IJCSMS International Journal of Computer Science & Management Studies, Special Issue of Vol. 12, June 2012
ISSN (Online): 2231 –5268
www.ijcsms.com

# A New Model Using Auction Oriented Approach in Grid Computing

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**Abstract**

Grids are emerging as the infrastructure for next generation computing. The resources in the Grid are heterogeneous and geographically distributed. The management of resources in such a large and distributed environment is a complex task. In this paper a model has been proposed using auction oriented approach. In this auction model each bidder offers a bid for a collection of resources rather than placing a bid on each item separately. This enables the bidder to express dependencies and complementarities between various resources. It can have various types selection such as Telecom Spectrum, Bus Routes and Industrial Procurement. This model has also been implemented.

***Keywords:*** *Grid computing, Resource management, Economic models, Comparison, Auction Models and Proposed Model.*

## 1. Introduction

The grid can be thought of as a distributed system with non-interactive workloads that involve a large number of files. Grid size can vary by a considerable amount. As defined by Ian Foster: Grid computing is concerned with

"Coordinated resource sharing and problem solving in dynamic, multi-institutional virtual organization"

A set of individuals and institutions defined by some sharing rules form what we call a virtual organization (VO) [6].Grid computing can be seen as a journey along a path of integrating various technologies and solutions that move us closer to the final goal. Interconnected computer systems where the machines utilize the same resources collectively. Grid computing usually consists of one main computer that distributes information and tasks to a group of networked computers to accomplish a common goal. Grid computing is often used to complete complicated or tedious mathematical or scientific calculations. [10]

Grid Resource Management means identifying application requirements, resource specification, matching resources to applications, allocating/scheduling and monitoring those resources and applications over time in order to run as effectively as possible.

In the real world, auctions are used extensively, particularly for selling goods/items within a set duration. Grid RM Mechanism includes resource information dissemination i.e. published by the resource(push) or gathered by GIS (pull) and on-demand dissemination (by agents),resource discovery i.e. centralized or distributed queries, agents, distributed queries + agents and resources are described in schema/language or objects ,resource scheduling/job execution i.e. assigning resources, centralized, hierarchical, distributed,resource monitoring and re-scheduling.Monitoring can be done by application (polling) or by resource (notification to the app or periodic status updates).Multiple layers of schedulers is an open issue.The higher level scheduler has less information about the remote resources, local resource managers actually control the resources .There is lack of control over resources.Grid scheduler does not have ownership or control over the resources.Shared resources and variance can be there. No dedicated access to the resources (resources are shared) and this results in a high degree of variance and unpredictability.Conflicting performance goals can be due to many participants having different/conflicting preferences and many different local policies, cost models and security.

Challenges in Grid Resource Management are resources are heterogeneous in nature (processors, disks, data, networks, other services), application has to compete for resources and lack of available data about current systems, needs of users, resource owners and administrators [11]

The three key players involved in auctions are: resource owners, auctioneers (mediators), and buyers many e-commerce portals such as Amazon.com and eBay.com are serving as mediators (auctioneers) [9].

Most of the related work in Grid computing dedicated to resource management and scheduling problems adopt a conventional style where a

scheduling component decides which jobs are to be executed at which site based on certain cost functions (Legion [3], Condor [8], AppLeS [1],Netsolve [2], Punch [7]).

Depending on various parameters, auctions can be classified into four types:
1. English Auction (first-price open cry)[5]
2. First-price sealed-bid auction
3. Dutch Auction [4]
4. Continuous Double Auction

In this proposed auction model, each bidder offers a bid for a collection of resources (of the bidder's choosing) rather than placing a bid on each item separately. This enables the bidder to express dependencies and complementarities between various resources. The auctioneer selects such set of these combinational bids that result in the highest revenue without assigning any item to more than one bidder**.** It can have various types selection such as Telecom Spectrum, Bus Routes and Industrial Procurement.

## 2. Comparison of Existing and Proposed Auction Model

(i) In this Auction, each bidder offers a bid for a collection of resources (of the bidder's choosing) rather than placing a bid on each item separately.
(ii) Enables the bidder to express dependencies and complementarities between various resources.
(iii) The auctioneer selects such set of these combinational bids that result in the highest revenue without assigning any item to more than one bidder**.**
(iv) It can have various types selection such as Telecom Spectrum, Bus Routes and Industrial Procurement.

## 3. Implementation of Proposed Auction Model

Algorithm used:

- The generic procedure for Proposed Auction is:

    1. Each bidder offers a bid for a collection of resources rather than placing a bid on each item separately.
    2. The bidder expresses dependencies and Complementarities between various resources.
    3. The auctioneer selects such set of these combinatorial bids that result in the highest revenue without assigning any item to more than one bidder**.**

**Table for Proposed Auction Model**

| Type | Buyer 1 | Buyer 2 | Buyer 3 |
|---|---|---|---|
| **Telecom Spectrum** | 100 | **110** | 105 |
| **Bus Routes** | **200** | 120 | 150 |
| **Industrial Procurement** | 300 | **310** | 305 |

## 4. Evaluations Results of Proposed Auction Model

The next experiment considers an Proposed model 2.There are three types in this from which one has to be selected. The three types are-Telecom Spectrum, Bus Routes and Industrial Procurement. The winner for type 1 is Buyer 2. The winner for type 2 is Buyer 1 and the winner for type 3 is buyer 2.

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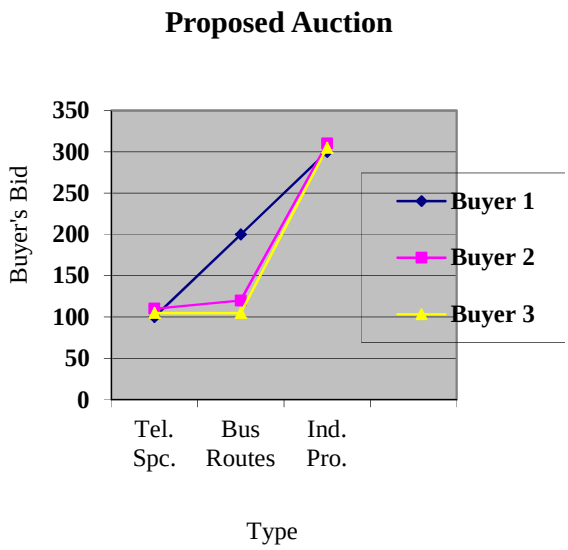
According to this table, graph has been plotted for this Auction.




**Graph between various types and Buyer's bid for Proposed Auction Model**

## 5. Conclusion and future work

In this Proposed Auction model, each bidder offers a bid for a collection of resources rather than placing a bid on each item separately. This enables the bidder to express dependencies and complementarities between various resources. It can have various types selection such as Telecom Spectrum, Bus Routes and Industrial Procurement.
In the future, it is possible to develop agents that can automatically choose one out of a set of auction protocols according to the requirements of the Grid environment.

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