



# International Journal of Innovative Research in Computer and Communication Engineering

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## JADE Based Bidding System for E-Commerce

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**ABSTRACT:** JADE Based Bidding System for E-Commerce is a multi-agent bidding system for e-commerce that performs purchase or sale of products through the interaction of mobile intelligent agents that acts on behalf of the users (buyers and sellers). The agents register the services they provide in the Document Facilitator which is the yellow page service. Other agents should be able to search for agents providing services. The agents can perform cloning and can migrate to the residing place of the service providing agent. If multiple agents for the same product can participate in auctions and the winner of the auction gets the chance to perform commerce. This system is implemented using JADE as per FIPA specifications.

**KEYWORDS:** E-Commerce; JADE; Software Agents; Bidding

### I. INTRODUCTION

The astonishing growth of internet users paved the way for e-commerce through internet. E-commerce is defined as the use of computers and electronic networks to organize shopping with customers over the internet or any other electronic network [1]. People can now sit at their home and get anything at their fingertips. Several approaches were made to make the various steps of commerce easier for everyone. Online shopping websites were one of those approaches. The long time consuming process of searching the catalogue was a tedious job and people never loved it [3].

An Advanced multi-agent e-commerce system allows mobile software agents living on separate platforms (or machines) come to a virtual marketplace and perform commerce [5]. The proposed system uses multiple agents communicating with each other performing tasks allocated to it. The current e-commerce system requires users to sit in front of a computer for hours in search of a product they wish to buy. Moreover they have to search different sellers and choose a seller that offers the least price. This is definitely a herculean task.

The proposed system implements multi-agent system that supports users to deploy mobile software agents on behalf of themselves to perform commerce over the network [2]. This system supports creation of several buyer and seller agents on behalf of the user who intends to buy or sell a particular product respectively. The agents are allowed to publish the services they provide in the yellow page service provided by Document Facilitator. The agents who wish to avail any service can search for those agents that provide the services it wish to avail [6].

The agents are able to communicate with each other using messages and also are incorporated the power of migration to them so that they can move among different machines [7] irrespective of platform. Agent cloning helps create multiple copies of the same agent. These agents can also negotiate over price with each other and ultimately perform purchase or sale. Software agents can clone themselves to generate any number of copies as per the need. They have the power to migrate from one container to another on behalf of the user.

### II. RELATED WORK

The introduction of intelligent agents [1] started a new era in several fields, e-commerce being the best one. Intelligent agents are software agents that act on behalf of the user to do certain tasks that the user had to do himself. Attempts have been made to automate shopping utilizing static intelligent shopping agents (shop bots) such as Bargain-Finder, ShopBot, PersonaLogic, Ringo, and Tete@Tete. [9] Widely available comparison shop bots include Google Product Search, Yahoo Shopping, MySimon, DealTime, and StaticICE.



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The basic properties of agents are following: Reactive, Pro-active, Autonomous, Object-oriented, social ability [6]. Intelligent agents were nothing but a mere little process. But the name they were called itself denotes their power (They were called bots, short form for robots). They were called “fire and forget” agents since they act persistently. The introduction of intelligent software agents into the field of e-commerce automated it. Moreover the online shopping systems in the internet lacked user friendly interface. The JADE technology can be used to build a user friendly system. [8]

The multi agent based e-shopping system [1] proposed a system which enabled a client to buy a product through the use of intelligent agents. The product details were made available to the client as per his need. The Client Agent shows different items available in various shops in the e-shopping system. The customer can choose any number of items from any shop.

Developing a JADE base multi-agent e-commerce system [2] developed a much more sophisticated system for e-commerce with multiple agents. A distributed marketplace was developed which hosted several e-shops that allowed several e-clients to visit them and purchase products. Negotiation and bidding was supported. Price was the only factor considered and only shops were allowed to advertise the product. It supported dynamic agent creation and also migration. The Client information centre was used to store all details about the clients and their addresses. The Client information centre agent was started in the main container. This system works on the basis of an extremely simplistic ontology that has to be refined.

JADE based multi-agent e-commerce environment initial implementation [3], introduced the use of FIPA English and Dutch auction protocols to perform multi-attribute auctions. Multi-Agent Automated Intelligent Shopping System (MAISS) [4] proposes a main agent which is always started at the central point. It connects to database and allows user registration and login facilities. All buyer and seller agents are created by the main agent. Seller agents have to register in the DF and can be seen by all other agents in the system. Design an Electronic Market Framework Using JADE Environment [5] proposes a system that contains multiple agents. Unique identifier production centre is an agent that provides authentication. The buyer of an e-market must also receive a license from the unique identifier production centre, and then determine the buyer's private agent authority. The buyer and seller have market agents that perform actual commerce through migration.

An integrated approach for developing e-commerce system [6] implemented a multi-agent platform; where two typical agent types are present namely buyer agent and seller agent that interact with each other on behalf of the buyer and seller respectively. Intelligent Shopping Using Migrating Agents [9] describes in detail about migration using inter platform mobility service that is provided by the JADE platform. Agents use the container id and platform id in order to move from one platform to another.

In Intelligent Agent Based Hotel Search and Booking System [8] the field of application is slightly different and the booking of hotel is comparable to buying some products. The Hotel Booking Agent is initiated once the user selects the appropriate hotel and makes booking with the hotel. Once booking gets confirmed, the Hospital Agent sends the confirmation to user's mobile phone. The Hotel booking agent has been developed in LEAP on the user's mobile device. This system was designed to use in mobile devices. JADE LEAP is the framework used for the development of agent based systems in mobile phones.

Intelligent Shopping Using Migrating Agents [9] describes in detail about migration using inter platform mobility service that is provided by the JADE platform. Agents use the container id and platform id in order to move from one platform to another. Shopper Agents are then dispatched to retail stores for Shopping where queries, purchases, and negotiations can be made with a Retail Agent. The Shopper Agents travel from one virtual outlet to another, and repeat the process as long as the client wants or until all items are bought. Meanwhile, the user has the choice to remain connected to the Managerial Shopper Agent to monitor the shopping process or leave the agents to do the job.

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## III. PROPOSED SYSTEM

The Book Shop Agent is created by The User Interface Agent (UIA). The Book Shop Agent used to create Seller Agents for selling a book. [3] It is similar to a shop keeper who sells books. The Book Shop agent creates agents for selling books such that one agent is created for one book.

The Book Client Agent (BCA) is created by the User Interface Agent (UIA). It is used by the user to deploy Book Buyer Agent to buy a book. It allows the buyer (user) to enter the details of the book (name, price) he wish to buy. [3] It contains the minimum and maximum price. The buyer agent is willing to buy the book within that price range. One Buyer agent is creates for one product. It includes the name of book to buy and the price. It defines the wish of a buyer.

The Book Seller Agent (BSA) is created by Book Shop Agent (BCA). One agent is creates for one product. It includes the name of book to sell and the sale price. It denotes the price range at which the seller of the book is ready to sell it. [4]. It includes the maximum and minimum price.

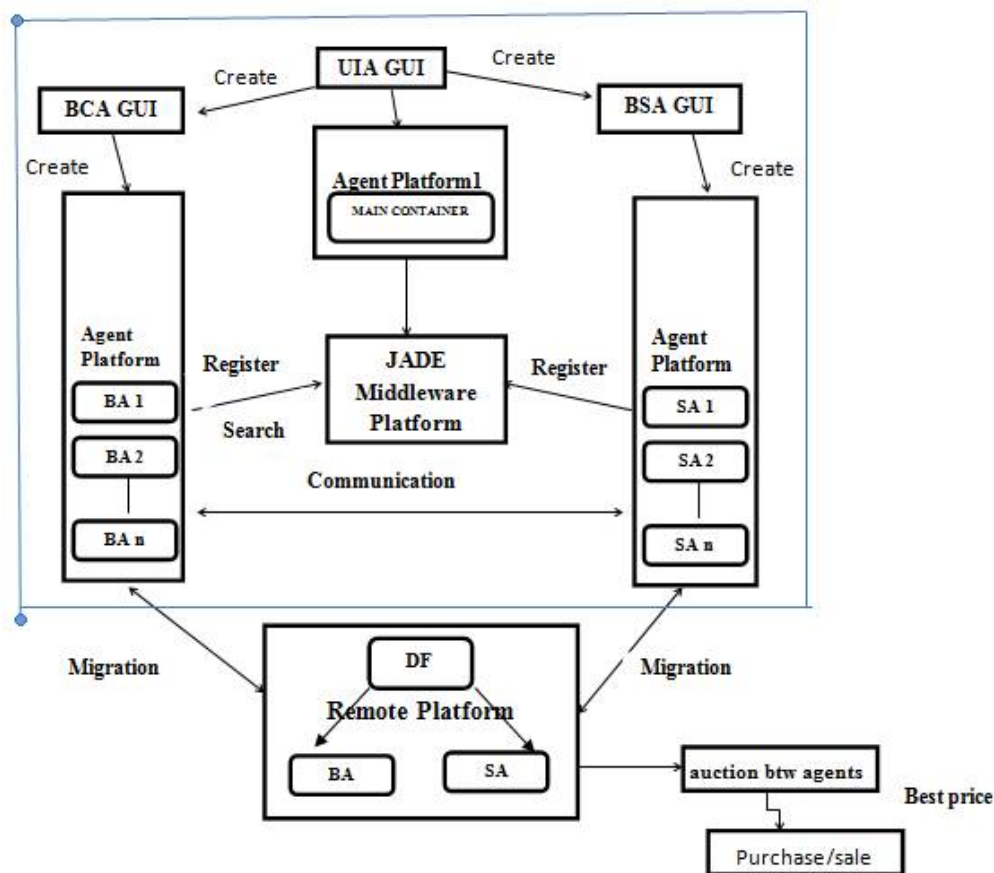


Fig 1: System Architecture

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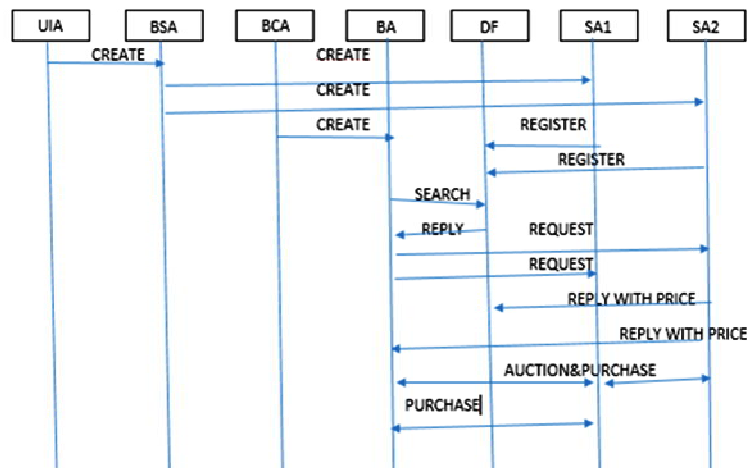


Fig 2: Communication between Agents

The fig 2 shows various communications taken place between various agents. Auction is started after all the agents reply their first quoted price.

## IV. SIMULATION AND RESULTS

The domain chosen for implementing the system is the sale of books. The system is implemented in two machines (two separate JADE platforms). The Client Agent is created in one platform (in one machine). The client agent was allowed to enter the details of the book he wish to buy. The details included name and Price. Similarly on the remote platform i.e. platform 2 on another machine the Shop agent was created. The Shop agent contained an interface that helped the shop keepers to enter the details of books they wish to sell. The details also included name of the book and price range. Price range includes the minimum and maximum price of the book that the buyer agent wishes to get. The Client agent provides an interface for creating buyer agents. For each book to buy a buyer agent is created. The buyer agent searches the Document Facilitator of the current platform for any agents that provide the service it wish to get.

The buyer agent migrates to the remote platform and registers in the AMS (Agent Management System) of the remote platform. [1] It searches the Document Facilitator of the remote platform for any agents that provide the service it wish to get. If there are any seller agents that wish to sell the book the buyer agent wish to buy they are identified. If multiple sellers that are present there that provide the same book, then the auction starts. Time is set for 10 minutes for auction. Every 1 minute each seller agent sets their bid amount. The bids are set such that it decreases with a constant amount every minute. The seller agents can specify the rate at which its bid value decreases. After the time period is over, the seller agent with the lowest bid is declared winner provided the bid value is within the acceptable range of the buyer agent. If no bids are within that range then the auction is declared a failure.

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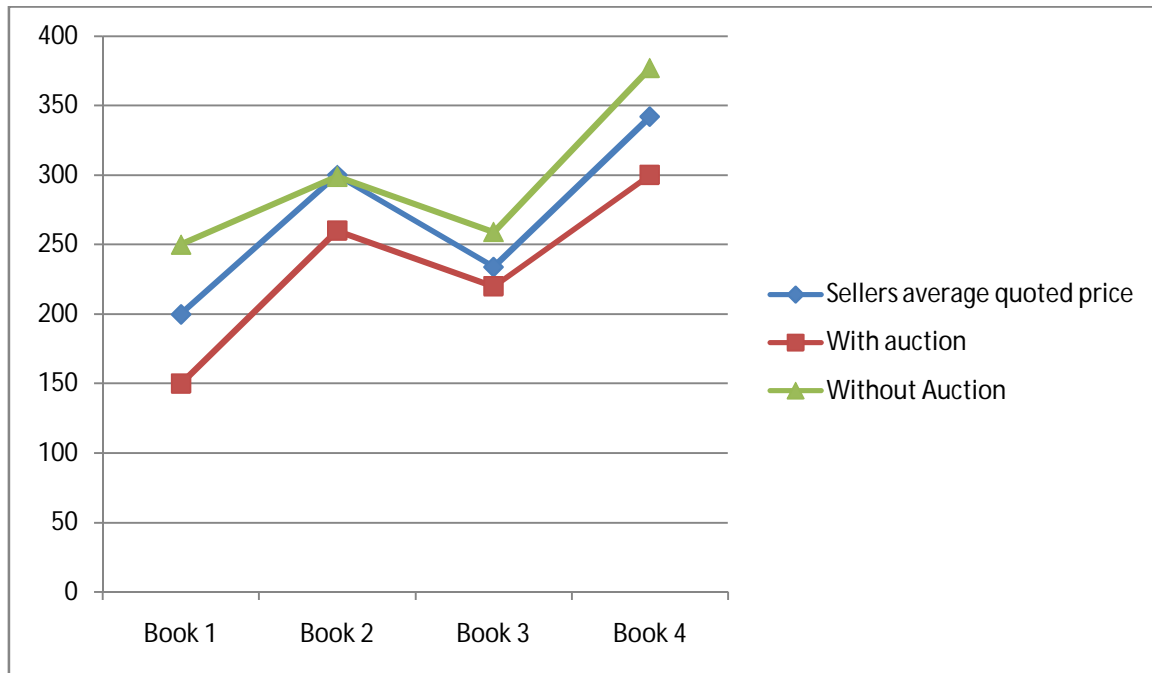


Fig 2: Price of 4 books with auction and without auction

Four books were chosen and buyer agents were created for each book. Five Seller agents were created for buying each book. It was observed that the price obtained with the use of auction was better in most cases compared to the price obtained without auctions. The agents that quoted price within the acceptable range of the buyer were selected. The buyer was able to buy a book at a lower cost with the use of auctions. Fig. 1 shows the benefits of using auctions. The buyer agents are benefitted in most cases by getting the products at a lower rate than the average seller quote.

If there are many machines, the buyer agent is cloned and is migrated to all platforms that host seller agents. The price should be greater than the minimum price the buyer is willing to buy. The agent finds the seller agent that provides the best price at each platform for a book and buys the book from the seller agent that provides the least price provided the price is lower than that the buyer is willing to pay. If the sellers provide a price higher than what the buyer is willing to pay, those seller agents are not considered. The version of JADE used is 3.5. Inter platform mobility service add-on need to be incorporated before running the program.

## V. CONCLUSION AND FUTURE WORK

JADE Based bidding system for e-commerce aid users to use intelligent agents which can participate in bidding, in the field of e-commerce. This system proposes agents that can clone themselves and migrate to other platforms and participate in bidding if necessary. The use of intelligent mobile software agents makes the system perform better compared to conventional e-commerce practices. The auction is done between the seller agents right now. It can be made possible between the buyer agents later as well. The bids are increased at a rate specified by the seller agents. The use of auctions made the buyers buy the books at a lower rate compared to that without the use of auctions. The aspects of buyers were considered here. The buyers were allowed to achieve the maximum profit from the whole business. The seller getting the best price is a matter of concern in the future.

This system has been implemented JADE framework and java. Intelligent agents (also called bots) were used to implement a multi-agent system where several agents live and interact with each other freely through migration and bidding.



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