Revenue Maximization with Good Quality of Service in Cloud Computing

Prof. Ms. Poonam Lad, Prof. Ms. Rohini Bhosale, Prof. Rajesh Bhise

PHCET, Rasayani, Khalapur, Raigad, Maharashtra, India

Abstract—*Cloud computing enables people to use resources and services without implementing them on their systems. Profit and quality of service is the most important factor for service providers and it is mainly determined by the configuration of a cloud service platform under given market demand. Single long term renting scheme is usually adopted to design a cloud platform which leads to resource waste and having more renting charges. The novel double renting scheme which is combination of short term and long term renting is aiming at existing issue. This double renting scheme will effectively and efficiently promises a good quality of service of all request and reduces the resource waste significantly. It also provides services with lower cost compared to short term renting scheme. It uses optimal queuing model to maximize the profit. That means the users can access the services simultaneously. The main objective of proposed system is, to maximize profit of service provider by providing efficient and effective services to user.*

Keywords—cloud computing, revenue maximization, quality of service, service level agreement.

I. INTRODUCTION

Cloud computing has becomes one of the emerging technology in today's Internet world. Number of IT dealers offering the services like computation, storage and application hosting .It provides access to user according to user demand. Now a days cloud computing is used in many fields like education, manufacturing, e-commerce, social networking etc. It gives access to store personal and business information without storing it on users system. The new computing and communications paradigms based on these technologies uses different techniques to give service to the user.

The 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(SLA), the satisfaction of a consumer, the QoS, the penalty of a low-quality service, the cost of renting and energy consumption, and a service provider's margin and profit. Cloud Computing [1] is Internet based computing where virtual pooled servers provides software/hardwares, infrastructure platform, devices and other resources are hosting to consumers on a renting basis. The cloud makes it possible for user to access your information from anywhere at any time Cloud computing is a model which allows suitable, on demand network access to a networks, servers, storage, applications, and services that can be rapidly provisioned and released with minimal management effort or service provider interaction. More specifically, cloud describes the use of a collection of services, applications, information, and infrastructure comprised of pools of computer, network, information, and storage resources. These components can be quickly composed, provisioned, implemented and withdrew, and scaled up or down; providing for an on demand utility-like model of allocation and consumption. Cloud enhances collaboration, agility, scaling, and availability, and provides the potential for cost reduction through optimized and efficient computing. In business concepts the profit is the main factor to be exist in the field of cloud computing environment is required. Such services were initially offered by commercial providers such as Amazon, Google, and Microsoft and over the years, several technologies such as Virtualization, Grid computing[2], and Service-Oriented Architecture (SOA) significantly contributed to make cloud computing.

II. RELATED WORK

It includes the relative mechanisms and the methods which are implemented earlier and also the merits and demerits of each method is defined concisely. We first focus on Pricing Policies which are based on the demand from the users and the supply of resources from service provider. The user competes with other users and a resource owner with other resource owners. The resource owner must provide good QoS with and must gain good revenue.

A. Pricing:

Pricing is the process of determining the rate or fee the provider will receive in exchange for offering services or selling resources. Cloud providers can use a variety of pricing

Strategies when selling their services[3] or resources. Finding the right pricing strategy is an important factor in running a successful business.

B. Pricing Factors:

The main pricing factors are cost of service, market competition and value to the costomer.Cost of service can be defined as to set final price to achieve good revenue.

The following figure shows Factors affecting the price. When providers understand how much it costs to provide the service, how much competitors are charging for the same service

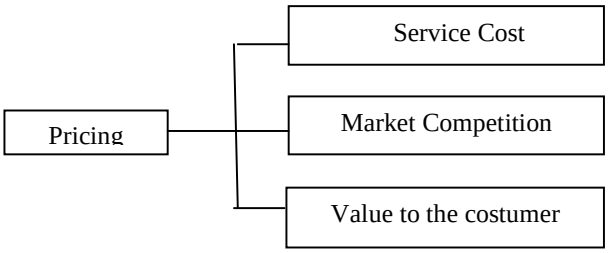

Fig.1: Pricing Factor

C. Pricing Models:

The most commonly used pricing models in cloud markets[5], especially in infrastructure as-a-service cloud marketplaces, are usage-based, subscription-based, and demand-oriented Pricing A usage-based pricing model (also known as consumption-based) relies on the scheme that customers pay according to the amounts of services that they use or consume. models Subscription-based pricing model: is a pricing model that allows customers to pay a subscription fee to use the service for a particular time period.

D.Cloud Computing Pricing Model classification:

1.Static Pricing Model:In this model the pricing strategy doesn't change.It is fixed.Cloud providers announced the price of resource-constrained in advance.Clients already acquainted with how much they will pay.

2.Dynamic Pricing Model: In this model the pricing strategy changes according to market demand. It is not fixed.The user is not familiar with the changing pricing strategy of the services. It is also called as market dependant pricing model.

E.Examples of Cloud Pricing Models:

Pay-as-you-go Model:It is static model. User pays fixed price for reserved resources. Pricing strategy is determined by cloud service provider.

Subscription Model :It is static model. Cloud providers sets the price depends upon lease period. Sometimes user may pay more than utilization.[8]

Dynamic Resource Pricing on Federated Clouds: It is dynamic pricing strategy. This is theoretical approach .The price is depends upon supply and demand.

Competition based Pricing Model:It is dynamic approach.The pricing strategy is depending upon market competition.It does not take customer's satisfaction into account.

III. LITERATURE SURVEY

Cloud platform provides an effective solution for analytics; the developed model can be hosted on the Cloud and consumed by customers in a pay-as-you-go manner. For this delivery model to become reality, this work focuses on the technical aspects and evaluate developed protocol model to provide analytics capabilities for Big Data on the Cloud. This work focuses on the key issues in phases of an analytics solution. With Big data many of the challenges of Cloud analytics concern with data management, integration, and processing. This system enhanced on previously existing models to provide and evaluate data models in the Cloud platform. It provides a solution for data visualization and analytics model over the Cloud.

Commercial products

In this section, we provide a survey of some of the dominant cloud computing products.

Amazon EC2: Amazon Web Services (AWS) [3] is a set of cloud services, providing cloud-based computation, storage and other functionality that enable organizations and individuals to deploy applications and services on an on-demand basis and at commodity prices. Amazon Web Services' offerings are accessible over HTTP, using REST and SOAP protocols. Amazon Elastic Compute Cloud (Amazon EC2) enables cloud users to launch and manage server instances in data centers using APIs or available tools and utilities. EC2 instances are virtual machines running on top of the Xen virtualization engine [5]. After creating and starting an instance, users can upload software and make changes to it. When changes are finished, they can be bundled as a new machine image. An identical copy can then be launched at any time. Users have nearly full control of the entire software stack on the EC2 instances that look like hardware to them.

Microsoft Windows Azure platform: Microsoft's Windows Azure platform [3] consists of three components and each of them provides a specific set of services to cloud users. Windows Azure provides a Windows based environment for running applications and storing data on servers in data centers; SQL Azure provides data services in the cloud based on SQL Server; and .NET Services offer distributed infrastructure services to cloud-based and local applications. Windows Azure platform can be used both by applications running in the cloud and by applications running on local systems. Windows Azure also supports applications built on the .NET Framework and other ordinary languages supported

in Windows systems, like C#, Visual Basic, C++, and others. Windows Azure supports general-purpose programs, rather than a single class of computing. With each application, the users upload a configuration file that provides an XML-based description of what the application needs. Based on this file, the fabric controller decides where new applications should run, choosing physical servers to optimize hardware utilization.

Google App Engine: Google App Engine is a platform for traditional web applications in Google-managed data centers. Currently, the supported programming languages are Python and Java. Web frameworks that run on the Google App Engine include Django, CherryPy, Pylons, and web2py, as well as a custom Google-written web application framework similar to JSP or ASP.NET. Google handles deploying code to a cluster, monitoring, failover, and launching application instances as necessary. Current APIs support features such as storing and retrieving data from a Big Table [10] non-relational database, making HTTP requests and caching. Developers have read-only access to the file system on App Engine. Table 1 summarizes the three examples of popular cloud offerings in terms of the classes of utility computing, target types of application, and more importantly their models of computation, storage and auto-scaling. Apparently, these cloud offerings are based on different levels of abstraction. and management of the resources. Users can choose one type or combinations of several types of cloud are offed.

Problem Statement

In cloud model, client, cloud service provider and infrastructure provider are participant.While providing a service the main aim of cloud service provider is how to gain profit with good quality of service and customer satisfaction. Often the service provider uses ,the single long term renting scheme in which servers are long term rented. The number of servers in this scheme are less. The pricing strategy in this system is static. Means if the user wont be able to buy the plan according to requirement. Though he needs less space for storage, it was compulsory to buy the plan which gives more storage space and apply more charges. On the other hand it was wastage of memory from providers side as it gives more space than needed was not able to share that space with different users. If request are more then due to less number of servers the request are not served within given period of time.Thus the customer may get unsatisfied and service provider may loose the customer.To overcome this problem the combination of short term renting and long term renting i.e. double quality renting scheme is proposed. In this system the user can choose the space required and duration of the service according to need. If the user is satis_ed then the service provider is successful to attract the customer which helps the cloud provider to maximize revenue with good QoS and customer satisfaction.This is achieved by new proposed model.

IV. PROPOSED SYSTEM

In this section, a new model has been proposed which avail the a novel renting scheme for service providers, which provides best QoS that satisfies customers service requirements, and will give more profit to service provider. This system proposes a new solution which combines long-term renting with short-term renting under the varying system workload and it also reduce the resource waste greatly. It uses a multiserver system with optimal queuing model and the performance will be analyse with the help of average service charge, the ratio of requests that need short term servers, and so forth.The system provides services[6] such as searching, video encryption and decryption to provide security. The results show that the proposed Double-Quality renting system will give good revenue than the compared single renting scheme with guaranteed service. It also provides security to maintain trust between consumer and service provider.

- Each request must be completed within given time period.
- The revenue of the service provider increases.
- It increases the quality of service .
- It provides a trusted relationship between consumers and service providers.

4.1Methodology

4.1.1 Introduction

Cloud is made up of both infrastructure and software. Cloud computing enables people to use the services without installing them on their machines. It becomes a highly demanded service due to advantages of high computing power, cheap cost of services, high performance, availability and accessibility. It is also called as on-demand computing. Due to this this service is attracted a lot of interest. The things provided on clients machine by using the process of virtualization. For the process of virtualization it uses resource pooling in which number of virtual and physical resources are dynamically assigned and reassigned according to users need.It provides broad network access i.e. the services can be accessible on cell phones, laptops,tablets or workstations[5].The cloud provisioned for single organization is called as private cloud.It is managed by that organization, or third party or combination of both. The cloud which is designed to use for common people is called as public cloud. The cloud which combines either public, private or community cloud is called hybrid cloud.

4.1.2 System Architecture and Implementation

Three different modules area as follows:

1)Client module: It could be either individual customer or associations.The client will buy the plan according to his/her requirements. According to the plan the If the client is registered user then he will login by username and password. The client will buy the plan according to his requirements i.e. required space and time duration will be provided by user. This request will send to BSP.BSP approves the request and send it to ISP for approval.

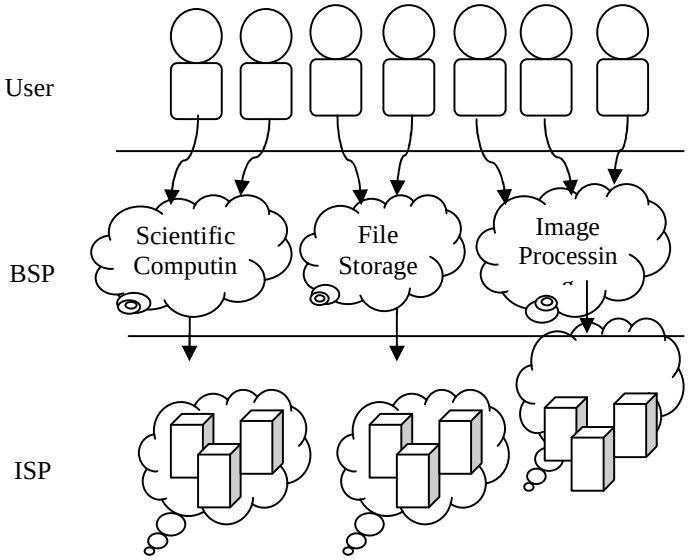

Fig.4.1: System Model

After approval of BSP and ISP he can upload the files according to desired plan orhe/she can download the files whenever required.

2)Business Service Provider (BSP) module: It is an entity which rents resources from infrastructure provider. After user registration the request of plan will sent to the BSP.It sends this request to ISP for space allocation. It can be a single entity or an organization.

3)Infrastructure Service Provider(ISP) module: It is an entity which is used to store a large amount of data.The ISP will assign either long term or short term rented servers.If the user requirement is less than 250MB the users file will be stored into short term rented servers.If more than 250MB the long term rented servers get assigned.ISP provides resources to BSP.

4.1.3 System Flow

Our system is divided into following phases

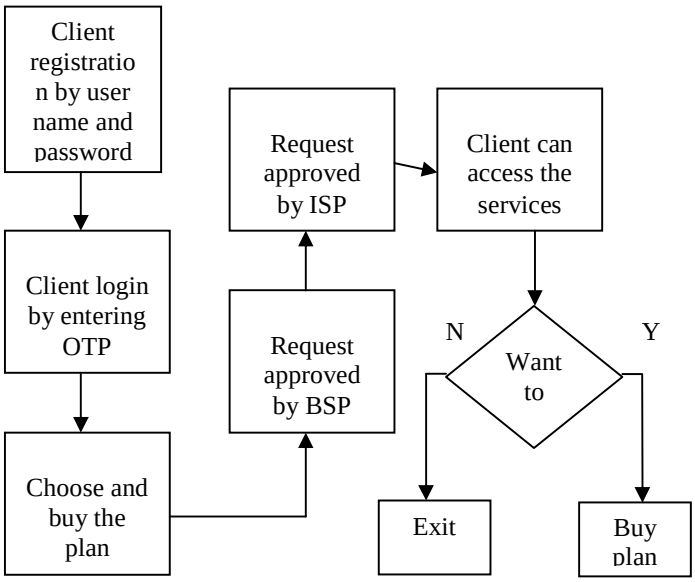

Fig.4.2: Flow of the System

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1. Registration Phase:

Whenever the new user wants to access the system he or she has to do registration first.After registration the OTP get generated which can be used as optional security enhancement to the client.The OTP will send on users registered mobile number.For login into the system the user will enter the OTP first then only he is able to use the services.

2. Buy the Plan

After login the user can use the system after buying the plan.The plan is buy according to required space and time.Whatever space user wants he enters it in the multiple of 10MB.He will choose the required time in number of days.The minimum buying plan is 1 day per 10MB.

3. Approval of BSP and ISP

When the ISP and BSP will approve the plan then only user is able to access the services.When client request for service it _rst go to BSP.After approval of BSP it goes to ISP.ISP allocates the server according to space and time duration.

4. Upload and Download Phase

After the approval of BSP and ISP the user is able to upload and download the files.User can access the files upto specified duration. The files are secured by using AES algorithm.When the duration is expired the user is unable to access the file

4.2 Algorithms

1 Algorithm for Costing:

- Input: Storage Space in multple of 10MB(Sn), Storage price for 10MB(St),time price for 1day(Tm),Time in multiple of one day(Tn)

- Output: Total cost of the plan for each user do
- Calculate storage in multiple of 10MB by using equation A;
- Calculate time in multiple of 1 day by using equation B;
- Calculate total cost by adding equation A and B;

$$\sum_{S_n=10mb}^{n} S_c * \frac{S_n}{10} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (A)$$

$$\sum_{T_n}^{n} T_m * T_n \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (B)$$

Total Cost=A+B

2 AES Algorithm

AES is a symmetric block cipher algorithm. It is utilized for securing data. It acknowledges a 128, 192 or 256-bit key. It has acceptably quick key setup time and moderately little memory requirements and encodes 128 bits of information at once. Whenever any client or an application uploads any data on the cloud, the data is stored in an encoded format by using AES algorithm at the storage server.

V. RESULT ANALYSIS

This chapter gives detail description of implemented system. It shows step by step procedure of application. It also includes the difference between an existing system and an implemented system.

The existing system provides a service in which the plan was static.User has to buy the plan which was predefined.On the other hand in current system the user will choose the plan according to requirement. Following table shows the comparative analysis of both the systems.

Table.1: Pricing Plan for Existing System

Space in Multiple of 10Mb	Time in Multiple of Days	Cost
50	60	1025
100	90	1925
250	180	920
350	180	1640

Table 1 shows the fix pricing strategy of existing system. In existing system the space and duration is fixed. Means though the user wants to buy less space for less time, he is not able to buy it .User has to select one of the above plan which was nearest to his requirement. Thus he has to pay more than requirement. On the other hand the cloud provider was not able to give allocated unused space to other user. Thus it was wastage of space also.

Table 2: Pricing Plan for Current System

Space in Multiple of 10Mb	Time in Multiple of Days	Cost
70	30	185
120	50	310
230	100	615
360	100	544

Table 2 shows the figures which enter by the user according to his requirement. Thus in current system the plan is of users choice. The user will choose require space and time and will only for usage, not more than that.

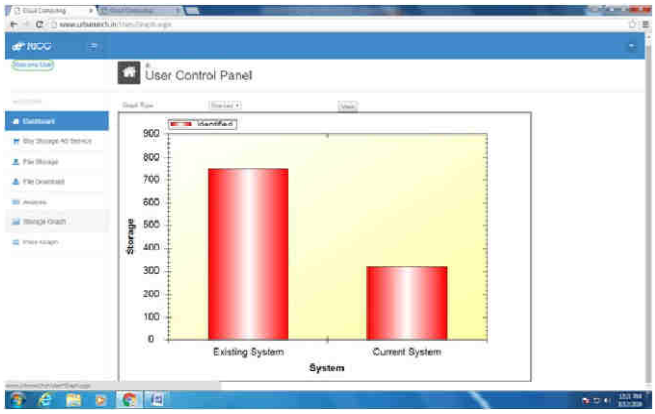

Fig.4.3: Storage Graph

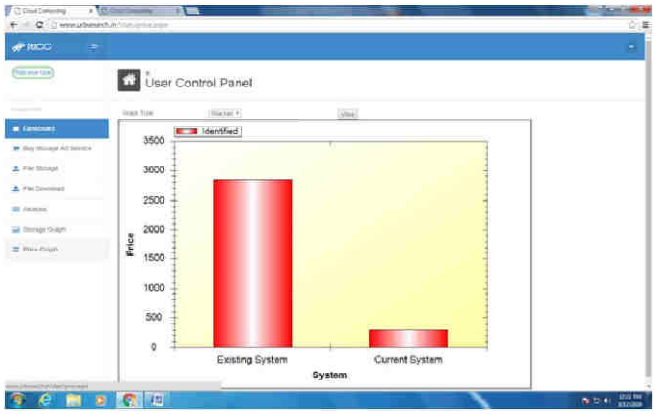

Fig.4.4: Price Graph

VI. CONCLUSION

The proposed system is successfully designed in order to provide a solution to solve the problem of revenue intensification. Additionally the system made it possible to improve the quality of service. As this system is combination of short-term renting with long-term renting, which can reduce the resource waste greatly and adapt to the dynamical demand of computing capacity. It enables user to select the plan according to requirement. The charges apply for the services are fixed. They does not get change according to demand. Thus user is aware of of the cost. The system uses multi-server system in which the servers are allocated as short term rented and long term rented servers. The system outperforms in terms of both quality of service and revenue. This system considers the requirement of both service provider and end user in terms of costing. Thus to get good profit with customer satisfaction this system scheme can be a precious solution. In this paper, I only consider the revenue maximization problem in a homogeneous cloud environment, because the invention in heterogeneous environment is difficult .

REFERENCES

[1] Jing Mei, Kenli Li, Aijia Ouyang and Keqin Li, "A Profit Maximization Scheme with Guaranteed Quality of Service in Cloud computing"IEEE trans. Vol.75 ,Pp. 1-14 2015.

[2] A. Fox, R. Grifth, A. Joseph, R. Katz, A. Konwinski,G. Lee, D. Patterson, A. Rabkin,and I. Stoica, "Above the clouds: A berkeley view of cloud computing," Dept.Electrical Eng. and Computer. Sciences, Vol. 28,Pp. 1-10, 2009.

[3] J. Cao, K. Hwang, K. Li, and A. Y. Zomaya,"Optimal multiserver configuration for profit maximization in cloud computing," IEEE Trans. Parallel Distrib. Syst., Vol. 24,no. 6,Pp. 1087, 2013.

[4] R. Buyya, C. S. Yeo, S. Venugopal, J. Broberg, andI. Brandic, "Cloud computing and emerging it platforms:Vision, hype, and reality for delivering computing as the5th utility," Future Gener. Comp. Sy., vol. 25, no. 6, pp. 599–616, 2009.

[5] P. Mell and T. Grance, "The NIST definition of cloud computing. National institute of standards and technology, "Information Technology Laboratory, vol. 15, p. 2009, 2009.

[6] J. Chen, C. Wang, B. B. Zhou, L. Sun, Y. C. Lee, andA. Y. Zomaya, "Tradeoffs between profit and customer satisfaction for service provisioning in the cloud," in Proc.20th Int'l Symp. High Performance Distributed Computing.ACM, 2011, pp. 229–238.

[7] J. Mei, K. Li, J. Hu, S. Yin, and E. H.-M. Sha, "Energy aware preemptive scheduling algorithm for sporadic tasks on dvs platform," MICROPROCESS MICROSY., vol. 37,no. 1, pp. 99–112, 2013.

[8] Taj Eldin Suliman M. Ali, "Pricing Models for Cloud Computing Services, a Survey," International Journal of Computer Applications Technology and Researc,Vol 5 2008.

[9] May Al-Roomi, Shaikha Al-Ebrahim, Sabika Buqrais and Imtiaz Ahmad,"Cloud Computing Pricing Models: A Survey", International Journal of Grid and Distributed Computing,Vol.6,Pp.93-106, 2013