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SERVICE OPERATOR AWARE AND PROFIT MAXIMIZATION IN MULTI SERVER SYSTEM USING DQG SCHEME

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Abstract: *Cloud Computing provides user a complete software environment. To serve resources to customers, Software as a Service providers rent resources from the Infrastructure as a Service Providers. Client applications and service providers negotiate for the sales of services by means of Service Level Agreement (SLA) that acts as a contract between them. Depending on the status of the demand, Infrastructure as a Service provider is able to offer higher or lower prices for maximising its profit. So it is difficult to establish a profitable pricing function for Software as a Service Providers and matchmaking a resource across service operator trust scheme for multiple clouds, trust management that can effectively reduce user burden and improve system dependability on multi-dimensional resource service operators. Trust evaluation as a process of multi-attribute decision making and develop and adaptive trust evaluation information entropy can overcome the limitation of traditional trust schemes trusted operators are weighted manually. Therefore, this paper proposes spot pricing strategy to estimate the bid according to the used specified constraints of the user and also optimizing the pricing level to improve the profit of Saas providers with rersource matchmaking seervice. We also have analyzed the performance of Spot Pricing Scheme with different Scenario to maximize the Saas providers' profit.*

Keywords-- Infrastructure as a Service, Spot Pricing, Service Operator, Resource Matchmaking, Reliability,Profit Maximization

I. INTRODUCTION

Cloud computing can be viewed as the transformation into reality of a long held dream called "Computing as Utility", it emerged into the market with a huge potential to fulfill this dream. It promises on-demand services for customer's software, platform and infrastructure needs. In its fold, companies do not even need to plan for their IT growth in advance with this new "pay as you go" system. Already, there has been upbeat assessment about its great potential for utility, scalability and instant access features; but on the flip side, some are also apprehensive of security gaps involving for instance, trust, threats and risks. Cloud computing has emerged as a new paradigm for delivery of applications, platforms, or computing resources to customers. The Cloud model is cost-effective because customers pay for their actual usage without upfront costs, and scalable because it can be used more or less depending on the customers' needs.A set of applications managed and hosted externally by a specialist partner and it is delivered over a secure high quality network it is also available anywhere with an internet connection, even when on the move. Cloud computing is an internet technology that utilizes both central remote servers and internet to manage the data and applications. This technology allows many businesses and users to use the data and application without an installation. Users and businesses can access the information and files at any computer system having an internet connection. Cloud computing provides much more effective computing by centralized memory, processing, storage and bandwidth.

Cloud computing refers to both the applications delivered as services over the Internet and the

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hardware and systems software in the datacenters that provide those services.A cluster of computer hardware and software that offer the services to the general makes up a public cloud. In this paper, we focus on the SaaS layer,which allows customers to access applications over the Internet without software related cost and effort (such as software licensing and upgrade).The general objective of SaaS providers is to minimize cost and maximize customer satisfaction level (CSL). The cost includes the infrastructure cost, administration operation cost and penalty cost caused by SLA violations.CSL depends on to what degree SLA is satisfied.In general, SaaS providers utilize internal resources of its data centres or rent resources from a specific IaaS provider. For example, Saleforce.com [11] hosts resources but Animoto [12] rents resources from Amazon EC2 [13]. In-house hosting can generate administration and maintenance cost while renting resources from a single IaaS provider can impact the service quality offered to SaaS customers due to the variable performance [14].There are several factors that can affect an IT solution or managed service provider"s pricing methodology for Cloud Computing Services, including their predominant business model, the services that comprise their Cloud offerings, their costs to deliver these services, their sales sophistication, and their efficiencies in delivering these services. The less efficient they are at delivering service, the higher their price points must be to maintain desired net profitability.

Cloud computing is quickly becoming an effective and efficient way of computing resources. By centralized management of resources and services, cloud computing delivers hosted services over the Internet. Cloud computing is able to provide the most cost-effective and energy-efficient way of computing resources management. Cloud computing turn's information technology into ordinary commodities and utilities by using the pay-per-use pricing model. A service provider rents resources from the infrastructure vendors, builds appropriate multi server systems, and provides various services to users. A consumer submits a service request to a service provider, receives the desired result from the service provider with certain service-level agreement. Then pays for the service based on the amount of the service and the quality of the service. A service provider can build different multi server systems for different application domains, such that service requests of different nature are sent to different multi server systems. Owing to redundancy of computer system networks and storage system cloud may not be reliable for data, the security score is concerned. In cloud computing security is tremendously improved because of a superior technology security system, which is now easily available and affordable. Applications no longer run on the desktop Personal Computer but run in the cloud. This means that the PC does not need the processing power or hard disk space as demanded by traditional desktop software. Powerful servers and the like are no longer required. The computing power of the cloud can be used to replace or supplement internal computing resources. Organizations no longer have to purchase computing resources to handle the capacity peaks. Cloud computing is quickly becoming an effective and efficient way of computing resources. By centralized management of resources and services, cloud computing delivers hosted services over the Internet. Cloud computing is able to provide the most cost-effective and energy-efficient way of computing resources management. Cloud

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computing turn's information technology into ordinary commodities and utilities by using the pay-per-use pricing model. A service provider rents resources from the infrastructure vendors, builds appropriate multi server systems, and provides various services to users. A consumer submits a service request to a service provider, receives the desired result from the service provider with certain service-level agreement. Then pays for the service based on the amount of the service and the quality of the service. Christo Ananth et al. [7] discussed about a Secure system to Anonymous Blacklisting. The secure system adds a layer of accountability to any publicly known anonymizing network is proposed. Servers can blacklist misbehaving users while maintaining their privacy and this system shows that how these properties can be attained in a way that is practical, efficient, and sensitive to the needs of both users and services. This work will increase the mainstream acceptance of anonymizing networks such as Tor, which has, thus far, been completely blocked by several services because of users who abuse their anonymity. In future the Nymble system can be extended to support Subnet-based blocking. If a user can obtain multiple addresses, then nymble-based and regular IP-address blocking not supported. In such a situation subnet-based blocking is used. Other resources include email addresses, client puzzles and e-cash, can be used, which could provide more privacy. The system can also enhanced by supporting for varying time periods. Powerful servers and the like are no longer required. The computing power of the cloud can be used to replace or supplement internal computing resources. Organizations no longer have to purchase computing resources to handle the capacity peaks.

II. LITERATURE SURVEY

In the paper [2] they have discussed regarding pricing in cloud, aspects of pricing models and different types of pricing models such as pay-as-you go model, genetic model for pricing in cloud computing markets etc.

A. Pricing in Cloud

The Service provider will provide requested services for the customer. The Customer will pay to the service provider based on the amount and also the quality of the provided service. The Pricing process may be of two types: Fixed and Dynamic. In case of fixed pricing mechanism, every time same amount is charged for the customer. Fixed pricing mechanism also include pay per-use pricing model in which customers are charged based on their usage and consumption of a service. [2] Subscription is considered as another type of fixed pricing, in which the customer will pay a fixed amount of money for using the service for longer periods at any convenient time or amount. In case of dynamic pricing mechanism, the customer is charged based on real time market conditions and also the price of service is market dependent. The Factors such as initial cost, lease period, quality of service, age of resources, maintenance cost which will influence pricing in cloud computing were also discussed.

Aspects of Pricing Models in Cloud: There are three main parameters for the pricing model: Quality of Service, utilization period and pricing approach. The pricing approach will describe the process based on which the price is determined.

The pricing approach may be any one of the following: The fixed price regardless of volume: In this, fixed price is charged for the customer regardless of their product utilization or volume of service.

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The Fixed Price Plus Per-Unit: In this case, the fixed price plus a unit rate is charged to the customer assured purchase.

Volume Plus Per-Unit Price Rate: In this case, customer pays fixed charge for certain quantity.

Per-Unit Rate with a Ceiling: In this case, the customer pays per unit rate up to a certain limit. The service provider may not charge the customer beyond that limit.

Price Per-Unit Approach: In this approach, different price per unit is charged for the customer.

Quality of service (Qos): Quality of service is the ability for providing different priority to different applications, users, or data flows, or to guarantee a certain level of performance. The Quality of service will also include on time delivery of service, providing security and privacy, scalability and integrity for the service provider. If all these requirements at high level are maintained by service provider then number of customers as well as customers loyalty towards service provider will increase.

a) Profit Maximization in Cloud Computing : We have proposed a pricing model for cloud computing which takes many factors into considerations, such as the requirement r of a service, the workload of an application environment, the configuration (m and s) of a multi-server system, the service level agreement c, the satisfaction (r and s) of a consumer, the quality (W and T) of a service, the penalty d of a low-quality service, the cost of renting, the cost of energy consumption, and a service provider's margin and profit a. By using an M/M/ m queuing model, we formulated and solved the problem of optimal multi-server configuration for profit maximization in a cloud computing environment. Our discussion can be easily extended to other service charge functions. Our methodology can be applied to other pricing models. At three-tier cloud structure, which consists of infrastructure vendors, service providers and consumers, the latter two parties are particular interest to us. Clearly, scheduling strategies in this scenario should satisfy the objectives of both parties. Our contributions include the development of a pricing model using processor-sharing for clouds, the application of this pricing model to composite services with dependency consideration, and the development of two sets of profit-driven scheduling algorithms.

b) Survey Paper For Maximization Of Profit In Cloud Computing : A pricing model is developed for cloud computing which takes many factors into considerations, such as the requirement r of a service, the workload of an application environment, the configuration (m and s) of a multi-server system, the service level agreement c, the satisfaction (r ands0) of a consumer, the quality (W and T) of a service, the penalty d of a low-quality service, the cost of renting, the cost of energy consumption, and a service provider's margin and profit. And this will schedules the job according to optimization of speed and size of the input hereby maximizing the profit.

c) A Review Of Saas Profit Maximization In Cloud Computing : Cloud computing is the technology of the next generation which unifies everything into one. It is an on demand service because it offers dynamic flexible resource allocation for reliable and guaranteed services in pay use manner to users. The review shows that SaaS is very important layer in cloud computing because all the allocation of resources to the application is done by SaaS providers. This paper focused on the review of customer requests for SaaS providers with the explicit aim of cost

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minimization or to increase the profit with dynamic demands handling. An effective strategy is required for achieving user satisfaction and maximizing the profit for cloud service providers. This paper discusses just about the review of SaaS layer in cloud computing based on the QoS parameter and SLA.

d) Integration Of Multiserver For Profit Efficiency In Cloud Computing : They have proposed a pricing model for cloud computing which takes many factors into consideration, such as the requirement r of a check, the workload of an application Environment, the configuration (m and s) of a multi-server system, the service level concurrence c, the satisfaction (r ands0) of a consumer, the quality (W and T) of a service, the price d of a low-quality service, the cost of renting, the cost of energy consumption, and a cloud service provider's margin and earnings a. By using an M/M/m queuing model, the formulated and solved the problem of optimal multi server configuration for profit maximization in a cloud computing environment. The discussion can be easily extended to other service charge functions.

III SYSTEM MODEL

In this system, we first propose the Double-Quality-Guaranteed (DQG) resource renting scheme which combines long-term renting with short-term renting. The main computing capacity is provided by the long-term rented servers due to their low price. The short-term rented servers provide the extra capacity in peak period. The detail of the scheme is shown in Algorithm 1.

3.1 Algorithm 1 Double-Quality-Guaranteed (DQG) Scheme

1: A multiserver system with *m* servers is running and waiting
for the events as follows
2: A queue *Q* is initialized as empty
3: **Event** – A service request arrives
4: Search if any server is available
5: **if** true **then**
6: Assign the service request to one available server
7: **else**
8: Put it at the end of queue *Q* and record its waiting time
9: **end if**
10: **End Event**
11: **Event** – A server becomes idle
12: Search if the queue *Q* is empty
13: **if** true **then**
14: Wait for a new service request
15: **else**
16: Take the first service request from queue *Q* and assign it
to the idle server
17: **end if**
18: **End Event**
19: **Event** – The deadline of a request is achieved
20: Rent a temporary server to execute the request and release
the temporary server when the request is completed
21: **End Event**

The proposed DQG scheme adopts the traditional FCFS queueing discipline. For each service request entering the system, the system records its waiting time. The requests are assigned and executed on the long-term rented servers in the order of arrival times. Once the waiting time of a request reaches *D*, a temporary server is rented from infrastructure providers to process the request. We consider the novel service model as an *M/M/m+D* queuing model. The *M/M/m+D* model is a special *M/M/m* queuing model with impatient customers. In an *M/M/m+D* model, the requests are impatient and they have a maximal tolerable waiting time. If the

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waiting time exceeds the tolerable waiting time, they lose patience and leave the system. In our scheme, the impatient requests do not leave the system but are assigned to temporary rented servers. Since the requests with waiting time *D* are all assigned to temporary servers, it is apparent that all service requests can guarantee their deadline and are charged based on the workload according to the SLA. Hence, the revenue of the service provider increases. However, the cost increases as well due to the temporarily rented servers. Moreover, the amount of cost spent in renting temporary servers is determined by the computing capacity of the long-term rented multiserver system. Since the revenue has been maximized using our scheme, minimizing the cost is the key issue for profit maximization. Next, the tradeoff between the longterm rental cost and the short-term rental cost is considered, and an optimal problem is formulated in the following to get the optimal longterm configuration such that the profit is maximized.

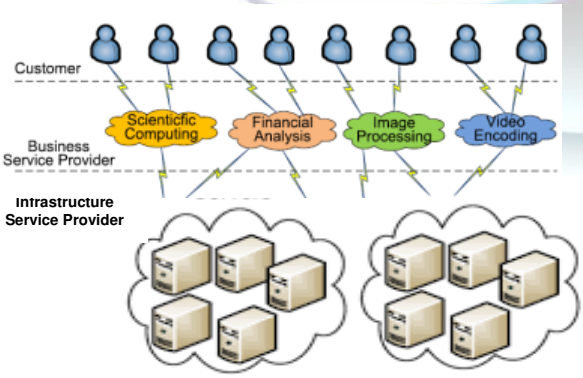


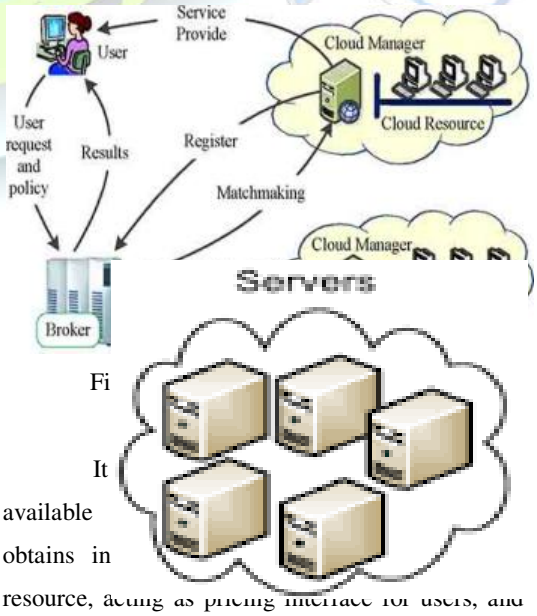
Fig 1. 3 Tier Architecture

3.2 MODULES

Cloud Customers: A customer submits a service request to a service provider which delivers services on demand. The customer receives the desired result from the service provider with certain service-level agreement, and pays for the service based on the amount of the service and the service quality. Cloud customers can perform the following functions,

- Cloud user registration
- Cloud user login
- Upload files into cloud
- View policies
- Choose package, cost and policies

Cloud Broker: The user request for the service to the broker with the policies so that client needs the specific services for production usability, reliability and security to the consumers, provider provides the various services through the broker so that the broker with trust worthy for the service operator and to the consumer. The Broker on viewing the services from the consumer and provider, matches the resources. For the user convenience and broker after serving the request or responding the request, the service status has to update whether it is processed or it is pending.



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resource, acting as pricing interface for users, and

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updating the database when new information is available.

Business Service Providers Module: Service providers pay infrastructure providers for renting their physical resources, and charge customers for processing their service requests, which generates cost and revenue, respectively. The profit is generated from the gap between the revenue and the cost.In this module the service providers considered as cloud brokers because they can play an important role in between cloud customers and infrastructure providers ,and he can establish an indirect connection between cloud customer and infrastructure providers.

Infrastructure Service Provider Module: In the three-tier structure, an infrastructure provider the basic hardware and software facilities. A service provider rents resources from infrastructure providers and prepares, a set of services. Infrastructure providers provide two kinds of resource renting schemes, e.g., long-term renting and short-term renting. In general, the rental price of long-term renting is much cheaper than that of short-term renting.

Advantages of the Proposed System

- The Broker is aware of the resources seeking and providing with the matchmaking framework.
- It makes the resource availability with using security key for sharing the content with highest security.
- In proposed system we are using the Double-Quality-Guaranteed (DQG) renting scheme can achieve more profit than the compared Single-Quality-Unguaranteed (SQU) renting scheme in the premise of guaranteeing the service quality completely.

CONCLUSIONS AND FUTURE SCOPE

In order to guarantee the quality of service requests and maximize the profit of service providers, this paper has proposed a novel Double-Quality-Guaranteed (DQG) renting scheme for service providers. This scheme combines short-term renting with long-term renting, which can reduce the resource waste greatly and adapt to the dynamical demand of computing capacity. An $M/M/m+D$ queueing model is build for our multiserver system with varying system size. And then, an optimal configuration problem of profit maximization is formulated in which many factors are taken into considerations, such as the market demand, the workload of requests, the server-level agreement, the rental cost of servers, the cost of energy consumption, and so forth. The optimal solutions are solved for two different situations, which are the ideal optimal solutions and the actual optimal solutions. In addition, a series of calculations are conducted to compare the profit obtained by the DQG renting scheme with the Single-Quality-Unguaranteed (SQU) renting scheme. The results show that our scheme outperforms the SQU scheme in terms of both of service quality and profit. In this paper, we only consider the profit maximization problem in a homogeneous cloud environment, because the analysis of a heterogenous environment is much more complicated than that of a homogenous environment. However, we will extend our study to a heterogenous environment in the future.

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