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An Efficient Nash Auction Euilibrium Model for Resource Provision in Cloud Systems

Bariki Leelavathy [1], Arvind T [2],R.Hari Sngh [3]

Assistant Professor, Dept. of CSE, Vasavi College of Engineering, Ibrahim Bagh, Hyderabad, T.S,India[1]

Assistant Professor(c), Dept of Computer Science, UCS, Saifabad, OU, Hyderabad, T.S, India[2]

Research Scholar, Dept. of CSE, Osmania University, Hyderabad, India[3]

ABSTRACT: Cloud computing is an emerging paradigm that provides all the services based on pay per use manner revenue generation. The process of selecting,deploying and managing the hardware/software resources to ensure the application performance is defined as resource provisioning. In an heterogeneous cloud computing environment, various types of virtual machines are interconnected with each other to provide better computational efficiency . The auction is the process of buying or selling a product or service, by offering bids,taking some bids and selling to the highest bidder. In this proposed research work, the resource provisioning based on auction mechanism is implemented in an heterogeneous cloud environment. Nash Auction equilibrium algorithm is used to compare lowest ask and highest bid values. The resources are allocated to the jobs based upon the matching results of the Nash Auction Equilibrium algorithm.

KEYWORDS: Nash Auction Equilibrium algorithm; Cloud Computing; Multi Cloud Environment; heterogeneous cloud computing environment; QoS;

I. INTRODUCTION

Cloud computing is one of emerging technology in which the services are provided based on pay per use manner. Therefore most of the organizations are preferring the clouds to provide the services to their customers. Cloud provisioning allocates the resources of cloud providers to a customer by creating the appropriate number of virtual machines (VMs) once a cloud provider accepts a request from the cloud user. Several cloud providers are available to provide their services based on the various cost. The service providers profit maximization is discussed in many of the existing auction architectures. Previous cloud computing architectures were not providing the reliable and performance solutions to the customers. In this paper a modified cloud computing architecture is proposed using new features. Those features are VM migration and Nash Auction Equilibrium. These features provide better results with optimal cost, performance and reliability solutions in Multi Cloud Environment.

II. RELATED WORK

This section deals with the related work based on the resource provisioning using auction mechanisms and Nash equilibrium in the cloud computing environment. In [3] Authors presented a two-level generic black box model for managing the behavior of the user across the cloud services. In [4] Authors introduced the service provisioning problem model as a generalized Nash game. Based on the best reply dynamics, two solution methods were presented. To generalize Nash equilibrium, it requires to prove their concurrence in a finite number of iterations. In [5] Author provided a representation of both workload and machine heterogeneity that established in clusters. In [6] Authors addressed the significant novel scheduling and resource provisioning problem on IaaS clouds. This increases the number of user-prioritized tasks within the constraints of budget and deadline. In [7] Authors identified the bandwidth shifting and redistribution problems in the mobile cloud computing environment. The problem of bandwidth redistribution varies from the problem of traditional bandwidth allocation. An auction based QoS guaranteed utility maximization algorithm was introduced. In [8] Authors addressed the problem of VM provisioning and allocation. This was designed using a combinatorial auction-based mechanism. In many existing auction mechanisms, service providers

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profit maximization is discussed and the optimal cost for user service prediction is not working in an accurate manner. The limitations such as job failures due to idle energy, complex computation of node prediction for job execution and minimum success rate have been observed during the study of existing mechanisms. The Nash Auction Equilibrium (NAE) model is proposed to compute optimal cost for user's service. Initially, a multi-cloud environment is established. After the creation of the multi-cloud environment, the broker generates the reservation plan for the cloud service provider. The creation of the reservation plan includes three key tasks such as selection of execution service/storage service, selection of plan and estimation of cost per MI. After the publication of the reservation plan, the ASK and BID values are computed for predicting the optimal computing node for job execution. The BID value is computed for each and every job. The ASK value for every VM is computed for each job. After the computation of the ASK and BID values, the highest bid value and the lowest ask value are matched using the Nash Auction Equilibrium (NAE) algorithm. Once the matching has been done, the job is allocated to the VM having minimum ask value. Then the initial cost, utilization cost and the overall cost is computed. The proposed NAE model offers optimal cost for users, minimum execution time, minimum response time, maximum user satisfaction and resource utilization.

III. PROPOSED ALGORITHM

A. *Nash Auction Equilibrium Algorithm:*

Nash Auction equilibrium checks the match in between lowest asks value and highest bid value.

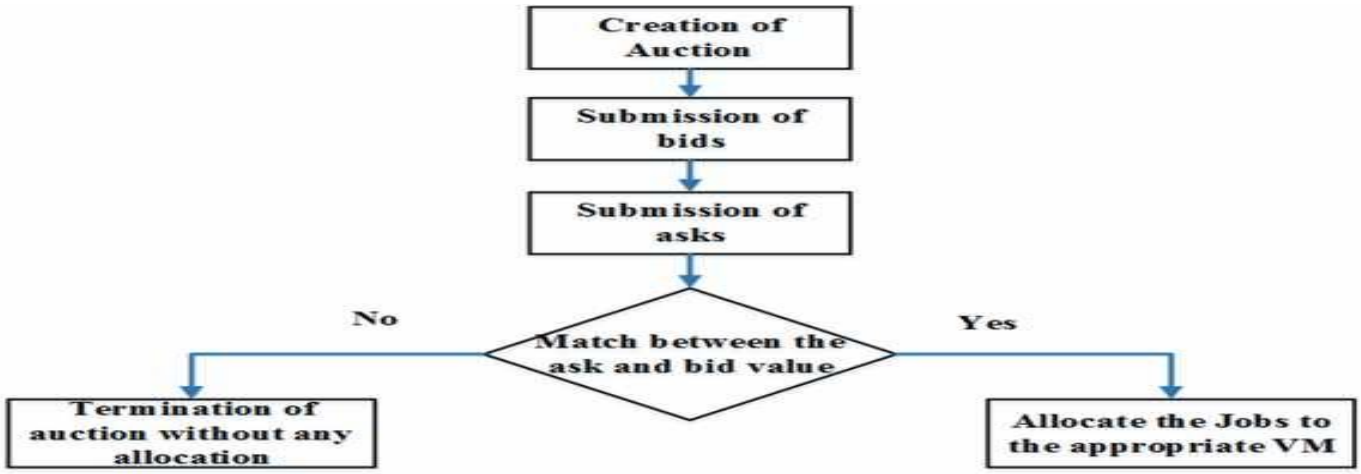

Fig 1. Steps involved in Resource provisioning using Auction model

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Input:V_{List} , J_{List}
Output:AJ_{List}
AJ List = Ø // Initialize allocated job list
For J = 0 to N then
$Б_j$ = bid_j from Equation 1
J = Ø // Initialize Ask Matrix
For I = 0 to M then
J_I = ask ij from Equation 2
End For
For I = 0 to M then
Match Б j with J_i // Using Nash Equilibrium
If (Match == true)
$AJ\ List_J = J_i$
Break
EndIf
End For
End For

IV.PSEUDO CODE

Input: List of virtual machines and job lists.
Output: allocated job list
Step1: allocated job list set as a empty
Step2: user agent determines their bid value
Step3: initialize ask matrix is empty
Step4: identify matched vms
Step5: average jobs allocated into different virtual machines.

V. SIMULATION RESULTS

In the simulation, users and servers are modelled as two kinds of agents. Data center is created and then the VM is established. Cloud service provider provides suitable reservation plans based on requests. Thus the proposed NAE model achieves optimal cost for users, minimum execution time, minimum response time, increased user satisfaction and resource utilization.

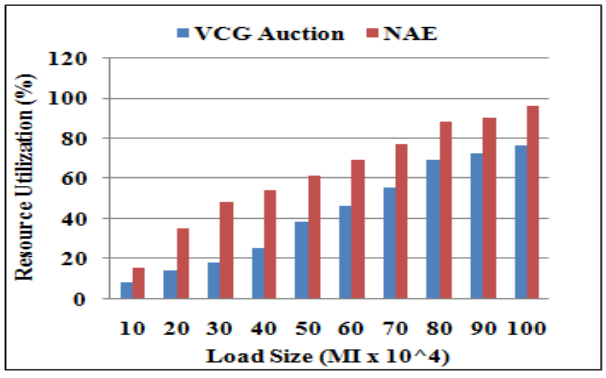

Fig.2. Performance comparison in between existing and proposed system.

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VI. CONCLUSION AND FUTURE WORK

We proposed a VM Migration and Nash auction Equilibrium model to implement the optimal reservation cost. The limitations of the Previous approaches can be overcome with new system design. Here the proposed NAE model achieves optimal cost for users, minimum execution time, minimum response time, increased user satisfaction and resource utilization. In future we can aim to design some other mobile cloud computing architecture with reduced fault values compare to the present architectures.

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