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Efficient Allocation for Computing Resources Using CDA Mechanism and QoS in Cloud

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ABSTRACT: Cloud computing offers network access to a shared pool of configurable computing resources. These resources can be utilized by the customers at any time which are provided by the Cloud Service Providers(CSP). The users has to pay for the amount of resources needed or utilized i.e Pay as you go service. This can be done as on-demand instance or reservation which leads the customers to give more amount for the resources. To avoid this problem the auction mechanism is applied. The Continuous Double Auction(CDA) is more efficient and more flexible and it is performed to improve the cost benefits of both customer and providers. The auction mechanism is performed on the e-bidding platform where both customers and providers can bids and asks for the price amount of the resources needed. But this may also leads to some problem when the particular provider does not have the efficiency to finish the work. The belief based hybrid strategy is described for the efficient allocation of computing resources. In this paper we introduce a concept called Feedback analyzer to calculate the Quality of Service(QOS). Using the various feedback of previous customers the QOS for storage, cost, efficiency and time will be calculated individually and then, based on the feedback the resources will be allocated to the particular CSPs.

Keywords: Cloud computing, Cloud Service Providers, Continuous Double Auction, Feedback analyzer, Quality of Services.

I.INTRODUCTION

The cloud computing has become an efficient one for computing of the resources. These resources are utilized by the customers and it is provided by the cloud service providers in the cloud environment. The resources may be any memory, storage, files, software and other essential documents. Many computing such as grid computing, green computing, cluster computing and cloud computing has been emerged. In these the cloud computing is an efficient model for utilizing of the resources when it is needed. Cloud computing provides a way to the users and organisations to store and process their data in the third party data centres. It rely on sharing the network resources to improve the economies among the people. It offers the good infrastructure and the service sharing among the peoples and the enterprises. Users attains more benefits and profit with the help of the cloud computing.

Cloud computing or simply called as “the cloud” is effective in maximizing the effectiveness and the utilization of the cloud resources. Cloud resources are not only shared with the multiple users and the networks it can also be reallocated per demand dynamically. This can be suitable for allocating resources to cloud users. For example, to serve the European users during the European business hours, the cloud computing has introduced the computer resources with the facility (e.g., email) can also be reallocated to serve the North American users during North America's business hours with a different resources or applications (e.g., a web server). This effective approach should maximize the computing power usage thus reducing the environmental damages such as air conditioning, less power, and rack space, etc. are required

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for a variety of functions. With the use of cloud computing, multiple users can retrieve and update their data without purchasing licenses for different applications by using the access to the single server.

In an investment market users and providers have different requirements and objectives. With the certain levels of guaranteed levels the users will pay the lowest price possible at a minimum and the strategy of achieving the highest return on their investment should be followed by the providers. In cloud computing services the fundamental criterion of resource management in distributed system is designing an optimal market-based resource allocation that provides the benefits for both users and providers. Most of the current market-based resource allocation models are developed in favour of the provider over the buyer in an unregulated trading environment. To avoid this problem a solution was addressed to be applicable in cloud computing environment called the Combinatorial Double Auction Resource Allocation model that is CDARA model. To evaluate the efficiency from an economic perspective the CDARA model was developed for cloud computing environments simulation. The final results shows that the combinatorial double auction-based resource allocation model is an suitable market-based model for cloud computing as it allows double-sided competition and bidding with an unrestricted number of items.

II.RELATED WORKS

The cloud computing utility services have created the market environment open and competitive. Every market participant searches for its own path to the maximum profit, while a market pricing mechanism should be applied in Real time for the supply and demand and maintain the market reliability. Just like markets for network resources, the pricing problem has become increasingly urgent. It is clear that if the markets are not properly designed, they could function Rather poorly, even leading to market failure. The traditional Internet was just a best-effort service without economic resources allocation, so it leads to poor network utility and congestion. Therefore many economic and technical approaches for network resources scheduling are brought, such as network utility maximization (NUM), network Resources auction, time-dependence pricing, etc.[6].

Economic methods are one of the way to allocate resources in cloud computing. When compared with the fixed-price method the double combinatorial method has more advantages. When done with double combinatorial, it has two phases namely resource allocation and the winner determination problem. It has number of proposed algorithm to solve this problem. It includes the calculation of the bid bundles by using the number of n bundles[7].

The Quality of Service management is also guaranteed solution for the allocating of resources. The levels of solutions may include the performance, reliability and the availability. It also includes the various modeling such as the workload modeling, system modeling and with the application of QoS. Its application includes the optimal decision making in the cloud system management[3]. The requirements of the QoS have to be satisfied by both the users and the providers. For this problem it offers the strong points and the limitations with the applications. Performance evaluation makes the transaction process to be satisfied for both consumers and the providers. The enhancement of the service quality is done by a new system called the Cloud Monitoring System(CMS). A generic model of cloud computing is also established to make the cloud workflow system[2].

For the truthful online auctions a framework has been established, it includes the dynamic design for the supply-demand relations, the joint design for heterogeneous user demands and the truthful design for cheating bidders. An incentive based Compatible Online Cloud Auction(COCA) is modelled for the simulation using the consumers and the providers. The payment based function and the rules for allocation are the building blocks of this model[10]. The simple pricing schemes for the trading off is the Pay-As-You-

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Go services and the spot market analysis. The PAYG instances includes that how much amount of resources is utilized that much amount has to be paid and spot market analysis includes the optimal bidding of the resources[1].

The time-dependent pricing has become the popular one in sharing the resources across the cloud computing. It allows the resources to be effectively shared by the authorised users. When there occurs the conflicts among the various users then the metrics will be calculated and with the help of those metrics the resources will be allocated[9].The auction based resource allocation consists of various methods to be followed. Among those methods the combinatorial double auction is more effective for allocation of resources.

III.A CLOUD CDA MECHANISM

In the cloud environment auction plays an important role in resource allocation. Auction is a sale in which the commodity is sold to the highest bidder. Cloud auction have three different areas and they are buyer, seller and an auctioneer. Virtualization technique helps to share single. Physical instance of an application or resource among different customers. Data will be in the form of virtualized pools in the data center and these resources are allocated based on the needs of the customer. There are two types of auctions primary and secondary actions.

The cloud computing market structure consists of CSPs, cloud users and the uniform bidding platform. By using this a competitive market can be formed effectively. This section includes the solution to resource allocation in such a market, including the cloud CDA model mechanism and its market rules. After that an e-bidding platform scheme is proposed to implement the mechanism in real cloud environment. The cloud CDA mechanism is an efficient way of the decentralized allocation for computing resources.

Auction mechanisms are usually feasible to solve problems, and the CDA is more efficient and fair than single auctions in cloud markets. Cloud users have a variety of application and valuation types, while CSPs also have various idle resources. The double auction mechanism permits both the users and CSPs to submit their demands at the same time. Moreover, the CDA mechanism allows both buyers and sellers bidding simultaneously in one auction. By using this mechanism we can increase the profit of both users and customers.

3.1 Overview

Cloud Users will make request for resources and submit tasks to cloud server. Resource Manager will accept the requests of multiple Cloud Users. Resource Manager is connected to all the data centers in cloud so it will evaluate the requirements of Cloud User with all available data centers and select those data centers (and Hosts) whose priority is high and which meets the requirements of Cloud User. Resource Manager will forward the selected data centers and Hosts to the Auctioneer. Auctioneer is connected to all the data center Brokers which act on behalf of respective data centers. Auctioneer will perform the auction between selected data centers and the Cloud User. Cloudlets or user tasks are executed in Hosts of data center which wins the auction. Results of the executed tasks are transferred to Resource Manager. Then the Resource manager will send the results back to the Cloud Users.

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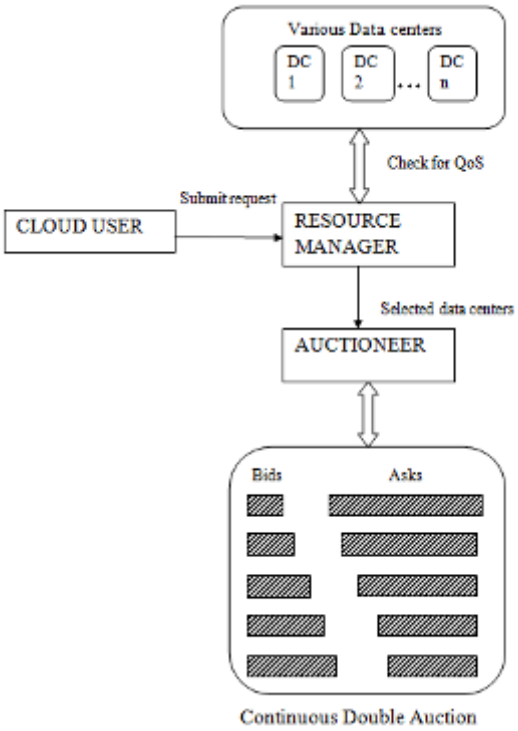

Fig 1. Auction between the customer and CSP

3.2 Request Client

Request Client will reside on cloud user side and it will handle the requests made by cloud clients. Then, it will check whether the requests made by the cloud user matches with the particular SLA. If SLA is not violated, then the Request client would prepare a job description or requirement list and forward the request to cloud server through the network. It may also send some parameters which will describe the type of request, service required, type of application, criticality etc.

3.3 Resource Manager

Resource Manager is the middleware entity which will act as a mediator between the actual physical resources and incoming requests from multiple Request Clients. Resource Manager is implemented inside the cloud server. The type of resource manager to use depends on which cloud computing system is used and how it is implemented. The main tasks of resource manager are to manage, maintain and allocate all the resources available in cloud server. Resource Manager monitors the state of resources and provides statistical data to Auctioneer. Resource allocation/de-allocation is also carried out by the Resource Manager. When the task gets completed, results are sent back to Request Client and resources are released which can be reused for new requests.

3.4 Auctioneer

The Auctioneer is the entity which will govern the entire auction scheme. It gets the list of selected hosts from Resource Manager and performs auction between the selected hosts and Request Client. The data

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center which wins the auction will be chosen and hosts of that data center will be assigned to cloud user for execution of tasks or cloudlets. Auctioneer will pass on the results to Resource Manager.

IV.BELIEF BASED FUNCTION

Most of the cloud users attempts to maximize their surpluses in cloud environment when the resources are utilized. This belief function works on behalf of the belief on the CSPs. The cloud users will assume that the selected CSP can finish their work when the bidding gets over. But some CSP will not have the enough requirements such as memory, applications.etc., In such cases the users work will not be finished or it will be finished partially. There are two types of stages in this belief based function named as aggressive stage and the unaggressive stage. In the aggressive stage the CSP should compute a best ask based on the improved belief function and in unaggressive stage the user or CSP will submits a new bids or asks that means it will accept a worse price than the previous users done. So this belief function will be applicable to only some cases where the users has less amount of work.

V.FEEDBACK PROCESS

In this paper, we present a fresh way to automatically mine similar entities from relative reviews that users posted online to address this difficulty. To achieve high accuracy and high recall, a weakly supervised approach is developed for comparative reviews identification and comparable entity extraction by control a large collection of online feedback archive. The resource providers is located by the directory node that have the required reputation, available amount, and price that it needs to choose the provider(s) for the resource requester. The final QoS offered by a provider is determined by a number of quality factors such as efficiency, distance, trustworthiness, security and price. We call these factors as QoS demands. When choosing from a number of providers, a single QoS demand at a time is rigidly considered by the most previous approaches. However, different tasks of users have different requirements. For time-critical jobs, distance should be given most priority.

The transaction prices in CDA is expected to be converge towards the competitive equilibrium price p*. To calculate this the market efficiency and the efficiency of bidding strategies are used. At an equilibrium condition both will be equal. The daily price volatility α, is used to define how the transaction prices in CDA converges towards the equilibrium price p*. The α can be calculated by using the formula,

$$\alpha = \frac{1}{p^*}\sqrt{\frac{\sum_{i=1}^{N}(p_i - p^*)^2}{N}}$$

As the cloud computing is a competitive market the p* is decided by both supply and demand together. The market efficiency can be calculated by using the formula,

$$e_{market} = \left(\frac{\sum_i (S_{b,i}/n_b)}{\sum_i S_{b,i}^{MP}} + \frac{\sum_j (S_{s,j}/n_s)}{\sum_j S_{s,j}^{MP}}\right)/2$$

After finding the market efficiency the bidding efficiency is compared with it. The daily price volatility α can also be calculated with the help of the transaction prices of final trade in Marshallian path as,

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$$\alpha = \frac{1}{p^{MP}} \sqrt{\frac{\sum_{i=1}^{N} (p_i - p^{MP})^2}{N}}$$

Peer Trust computes the trustworthiness of an agent as normalized feedback weighted against the credibility of feedback originators. Peer Trust uses personalized similarity measure to compute the credibility of recommenders and it uses this credibility measure to weight each feedback submitted by the recommenders.

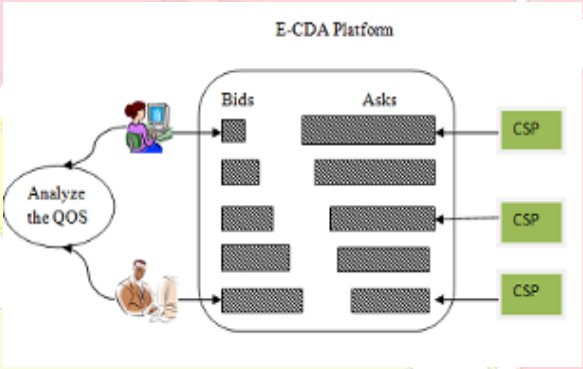

Fig 2. Cloud CDA with QOS

FC Trust uses transaction density and similarity measure to define the credibility of any recommender providing feedback as opposed to which use global trust to weigh the quality of feedbacks. In other words, FC Trust differentiates from that of providing services with the role of providing feedbacks. By using this the customer feedback process will be computerized and automatic feedback analyzing takes place. By using this, the Customer Feedback process is computerized and automatic feedback analyzing takes place.

The customer can select the provider based on the trust worthiness. When the process takes place in this manner, the efficiency, openness, fairness and feasibility gets increased.

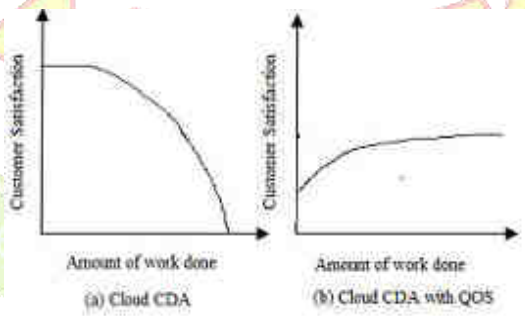

Fig 3. Comparing cloud CDA and cloud CDA with QOS

On comparing the above given graphs the cloud CDA with QOS attains the more customer satisfaction than the cloud CDA. Because before allocating the resources the users will check for the QOS of the CSPs. If that particular CSP has not finished the work properly in the previous jobs then that CSP will not selected by most of the users. They will go for other CSP who has the best rating in the QOS, so that their works will be finished properly and the user will get more satisfied.

VI.CONCLUSION

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Cloud computing has been an emerging technology which allows the customers to use the resources based on their needs. The cloud computing utility services have created the market environment open and competitive. Every market participant searches for its own path to the maximum profit, while a market pricing mechanism should be applied in Real time for the supply and demand and maintain the market reliability.For such environment the CDA mechanism will be an effective one for utilizing of the resources.

In this paper, along with the CDA mechanism the QOS is also included to make the process more effective. The customer selects the CSP based on the trust. The QOS for the cost, performance and storage of the CSPs are evaluated individually. Based on that feedback the user will starts bidding with the best CSP. When the bidding achieves the equilibrium with the CSPs asks then the bidding will takes place in the e-bidding platform and the users work will be finished soon. This can also be applied in real cloud markets to attains its feasibility.

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