ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 5, Issue 1, pp: (5-9), Month: April 2018 – September 2018, Available at: www.paperpublications.org

A Guaranteed Quality of Service by Double Renting Scheme

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Abstract: **A double resource renting scheme is designed with short-term renting and long-term renting for guaranteed quality of service in cloud computing. This double renting scheme can effectively guarantee the quality of service of all requests and reduce resource waste greatly. Where a service system is considered a queuing model and the performance. Also, 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.**

Keywords**: Queuing model, Renting scheme.**

I. INTRODUCTION

Cloud computing is a type of Internet-based computing that provides shared computer processing resources and data to computers and other devices on demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services), which can be rapidly provisioned and released with minimal management effort. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers that may be located far from the user–ranging in distance from across a city to across the world. Cloud computing relies on sharing of resources to achieve coherence and economy of scale, similar to a utility (like the electricity grid) over an electricity network.

Advocates claim that cloud computing allows companies to avoid upfront infrastructure costs (e.g., purchasing servers). As well, it enables organizations to focus on their core businesses instead of spending time and money on computer. Proponents also claim that cloud computing allows enterprises to get their applications up and running faster, with improved manageability and less maintenance, and enables Information Technology (IT) teams to more rapidly adjust resources to meet fluctuating and unpredictable business demand. Cloud providers typically use a "pay as you go" model.

Managing a private cloud requires software tools to help create a virtualized pool of compute resources, provide a self-service portal for end users and handle security, resource allocation, tracking and billing. Management tools for private clouds tend to be service driven, as opposed to resource driven, because cloud environments are typically highly virtualized and organized in terms of portable workloads.

In hybrid cloud environments, compute, network and storage resources must be managed across multiple domains, so a good management strategy should start by defining what needs to be managed, and where and how to do it. Policies to help govern these domains should include configuration and installation of images, access control, and budgeting and reporting. Access control often includes the use of Single Sign-on (SSO), in which a user logs in once and gains access to all systems without being prompted to log in again at each of them.

As an effective and efficient way to consolidate computing resources and computing services, clouding computing has become more and more popular In a cloud computing environment, there are always three tiers, i.e., infrastructure providers, services providers, and customers. An infrastructure provider maintains the basic hardware and software facilities. A service provider rents resources from the infrastructure providers and provides services to customers. A customer submits its request to a service provider and pays for it based on the amount and the quality of the provided service.

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 multi server system adopted in our work is modeled as an queuing model and the performance indicators are analyzed such as the average service charge, the ratio of requests that need short term 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.

II. LITERATURE SURVEY

Junwei Cao,Kai Hwang and Keqin Li[1] 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 multi-server system. The problem of optimal multi-server 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 multi-server 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 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.

Rajkumar Buyya, Chee Shin Yeo and James Broberg [2] 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.

P.Mell and T.Grance[3] The Information Technology Laboratory (ITL) at the National Institute of Standards and Technology (NIST) promotes the U.S. economy and public welfare by providing technical leadership for the nation"s measurement and standards infrastructure. ITL develops tests, test methods, reference data, proof of concept implementations, and technical analysis to advance the development and productive use of information technology. ITL"s responsibilities include the development of technical, physical, administrative, and management standards and guidelines for the cost-effective security and privacy of sensitive unclassified information in Federal computer systems. This Special Publication 800-series reports on ITL"s research, guidance, and outreach efforts in computer security and its collaborative activities with industry, government, and academic organizations.

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III. PROPOSED SYSTEM

- In this paper, we propose a novel renting scheme for service providers, which notonly 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.
- 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 comparison 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.

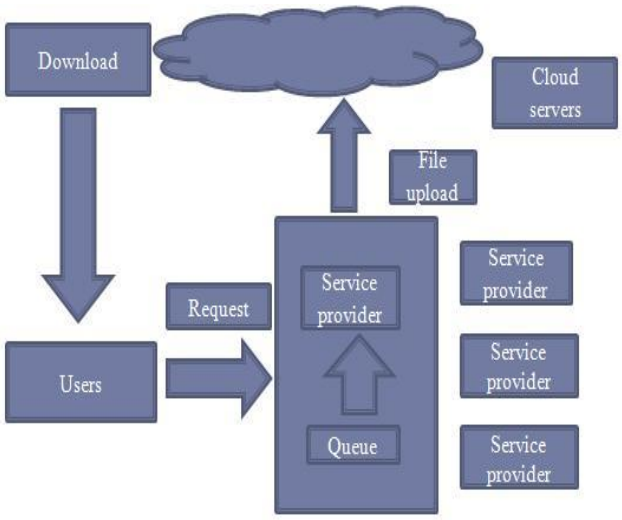

Fig 1: system architecture

Queuing model:

We consider the cloud service platform as a multi-server system with a service request queue. The clouds provide resources for jobs in the form of virtual machine (VM). In addition, the users submit their jobs to the cloud in which a job queuing system such as SGE, PBS, or Condor is used. All jobs are scheduled by the job scheduler and assigned to different VMs in a centralized way. Hence, we can consider it as a service request queue. For example, Condor is a specialized workload management system for compute intensive jobs and it provides a job queuing mechanism, scheduling policy, priority scheme, resource monitoring, and resource management. Users submit their jobs to Condor, and Condor places them into a queue, chooses when and where to run them based upon a policy. An queuing model is build for our multi-server 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.

Service-level agreement:

A **service level agreement** (**SLA**) is a contract between a **service** provider (either internal or external) and the end user that defines the **level** of **service** expected from the **service** provider. SLAs are output-based in that their purpose is specifically to define what the customer will receive. To configure a cloud service platform, a service provider usually adopts a renting scheme. The servers in the service system are all long-term rented.

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Service Provider:

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 provider:

In the three-tier structure i.e., infrastructure providers, services providers, and customers, an infrastructure provider have the basic hardware and software facilities. A service provider rents resources from infrastructure providers and prepares, a set of services in the form of virtual machine (VM). 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.

RIVEST SHAMIR and ADLEMAN (RSA):

RSA is one of the first practicable public-key cryptosystems and is widely used for secure data transmission. In such a cryptosystem, the encryption key is public and differs from the decryption key which is kept secret. This is a java program to implement RSA algorithm. RSA is one of the first practicable public-key cryptosystems and is widely used for secure data transmission. In such a cryptosystem, the encryption key is public and differs from the decryption key which is kept secret. In RSA, this asymmetry is based on the practical difficulty of factoring the product of two large prime numbers, the factoring problem. RSA stands for Rivest Shamir and Adleman.The Rivest-Shamir-Adleman (RSA) algorithm is one of the most popular and secure public-key encryption methods. The algorithm capitalizes on the fact that there is no efficient way to factor very large (100-200 digit) numbers.

Using an encryption key (*e*,*n*) the algorithm is as follows:

1. Represent the message as an integer between 0 and (*n*-1). Large messages can be broken up into a number of blocks. Each block would then be represented by an integer in the same range.
2. Encrypt the message by raising it to the *e*th power modulo *n*. The result is a cipher text message C.
3. To decrypt cipher text message C, raise it to another power *d* modulo *n*.
4. The encryption key (*e*,*n*) is made public. The decryption key (*d*,*n)* is kept private by the user.

How to Determine Appropriate Values for *e*, *d*, and *n:*

1. Choose two very large (100+ digit) prime numbers. Denote these numbers as *p* and *q*.
2. Set *n* equal to *p* * *q*.
3. Choose any large integer, *d*, such that GCD(*d*, ((*p*-1) * (*q*-1))) =z.
4. Find *e* such that *e* * *d* = 1 (**mod** ((*p*-1) *(*q*-1)))

Rivest, Shamir, and Adleman provide efficient algorithms for each required operation.

IV. SYSTEM IMPLEMENTATION

The system output is mainly based on the series of comparison 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. Many tests are needed to guarantee system availability and efficiency.

V. CONCULSION AND FUTURE WORK

In this work, we combine short-term renting with long-term renting, which can reduce the resource waste greatly and adapt to the dynamical demand of computing capacity. An queuing model is build for our multi-server 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.

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