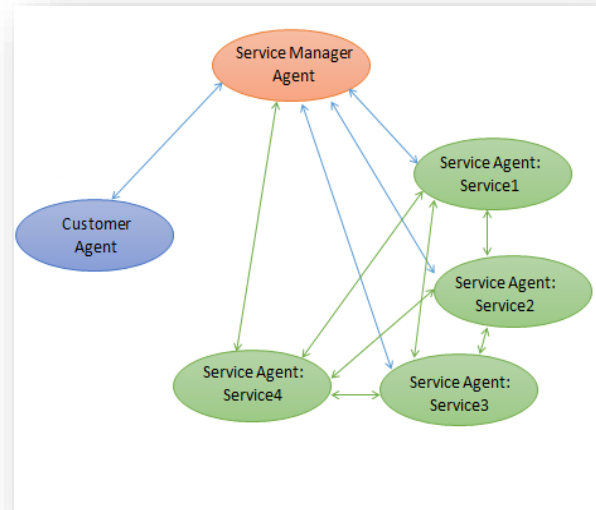


Figure02:Agent Architecture Diagram

The functions that were shown in figure 01 are achieved through the agent communication of software agents as shown in the figure 02. When the user enters the requirements the manager agent will select the relevant service providing agents and pass local messages to them. Those agents would use the ontology and generate all the possible packages with in the customers' budget. On this function the customer can ask the system to build the total packages for them or either customer has the privilege to provide a more detailed budget and obtained results on separate services.

After retrieving all possible packages, the agents will send back message to the manger agent where he will finalise and calculate the total of the packages and provide suggestions to the user if possible.

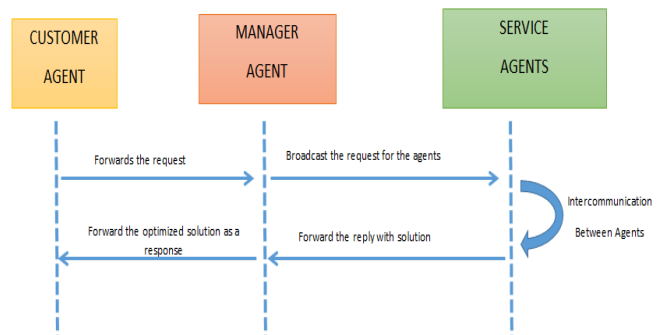


Figure03:Agent Communication Diagram

And this system also gives the suppliers from around the county to add their details on products and packages. For there are no specific web services developed for this functionality until now, they will have a separate access to the system to update on their product details. And these data are what would be used by agents to generate knowledge and information. So it could be noticed that one limitation of the framework is that the customers are only provided with services that are present as data on the ontology.

IV. HOW THE SYSTEM WORKS

The system deals with users who are totally different in their needs, so the user interfaces should be totally eye catching and understandable. To create creative interfaces, the technologies like HTML, CSS and JavaScript are used. Therefore, the JSP platform which integrates the above mentioned technologies with the Java platform. The agent development is done using integrating MaSMT with the Java platform. MaSMT 2.0 (Multi-Agent System for Machine Translation) is an open source framework develop to handle the communication among agents. Hence MaSMT provides and enables the local message passing among agents as well as the message broadcasting ability which are developed to FIPA specifications and standards. The ontology development is done using XML language which could be read by human as well as machines.

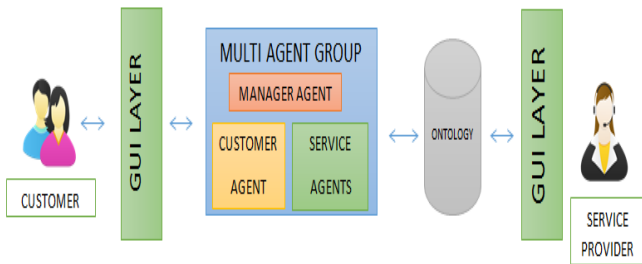


Figure04:Overall System Architecture

The agent communication process is totally executed via the Agent Communication by using the Agent Communication language(ACL) and String Messages. ACL is a language that is bounded by different protocols to control and optimize the process of message passing. The different protocols associate with ACL are commonly under Foundation for Intelligent Physical Agents (FIPA) specifications.

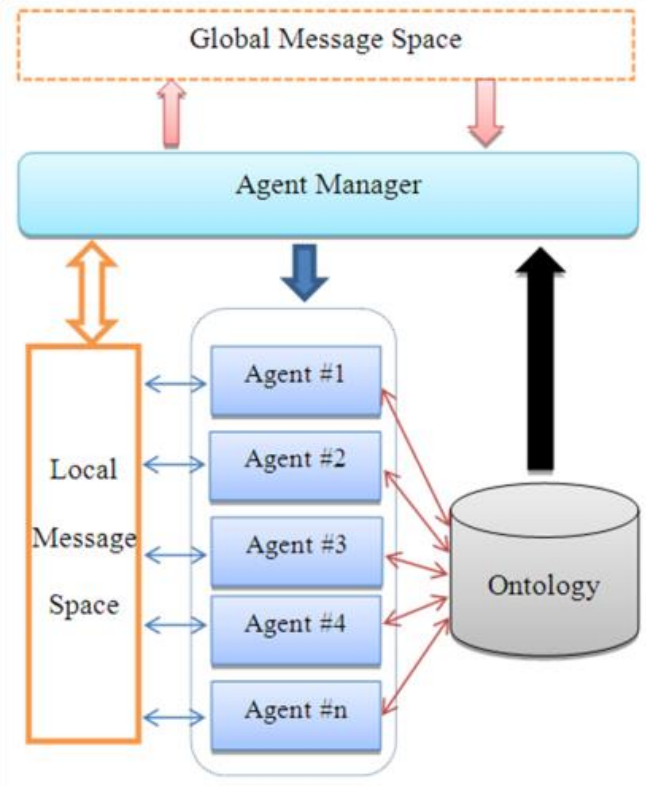


Figure05:The MaSMT Architecture

The MaSMT framework composes of two types of agents namely ordinary agents and manager agents. A manager agent act as the root agent of the group and poses regular agents under him. The manager agent is responsible for controlling the regular agents. The regular agents are performing actions to achieve the goals of the system. The regular agent however should always be under the control of a manager agent and also for a regular agent the communication is limited within its swarm. That is he can communicate with the agents inside the swarm but if requires to communicate with outer boundary the communication should be done through manager agent. The framework primarily implements infrastructure of the agents and message parsing methods to implement multi-agent system easily.

All the agents are present in the group named 'Event_Handling' and they possess different roles with in the group. The root agent is considered to be the GUI agent or the manager agent on this scenario. The following figure shows the group -role architecture of the agent involved in the process.

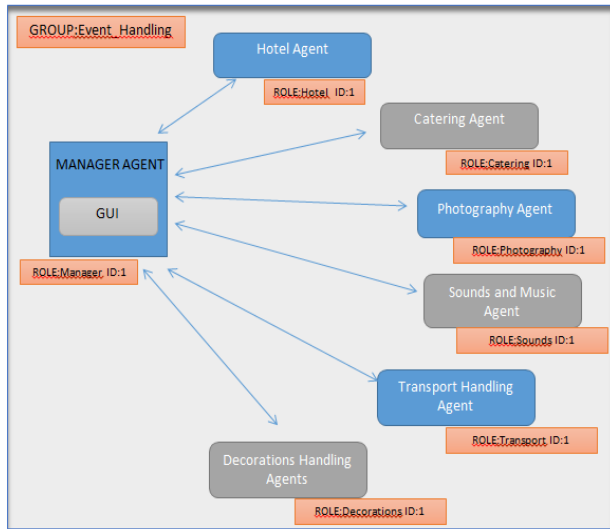


Figure06:The group-role architecture of agents

The process of event planning, and creating different packages for the customers is brought into a framework by using agent technologies along with the web development technologies on the JAVA platform as mentioned in the methodology section of this paper. A complex situation is divided into small subprograms and with the assistance of the software agents, the application makes its effort to provide the most optimum output.

V. IMPLEMENTATION

Given below is the implementation of the core module of the system. The system consists of the following modules,

- Customer Requirement Analysis
- Package Generation
- Confirmation with vendors
- Progress Tracking
- Testimonials

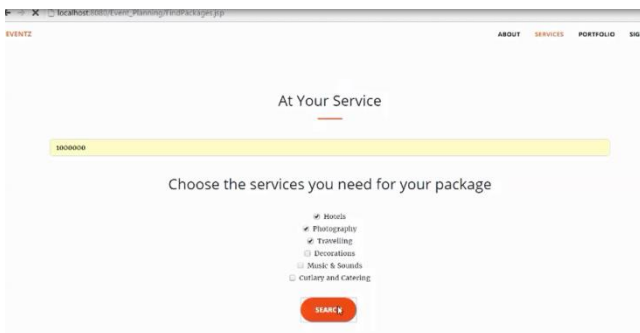


Figure06:The Interface to Get Customer Request

The interface to capture the users' need is displayed above. It consists of a pre-defined set of services from which user can select the required. Then together with the requested budget the HTTP request would be forwarded. The agents would be activated and so do the communication. The following response would be given through a static array to collect the relevant agent responses.

Figure07:Derived Packages for the request

There will be plenty of agent responses created within the server. But the duplicates are removed before rendering the page with package details.

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Event_Planning (run)  Java DB Database Process  GlassFish Server 4.1.1
Info: Created HTTP listener http-listener-2 on host/port 0.0.0.0:8181
Info: Grizzly Framework 2.3.23 started in: 6ms - bound to [/0.0.0.0:8181]
Severe: Sun Oct 02 10:33:49 IST 2016 WARN: Establishing SSL connection without
Info: [Active] MANAGER ... test_0@masmt
Info: Root element :services
Info: [Active] ... cus_1@masmt
Info: [Active] ... Hotel_3@masmt
Info: [Active] ... Hotel_4@masmt
Info: [Active] ... Hotel_2@masmt
Info: [Active] ... Photography_5@masmt
Info: [Active] ... travelling_8@masmt
Info: [Active] ... Photography_6@masmt
Info: End.
Info: test_0@masmt [MP Active]
Info: get_saleswas received byHotel_2@masmt from cus_1@masmt
Info: get_saleswas received bytravelling_8@masmt from cus_1@masmt
Info: get_saleswas received byPhotography_6@masmt from cus_1@masmt
Info: get_saleswas received byPhotography_5@masmt from cus_1@masmt
Info: get_saleswas received byHotel_4@masmt from cus_1@masmt
Info: join_sales<b>HotelGaladari</b> offers <b> Package01</b> worth <b>Rs:50000
Info: join_sales<b>HotelGaladari</b> offers <b> Package01</b> worth <b>Rs:50000
Info: broadcast from Hotel_2@masmt to travelling8
Info: join_sales<b>HotelGaladari</b> offers <b> Package01</b> worth <b>Rs:50000
Info: broadcast from Hotel_2@masmt to Hotel2
Info: join_sales<b>HotelChaya</b> offers <b> Package01</b> worth <b>Rs:35000.0<
Info: broadcast from Hotel_4@masmt to travelling8
Info: join_sales<b>HotelChaya</b> offers <b> Package01</b> worth <b>Rs:35000.0<
Info: broadcast from Hotel_4@masmt to Hotel2
Info: join_sales<b>HotelChaya</b> offers <b> Package01</b> worth <b>Rs:35000.0<
Info: broadcast from Hotel_4@masmt to Photography6
Info: join_sales<b>StudioQuickPic</b> offers <b> Package01</b> worth <b>Rs:1500
Info: broadcast from Photography_5@masmt to Hotel2
    
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Figure 08: Agent Communication Inside the Glass Fish Server

V. FURTHER WORK AND CONCLUSIONS

A complete web based framework is to be implemented and the users are to be given the knowledge on how to use the system. Moreover a mobile application is to be

developed which enables the users to plan their events even when they are travelling.

The agent technology can be considered as one of trending technologies used when developing e-Commerce applications. Most of the business processors could be automated by using agents, the tasks could be performed more efficiently and accurately. The event planning process too which could be considered as one of the time consuming tasks, could be made effective and easy using the agent communication. For agent communication is available in most of the agent development frameworks these type of applications could be developed in many languages which the developers are familiar with. This project is focused on a simple single example where the distributed systems could be applied in the practice environment. Yet could be applied to make complex situations simple and effective.

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