International Journal of
Emerging Research in Management &Technology
ISSN: 2278-9359 (Volume-5, Issue-5)

Research Article | **May 2016**

A Heuristic Framework for Increasing Profit at Cloud Paradigm

Shahaji Nalawade, Vikas Ghadage, Sagar Aher, Sambhaji Palve
Dept. of Computer Engineering, Vishwakarma Institute of Information Technology, Savitribai Phule Pune University, Pune, Maharashtra, India

Abstract—

Its always been challenging task to fulfill the requirements of the end customers in any web applications. For this cloud computing is a boon as it provides all services by introducing SaaS,PaaS,IaaS. Even though maintaining a good quality of service is always a tough task to the cloud service providers to get a maximum profit on utilization of available resources. As many times the relationship between the cloud owners and cloud service providers by maintaining good quality of service to the end users but most of them are failed to perform upto the expectation. So as a part of a good effort this paper put forward an idea to increase the profit of cloud service providers and cloud owners by allocating threshold space which helps the end users on run out situation of space. This is been properly weaved with server availability paradigm which is catalysed by fuzzy logic to enhance the complete process.

Keywords— Cloud computing, multi-server system, queuing model, Fuzzy logic, DQG(Double Quality Guaranteed), Quality Of Service(QOS).

I. INTRODUCTION

Cloud computing characterize types of outsourcing of computer services, similar to the way in which the supply of electricity is outsourced. Users can use it in simple way. They do not need to worry where the electricity is from, how it is made, or transported. Every month, they pay for how much electricity is used. The idea behind cloud computing is similar: The user can easily use storage, computing power, or specially discovered development environments, without having to worry how these work internally. Cloud computing is generally Internet-based computing. The cloud is a metaphor for the Internet based on how the internet is represented in computer network diagrams; which means it is an abstraction covering the complicated infrastructure of the internet. It is a style of computing in which similar to IT capabilities are provided “as a service”, granting users to access technology-enabled services from the Internet ("in the cloud")without knowledge of, or manage over the technologies behind these servers.

Three types of services are available in cloud computing:

A. Software as a Service (SaaS):

SaaS provides an application on the basis of users requirement. It is a type of model for deploying software in which an application is hosted as a service provided to the user across the network. There is no need to installing and running the application on the user’s own computer. CRM, E-mail, Games, Virtual Desktop are the examples of SaaS.

B. Platform as a Service (PaaS):

The idea of PaaS is that some users can provide the specific hardware and a certain amount of application.

C. Infrastructure as a Service (IaaS):

It includes computing control and storage. Cloud infrastructure is a cost-effective model for distributing distinguished services like reducing hardware maintenance complexity, real-time workload balancing, etc. Instead of servers, software, data-centric space or network equipment user cloud can buy those resources as fully outsourced services. A virtual machine, Servers Storage, Networks are the examples of IaaS. Amazon Web Services.

Cloud service providers viewpoint, profit is one of the most important considerations, and it is mainly determined by the configuration of a cloud service platform beneath given market demand. However, a single long-term renting scheme is usually adapted to configure a cloud platform, which cannot guarantee the service quality but leads to serious resource loss. In this paper, a double resource renting scheme is designed firstly in which short-term renting and long-term renting are united aiming at the existing issues. This double renting scheme can effectively guarantee the quality of service of all requests and decrease the resource waste greatly. Secondly, a service system is considered as an M/M/m+D queuing model and the execution indicators that affect the profit of our double renting scheme are analysed.

II. LITERATURE SURVEY

The resource allocation problem is one of the most challenging problems in the resource management problems. The SLA based resource allocation has attracted the attention of the research community in the last years. Our paper considers the resource administration problem in a cloud computing system. Key features of our formulation and subsequently proposed solution are that we:

A Profit Maximization Scheme with Guaranteed Quality of Service in Cloud Computing, reduces wastage of resources greatly and combines short term renting and long term renting scheme to provide quality of service for end users and it also use an M/M/m+D queueing model concept for multi server system to varying system size. It consider only problem related to homogeneous cloud environment[1]. The economic model for Cloud service providers that can be used to maximize profit based on choosing the right pricing and right sizing with considering revenue from charging for storage and data transfer[2].cloud computing takes many factors into examinations, such as the requirement of a service, the workload of an application environment, the composition of a multi server system, the service level agreement, the satisfaction of a consumer, the quality of a service, the cost of a low-quality service, the cost of renting, the cost of energy consumption, service provider's margin and profit . By using an M/M/m queuing model, the problem of optimal multi server configuration for profit maximization in a cloud computing environment is solved using only single renting scheme[3].Analytical model to measure profit in large data centers without and with behind the meter renewable power generation. it takes into account several factors including the practical service-level agreements that currently exist between data centers and their clients, price of electricity, and the amount of renewable power available. After this derived profit model is used to develop an optimization-based profit maximization strategy for data centers [4].Dynamic Scheduling and Pricing can produce a close-to-optimal long-term profit while bounding the job queue length in the data center. The key idea of Dyn-SP is, using pricing to proactively adapt the service demand to workload scheduling in the data center; and opportunistically promotes low electricity prices to process batch jobs for energy cost saving[5]. Now, mobile computing users are staring for more impressive ways to store and access their large amount of personal data. Alternately multiplicity of managing data increasing so better solutions need to implement. Proposed work is providing more resilience to access the data using if then rule of fuzzy concepts. Also that data may not be precise. In future system include fuzzy concept to improve accessibility of imprecise data also[6].

III. PROPOSED METHODOLOGY

This section narrates the techniques of deployment of profit maximization system in the cloud with the below mentioned steps as shown in figure 1.

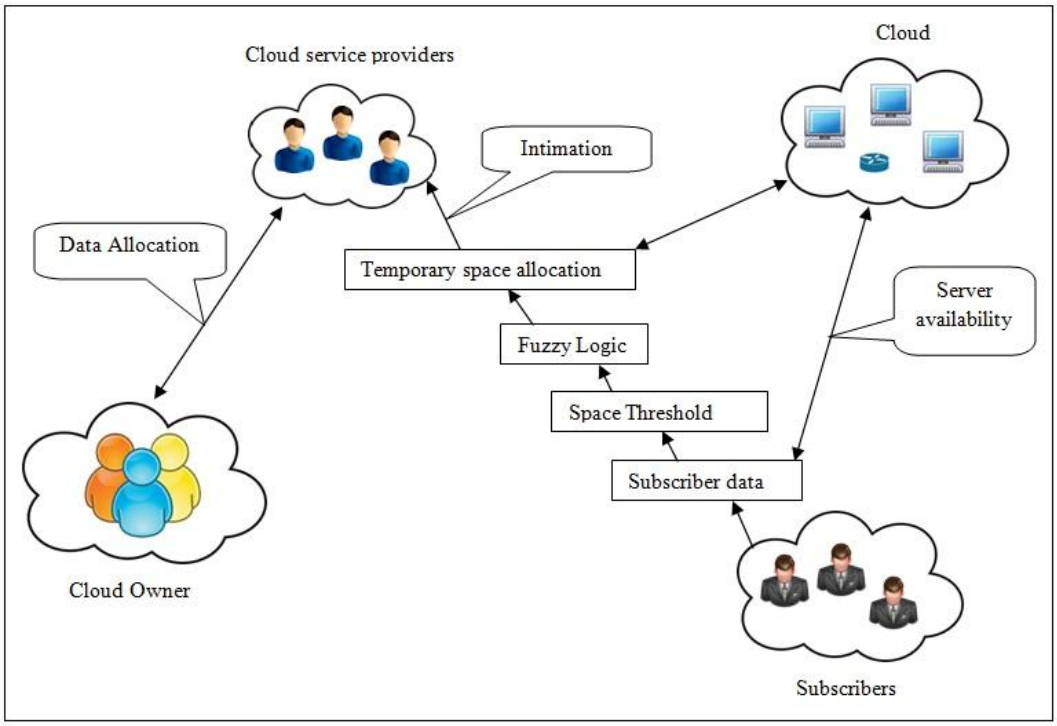

Fig. 1. Overview of the proposed work

Step 1: Here in the proposed system initially cloud service provider (CSP) seeks the data space allocation from the cloud owner for the business purpose. Then CSP will allocate both regular and threshold data space. Threshold data space is the space which will be active once the regular space will be filled. Once this is done many of the end users (subscribers) are register with the CSP to store their data in the assigned space.

Step 2: As the subscriber uploads the data into the cloud then the space availability will be checked in the regular data space server for proper storage. If there is no enough space then the system is going to use the threshold space server. This is process can be depicted in the below algorithm 1.

Algorithm 1: Server Availability

// Input : Subscriber data **D**
// Output : Server Availability

Step 0: Start
Step 1: Upload the Data **D**
Step 2: Data Size $\mathbf{D_S}$
Step 3: Get the storage space in cloud WRT to CSP as $\mathbf{S_p}$
Step 4: **IF** $\mathbf{S_p > D_S}$
Step 5: Allocate CSP regular server for data storage
Step 6: **ELSE**
Step 7: Allocate CSP threshold server for data storage
Step 8: **END IF**
Step 9: End

Step 3: Here in this step intimation to the CSP is done based on the availability of the storage space at the servers for the uploaded data from the subscribers.

Here timely intimation is done based on the fuzzy logic which is performed by receiving the inverse space levels of the data storage server and threshold server .The values of the space levels are divided into 5 ranges for the simplicity using fuzzy logic between the ranges 0 to 1 . And they are known as fuzzy crisp values as shown below.

- ✓ VERY LOW – 0 TO 0.2
- ✓ LOW -- 0.21 TO 0.4
- ✓ MEDIUM -- 0.41 TO 0.6
- ✓ HIGH _ 0.61 TO 0.8
- ✓ VERY HIGH --0.81 TO 1.0

Any regular server space which is about to fill-up is assigned fuzzy value as VERY LOW , Whereas any threshold server space which is about finish is assigning an value as VERY HIGH. Based on this facts of fuzzy crisp values ῑ timely intimation to the CSP is done through the mailing system.
The whole process can be shown in the below algorithm.

Algorithm 2: Improved profit maximization scheme

Step 0: Start
Step 1: A multi-server system with *m* servers is running and waiting for the events
Step 2: An Event queue *Q* is initialized as empty
Step 3: **Event** – A service request arrives
Step 4: Record Arrival time of the event and start count down for waiting time
Step 5: Search for server Availability
Step 6: **if** true **then**
Step 7: Assign the service request to one available server
Step 8: **else**
Step 9: Put it at the end of queue *Q* and record its waiting time
Step 10: **end if**
Step 11: **End Event**
Step 12: **Check for the Event space**
Step 13: **if** true **then**
Step 14: Perform event
Step 15**: else**
Step 16: Check for the event priority
Step 17: Allocate temporary space based on Fuzzy Logic
Step 18: Perform event
Step 19: Update space
Step 20: **End Event**
Stop 21: Stop

IV. PARAMETERS FOR PROFIT MAXIMIZATION

A. Profit maximization

Profit maximization is the one of the important concept which need to be considered when we dealing with cloud. Here we are going to maximize the profit of cloud service provider. There are number of ways to maximize the profit of cloud service providers as assigning high pay per use facility is one of them but we are going to concentrate on space which are requested by customers to the cloud service providers. For example if consider there is one cloud service provider he has 10GB of space and at the same time that space is requested by ten customers 1GB each . At this condition he is not able to take request of eleventh customer now we are going to overcome this condition we calculate

the space of all ten customers which are used as well as remaining space and according to the remaining space we can assign space to eleventh customer for this space calculation we are going to use fuzzy logic concept. In this way we are maximizing the profit of cloud service provider by allocation and calculation of space at run time.

B. Quality of service

Now a day cloud computing is growing as well as new technology which are used frequently by many of you. So there are number of cloud service providers who provide services in cloud but customers focus on quality of service and according to that they are going to use same service. In our project we are concentrate three main parameters of quality of service as

1. *Availability:* As we describe in example previous in profit maximization when a eleventh user is came for space requirement we are going to avail him the space by calculating the space on runtime. In this way availability parameter of the quality of service is covered.
2. *Performance:* we are going to provide service to clients at runtime with minimum resources and when there are more requests of clients that time they need not to wait in queue for long time.
3. *Security:* It is most important to maintain safety of data in cloud computing The data safety must be ensured by using high level of encryption. For this we use AES encryption Algorithm for a secure and reliable transmission media.

V. RESULTS AND DISCUSSIONS

To show the effectiveness of the proposed system some experiments are conducted on java based windows machine using Apache tomcat as the server and NetBeans as IDE. To measure the performance of the system we set the bench mark on different number of users in the web application in cloud for data storage service system. And then we allow the number of users to seek the service of the CSP for availability of the storage space on uploading the storage data to the cloud environment. To evaluate the performance of the system WAPT 8.0 web load testing tool is used. And then experiment is plotted in the below figure.

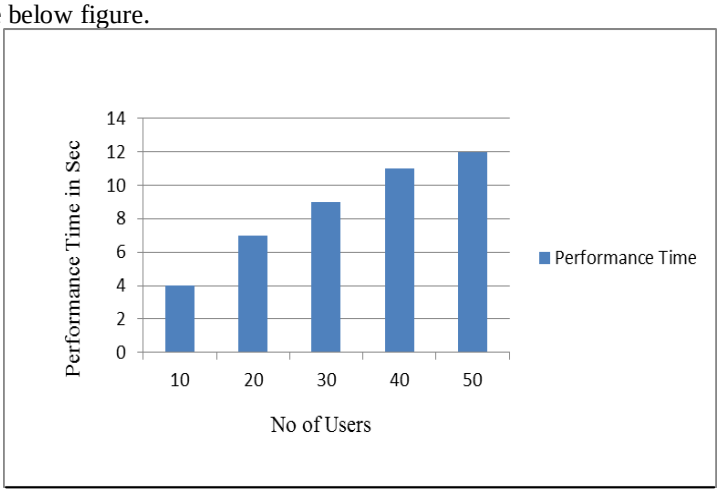

Fig. 2. Performance measurement for different no of users.

The above plot expresses result of data storage service of CSP at cloud end with the measuring parameter as time which is not directly proportional to number of users. So this indicates that the system over performs the optimization of storage facility at cloud in matter of time.

VI. CONCLUSIONS

To maximize the profit of service providers, this paper has proposed a novel Double-Quality-Guaranteed (DQG) renting scheme. This scheme merge short-term renting with long-term renting, which can reduce the resource loss greatly and prepare to the dynamical demand of computing capacity. An M/M/m+D queueing model is build for our multi server system with fluctuating system size. And then, an optimal configuration problem of profit maximization is formulated in which many circumstances are taken into considerations, such as the market demand, the workload of requests, the server-level agreement, the rental price of servers, the price of energy consumption, and so forth. The optimal solutions are solved for two different conditions, which are the ideal optimal explanations and the actual optimal solutions. In addition, a series of calculations are supervised to compare the profit obtained by the DQG renting scheme with the Single-Quality-Unguaranteed (SQU) renting scheme. The results presents that our scheme outperforms the SQU scheme in terms of both of service quality and profit.

REFERENCES

[1] Jing Mei, Kenli Li, Member, IEEE, Aijia Ouyang, and Keqin Li, Fellow, "A Profit Maximization Scheme with Guaranteed Quality of Service in Cloud Computing", VOL. 64, NO. 11, IEEE TRANSACTIONS ON COMPUTERS, NOVEMBER 2015.

[2] Thanadech Thanakornworakij, Raja Nassar, Chokchai Box Leangsuksun, Mihaela Paun , "An Economic Model for Maximizing Profit of a Cloud Service Provider",conference publishing services IEEE,2012.

[3] Junwei Cao, Kai Hwang,Keqin Li and Albert Y. Zomaya, "Optimal Multiserver Configuration for Profit Maximization in Cloud Computing", VOL. 24, NO. 6, IEEE TRANSACTIONS ON PARALLEL AND DISTRIBUTED SYSTEMS, JUNE 2013.

[4] Mahdi Ghamkhari and Hamed Mohsenian-Rad, "Energy and Performance Management of Green Data Centers: A Profit Maximization Approach", VOL. 4, NO. 2IEEE TRANSACTIONS ON SMART GRID, JUNE 2013.

[5] Shaolei Ren, Mihaela van der Schaar, "Joint Design of Dynamic Scheduling and Pricing in Wireless Cloud Computing", IEEE ,2013.

[6] V. Prasath, Nithya Bharathan, Neetha N.P**,** N. Lakshmi, M.Nathiya," Fuzzy Logic In Cloud Computing", International Journal of Engineering Research & Technology (IJERT),Vol. 2 Issue 3, March 2013.

