

**GENERIC ARCHITECTURE FOR AGENTS  
IN  
E-COMMERCE (AUCTION)**

by  
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**Submitted in fulfillment of the  
requirements for the degree of  
Doctor of Philosophy**

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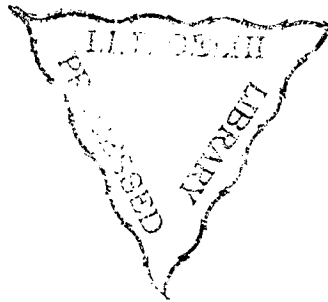
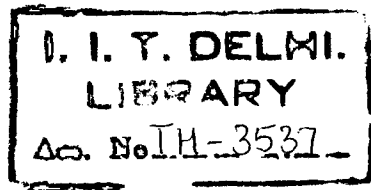
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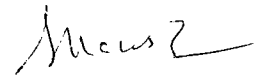
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## Certificate

This is to certify that the thesis titled “Generic Architecture for Agents in E-Commerce (Auction)” being submitted by Himanshu Tagra to the Indian Institute of Technology Delhi, for the award of the degree of Doctor of Philosophy in Computer Science and Engineering, is a record of bona-fide research work carried out by him under my supervision. The work presented in this thesis has not been submitted to any other university or institute for the award of any other degree or diploma.



Prof. Saroj Kaushik

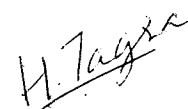
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Himanshu Tagra

## **Abstract**

The advent of e-commerce has brought about a radical change in the process of auctions. Online auctions are conducted by various auction houses on internet. Users can participate as bidders or sellers in the auctions conducted by the auction houses. Since similar items may get auctioned by multiple auction houses at the same or overlapping time intervals, bidders seeking items will require lot of time, energy and coordination. Therefore, there is a need for automation in the process of auctions. Agents are widely used in this automation process. However due to varying nature of auction houses, the agents participating in different auctions need to be reconfigured for each auction which might not be feasible for individual user.

In this thesis, a flexible framework based on service oriented architecture is proposed which acts as a bidding house. This proposed framework can be implemented using web services as granular agents and ontology as shared method of communication between these agents. The bidding house participates on behalf of registered users in multiple independent auctions held by different auction houses for the same item(s) and gets the best possible deal for the user(s). The framework is loosely coupled and flexible to integrate with best performing agents. These agents can be part of bidding house or third party agents outside the system. Architecture for combined agent handling combined auctions for obtaining different interdependent items (based on priority defined by the user) is also proposed. Agents providing learning into the bidding system using case based learning technique have been developed. Further Case-base structure to be used by agents is evolved using genetic algorithm. Agents handling market dynamics intelligently are also proposed and the concept of mole agent has been introduced.

The bidding house framework is not implemented but is validated using ATAM (Architecture Tradeoff Analysis Method) and through a prototype implementation covering limited functionalities. Empirical evaluation of various proposed agents is shown by simulating auction environments which consists of multiple auctions of the same item with multiple bidders participating in them. The performance of agents is calculated by comparing its success percentage and average winning price with that of other agents participating in the auctions. Experimental data is validated using statistical techniques such as multivariate ANOVA and Independent Samples T Test.

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