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A Profit Maximization Scheme with Guaranteed Quality of Service in Cloud Computing

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Abstract — 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-peruse pricing model. cloud service providers view point profit is one of the most important considerations and it is mainly determined by the configuration of a cloud service platform under given market demand. But traditional single resource renting scheme cannot guarantee the quality of all requests and also wastes a large amount of resources. To overcome that weakness use Double-Quality-Guaranteed (DQG) resource renting scheme this combines long-term renting with short-term renting. For security purpose we are using attribute based encryption scheme. The result shows guaranteed the service quality of all requests, security also obtain more profit. e.g., the average charge, the ratio of requests that need temporary servers, and so forth. Thirdly, a profit maximization problem is formulated for the double renting scheme and the optimized configuration of a cloud platform is obtained by solving the profit maximization problem. Finally, a series of calculations are conducted to compare the profit of our proposed scheme with that of the single renting scheme. The results show that our scheme can not only guarantee the service quality of all requests, but also obtain more profit.

Keywords —***multi-server system, profit maximization, waiting time, guaranteed service quality, Cloud computing.***

1. INTRODUCTION

The cloud is a next generation platform that provides dynamic resource pools, virtualization, and high availability. Today, have the ability to utilize scalable, distributed computing environments within the confines of the Internet, a practice known as cloud computing. Cloud computing is the concept implemented to decipher the daily computing problems, likes of hardware software and resource availability unhurried by computer users. 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. In business ideas the profit is that the main issue to be exist within the field of the specific environment. Obviously, the requirement of profit maximization in cloud computing environment is needed. Today's the sixty billion servers are working in this world. Therefore the server required a large amount of power. Normally between the user and server has some agreement i.e., service level

agreement. In this service level agreement, defined the Quality of service need to provide for the user and the maximum needed execution time. If the service provider violates this service-level agreement no charge is provided for the specific service. So there will be the loss of the profit. Here valuation of the optimal speed and size of the input the SLA is provided and here a pricing model is developed consistent with optimal size and speed and service charge is calculated. Therefore the service supplier or provider can maximize the profit.

2. PROPOSED METHOD

- In this paper, we propose a novel renting scheme for service providers, which not only can satisfy quality-of-service requirements, but also can obtain more profit.
- A novel double renting scheme is proposed for service providers. It combines long-term renting with short-term renting, which can not only satisfy quality-of-service requirements under the varying system workload, but also reduce the resource waste greatly.
- A multiserver system adopted in our paper is modeled as an *M/M/m+D* queuing model and the performance indicators are analyzed such as the average service charge, the ratio of requests that need shortterm servers, and so forth.
- The optimal configuration problem of service providers for profit maximization is formulated and two kinds of optimal solutions, i.e., the ideal solutions and the actual solutions, are obtained respectively.
- A series of comparisons are given to verify the performance of our scheme. The results show that the proposed 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.

ADVANTAGES OF PROPOSED SYSTEM:

- ✓ 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.
- ✓ Increase in the quality of service requests and maximize the profit of 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.

3. LITERATURE SURVEY

1) Above the clouds: A berkeley view of cloud computing

AUTHORS: A. Fox, R. Griffith, A. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, and I. Stoica

Provided certain obstacles are overcome, we believe Cloud Computing has the potential to transform a large part of the IT industry, making software even more attractive as a service and shaping the way IT hardware is designed and purchased. Developers with innovative ideas for new interactive Internet services no longer require the large capital outlays in hardware to deploy their service or the human expense to operate it. They need not be concerned about over-provisioning for a service whose popularity does not meet their predictions, thus wasting costly resources, or under-provisioning for one that becomes wildly popular, thus missing potential customers and revenue. Moreover, companies with large batch-oriented tasks can get their results as quickly as their programs can scale, since using 1000 servers for one hour costs no more than using one server for 1000 hours. This elasticity of resources, without paying a premium for large scale, is unprecedented in the history of IT. The economies of scale of very large-scale datacenters combined with ``pay-as-you-go" resource usage has heralded the rise of Cloud Computing. It is now attractive to deploy an innovative new Internet service on a third party's Internet Datacenter rather than your own infrastructure, and to gracefully scale its resources as it grows or declines in popularity and revenue. Expanding and shrinking daily in response to normal diurnal patterns could lower costs even further. Cloud Computing transfers the risks of over-provisioning or under-provisioning to the Cloud Computing provider, who mitigates that risk by statistical multiplexing over a much larger set of users and who offers relatively low prices due better utilization and from the economy of purchasing at a larger scale. We define terms, present an economic model that quantifies the key buy vs. pay-as-you-go

decision, offer a spectrum to classify Cloud Computing providers, and give our view of the top 10 obstacles and opportunities to the growth of Cloud Computing.

2) Cloud computing and emerging it platforms: Vision, hype, and reality for delivering computing as the 5th utility

AUTHORS: R. Buyya, C. S. Yeo, S. Venugopal, J. Broberg, and I. Brandic

With the significant advances in Information and Communications Technology (ICT) over the last half century, there is an increasingly perceived vision that computing will one day be the 5th utility (after water, electricity, gas, and telephony). This computing utility, like all other four existing utilities, will provide the basic level of computing service that is considered essential to meet the everyday needs of the general community. To deliver this vision, a number of computing paradigms have been proposed, of which the latest one is known as Cloud computing. Hence, in this paper, we define Cloud computing and provide the architecture for creating Clouds with market-oriented resource allocation by leveraging technologies such as Virtual Machines (VMs). We also provide insights on market-based resource management strategies that encompass both customer-driven service management and computational risk management to sustain Service Level Agreement (SLA)-oriented resource allocation. In addition, we reveal our early thoughts on interconnecting Clouds for dynamically creating global Cloud exchanges and markets. Then, we present some representative Cloud platforms, especially those developed in industries, along with our current work towards realizing market-oriented resource allocation of Clouds as realized in Aneka enterprise Cloud technology. Furthermore, we highlight the difference between High Performance Computing (HPC) workload and Internet-based services workload. We also describe a meta-negotiation infrastructure to establish global Cloud exchanges and markets, and illustrate a case study of harnessing 'Storage Clouds' for high performance content delivery. Finally, we conclude with the need for convergence of competing IT paradigms to deliver our 21st century vision

3) Tradeoffs between profit and customer satisfaction for service provisioning in the cloud

AUTHORS: J. Chen, C. Wang, B. B. Zhou, L. Sun, Y. C. Lee, and A. Y. Zomaya

The recent cloud computing paradigm represents a trend of moving business applications to platforms run by parties located in different administrative domains. A cloud platform is often highly scalable and cost-effective through its pay-as-you-go pricing model. However, being shared by a large number of users, the running of applications in the platform faces higher performance uncertainty compared to a dedicated platform. Existing Service Level Agreements (SLAs) cannot sufficiently address the performance variation issue. In this paper, we use utility theory leveraged from economics and develop a new utility model for measuring customer satisfaction in the cloud. Based on the utility model, we design a mechanism to support utility-based SLAs in order to balance the performance of applications and the cost of running them. We consider an infrastructure-as-a-service type cloud platform (e.g., Amazon EC2), where a business service provider leases virtual machine (VM) instances with spot prices from the cloud and gains revenue by serving its customers. Particularly, we investigate the interaction of service profit and customer satisfaction. In addition, we present two scheduling algorithms that can effectively bid for different types of VM instances to make tradeoffs between profit and customer satisfaction. We conduct extensive simulations based on the performance data of different types of Amazon EC2 instances and their price history. Our experimental results demonstrate that the algorithms perform well across the metrics of profit, customer satisfaction and instance utilization.

4) Optimal multiserver configuration for profit maximization in cloud computing

AUTHORS: J. Cao, K. Hwang, K. Li, and A. Y. Zomaya

As cloud computing becomes more and more popular, understanding the economics of cloud computing becomes critically important. To maximize the profit, a service provider should understand both service charges and business costs, and how they are determined by the characteristics of the applications and the configuration of a multiserver system. The problem of optimal multiserver configuration for profit maximization in a cloud computing environment is studied. Our pricing model takes such factors into considerations as the amount of a service, the workload of an application environment, the configuration of a multiserver system, the service-level agreement, the satisfaction of a consumer, the quality of a service, the penalty of a low-quality

service, the cost of renting, the cost of energy consumption, and a service provider's margin and profit. Our approach is to treat a multiserver system as an M/M/m queuing model, such that our optimization problem can be formulated and solved analytically. Two server speed and power consumption models are considered, namely, the idle-speed model and the constant-speed model. The probability density function of the waiting time of a newly arrived service request is derived. The expected service charge to a service request is calculated. The expected net business gain in one unit of time is obtained. Numerical calculations of the optimal server size and the optimal server speed are demonstrated.

4. RELATED WORK

SURVEY PAPER FOR MAXIMIZATION OF PROFIT IN CLOUD COMPUTING: From this Paper We Referred :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.

A REVIEW OF SAAS PROFIT MAXIMIZATION IN CLOUD COMPUTING: From this Paper We Referred: 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 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.

INTEGRATION OF MULTISERVER FOR PROFIT EFFICIENCY IN CLOUD COMPUTING: From this Paper We Referred: 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.

5.CONCLUSION

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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