# A Framework for Secure and Scalable Agent Based E-Auctions

**Radheshyam Nanduri, Sai Krishna.G, Sandeep Kumar. D, Sathyamoorthy. E, and Dr.N.Ch.S. N. Iyengar**

School of Computing Sciences, VIT University, Vellore, Tamilnadu-632014, India

radhe_vit@yahoo.co.in, saikrishnag.vit@gmail.com, sande2p@gmail.com, sathya_075@yahoo.com, nchsniyr@gmail.com

***Abstract*- The e-commerce has gained its prominence immensely over the past few years. This has increased the amount of e-transactions over the web. Mainly in e-auctions the transactions have seen many security concerns. The buying and selling of products over the web have resulted in leaving some of the loop holes to the trackers. So this paper mainly considers the security and performance issues of the e-commerce. The security and dealing with the loop holes of the e-transactions are dealt by using the concept of agents. Several agents can be incorporated in to the system, which perform their own tasks in runtime. For example, an analysis agent will take care of the presence of any shill bidding activity in the auction. Another agent might be responsible for maintaining load balance.**

***Keywords*- e-commerce, e-transactions, e-auctions**

## I. INTRODUCTION

Many concepts on security have been proposed. But most of them could not meet the expectations of the customers. Trust has been the concern for most of the customers. Most of the fraud detected in auctions is related to shilling behaviours. Trust management is the activity of collecting the security evidence, analysing them and taking decision on trust relationships in e commerce. While dealing with these issues, one of the major drawbacks found was the scalability. The scalability is an important property which cannot be neglected as it accounts for the performance of the system. In this paper, the scalability property is handled by distributing the load among different databases. And the security is implemented through many agents running on the server. Each agent is associated with its own job of maintaining the security.

## II. RELATED WORK

In general, trust management is based on the reputation model built on previous history of experience and from feedback. One such model is described by Shamtikov and Talcott [4]. Based on the license-based digital rights language, they used licenses to formalize both “good” and “bad” behaviours, which specify obligations and forbidden actions, respectively. Trust and reputation management has been promising approach for building trustworthy systems. Apart from these constraints, we need to take care of the scalability issue too.

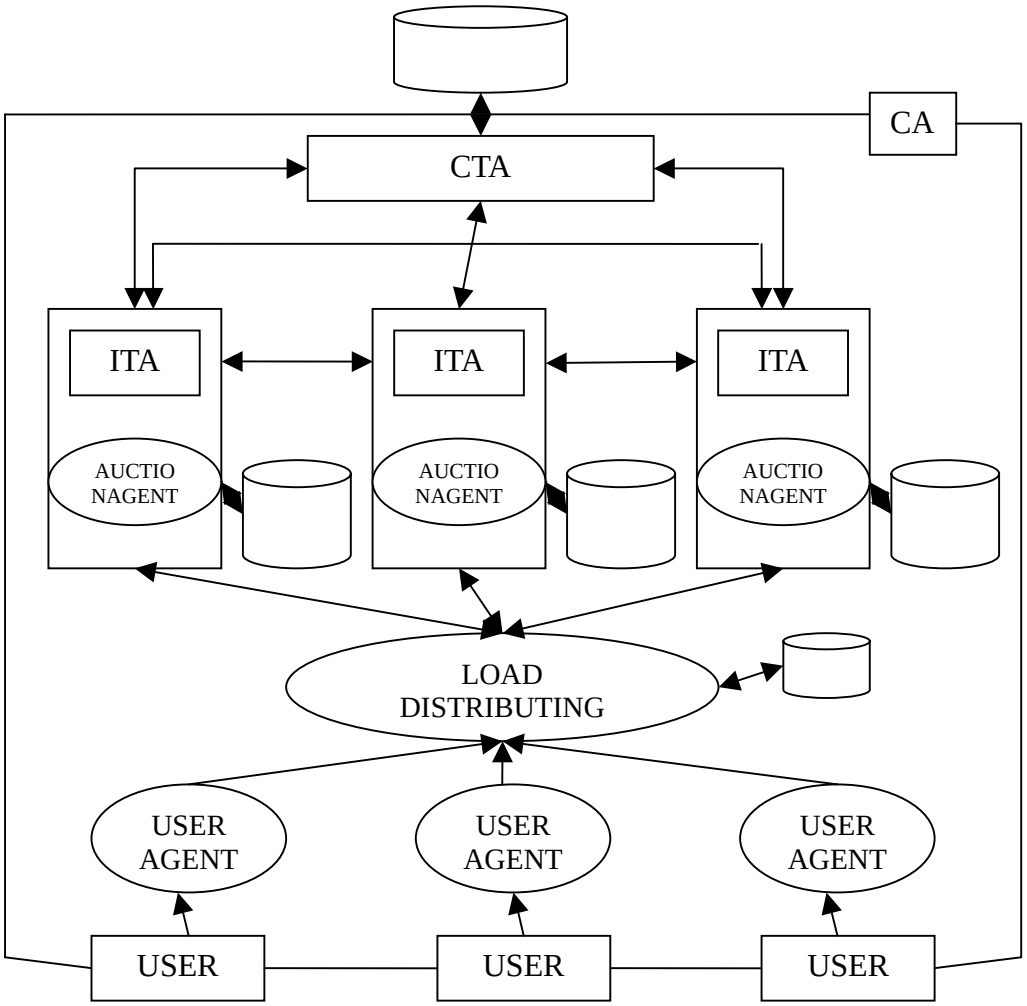


**Fig. 1**. Framework for agent based trustworthy e auctions

The recent work proposed by Haiping Xu, Sol M. Shatz, and Christopher K. Bates in [1], integrated trust management with agents. The inclusion of agents would help in many aspects like real time trust revaluation (i.e. the trust is calculated dynamically). Whereas this was not possible in the systems with no agents. The work proposed by Kannammal etc. in [2], illustrated the use of agents to improve scalability. As per work proposed by Amalia Parvaneseu, Costin Badica, Marcin Paprzycki in [3], the agents implemented by JADE are very effective. In this paper, we have proposed the framework for the scalable e-auction system using agents.

## III. FRAMEWORK

The frame work consists of different components like ITA (Intermediate Trust Authority), CTA(Central Trust Authority) and the central database is distributed. The database is distributed in order to address the scalability issue. Each individual server consists of ITA whose responsibility is to authenticate the user and assign the appropriate access rights to the user. For each user the ITA creates auction object. CTA maintains the entire database. When ever an update takes place in any of the ITA that gets reflected in the CTA. When ever the required details of the customer are not present at the ITA, the concerned ITA will contact the CTA requesting the details. If by any chance the CTA is busy, the ITA will

interact with other ITA's and requests the data. The main function of ITA is to calculate the trust. The trust may be calculated in many ways like feedback is one of the techniques.

The absence of agents makes it difficult for us to calculate trust in real time trust calculation. The most frequent type of fraud that takes place generally is Shilling where the seller pretends as a buyer and increases the bid price in order to increase the competition which has to be avoided. In this paper, we present a frame work for agent based e auctions (fig 1).

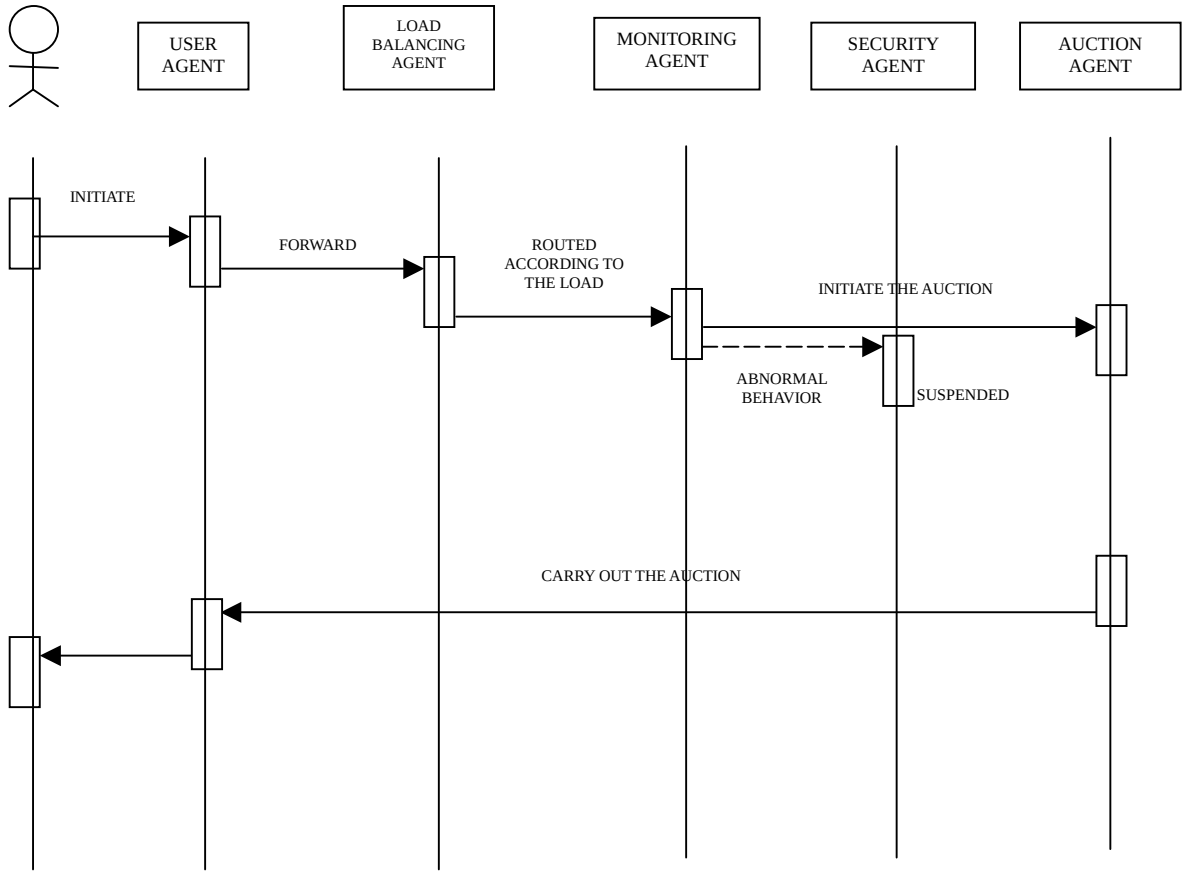


**Fig. 2**. State transition diagram for agent based e auctions

In case of agents, the ITA has three agents viz., monitoring agent, analysis agent and Security agent (fig 3). The monitoring agent continuously monitors the customers and their bidding behaviour. If it notices any abnormal behaviour, it reports it to security agent. The security agent then queries the details of the user. It also requests for the some other details like transaction history and if it confirms the abnormal behaviour, it suspends the auction and reduces the trust of the user, based on some threshold shill value which will be maintained by the analysis agent (fig 4). The main function of analysis agent is to calculate the trust of the user. Trust may be calculated through several ways like transaction history, feedback mechanism etc. This framework also supports customer agents. This eliminates the overhead of sitting in front of computer continuously to participate in an auction. All the customer needs to do is to initiate the auction or give the search item to the agent. The agent automatically participates in the auction or the agent will search for the item across the web. The load distributing agent plays the main role of balancing the load among the distributed databases.

The initial request for the auction is taken from the user by the load distributing agent.

This agent will route it to one of the databases. Then the request is taken by the auction agent and processed accordingly. The main working of this agent can be seen at the time of heavy load on particular databases.

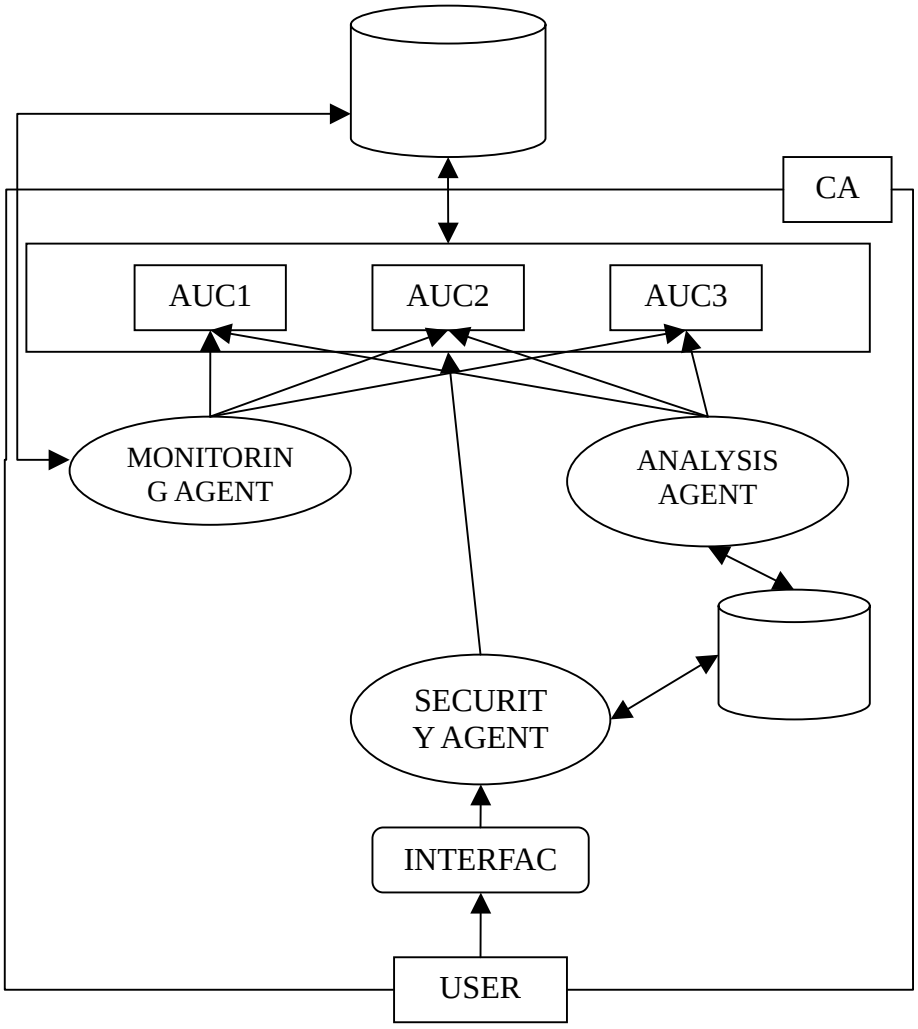


**Fig. 3**. Architecture of agent based ITA

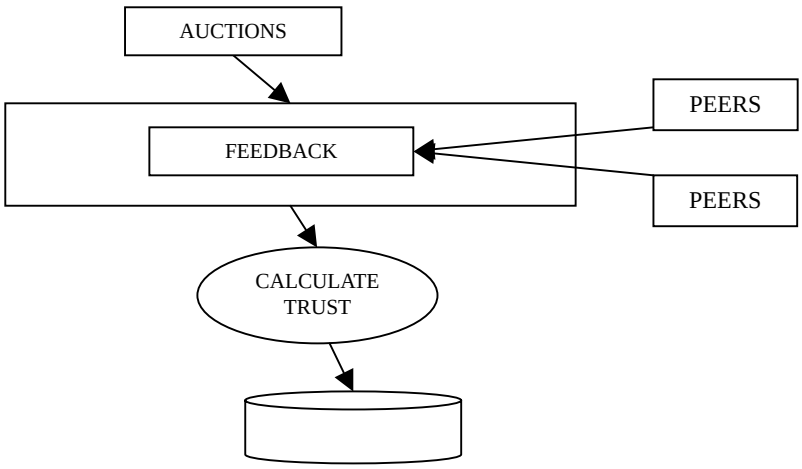


**Fig. 4**. Internal structure of analysis agent

For example, whenever an auction reaches its closing time, the rate of requests to that category of the database increases rapidly. If this is not handled properly, it will lead to slow response to the customer. The database of the load distributing agent is constantly updated by the auction agents, with the status of the auctions which are nearing the closing time and amount of load on the server. The auction agent constantly monitors the load on their databases. If the load on the corresponding auction database exceeds a threshold limit, then, the auction agent routes it to the other database. This is possible with the communication between the three ITA's. Then, the auction agent also updates the database of the load distributing agent. Now, the load distributing agent, instead of routing the request to the corresponding database, would calculate the load of the network and then decide to route it to the database with least overload. In this way the scalability is achieved effectively.

## REFERENCES


[1] Haiping Xu, Sol M. Shatz, and Christopher K. Bates, "A Framework for Agent-Based Trust Management in Online Auctions", Proceedings of Fifth International Conference on Information Technology: New Generations, pp 149-155

[2] A. Kannammal, V.Ramachandran and N.Ch.S.N.Iyengar, "Design and Performance Analysis of Agent Based Architecture for Session Management" Int. J. Electronic Business (IJEB), Vol.5, No.3, 2007, pp 263-275.

[3] Amalia Parvaneseu, Costin Badica, Marcin Paprzycki, "Developing A JADE Based Multi-agent E-Commerce Environment", http://software.ucv.ro/~badica_costin/proiecte/agenti/iadis2005.pdf

[4] V. Shmatikov and C. Talcott, "Reputation-Based Trust Management," *Journal of Computer Security*, Special Issue on Selected Papers of WITS 2003 (ed. Roberto Gorrieri), Vol. 13, No. 1, 2005, pp. 167-190.