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A Novel Cloud Renting Scheme in a Homogeneous Environment for Service Provider to Maximize Profit

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ABSTRACT:

In the superior moral of bringing advanced data packing and management services, we have designed an internet based computing service called Cloud Computing. Day to day advancements in the cloud data sharing services we have achieved a greater progress. The moto being an efficient and effective way of providing cloud computing facilities towards the user and customer grounded happening their requirement. In the market of digital world the so called Cloud services are being used on a larger scale through the internet users giving access to mobiles and laptops and many more computing gadgets making internet as the only medium for sharing data worldwide. However, the principle agenda of cloud services is to provide a service with good quality of service at a larger scale with minimal profits and cost effective. As a fact a single long-term renting scheme which is obtained and acquired to configure a cloud platform cannot provide a guaranteed quality of service.

In this paper, we propose a double resource renting scheme designed to overcome the issues emerged in short and long-term renting schemes. Our proposed renting scheme provides an efficient and effective way of providing quality of service without any wastage of space and data. we consider a service system is considered as an M/M/m+D queuing model and performance has been analyzed and evaluated in all the following parameters e.g., the average charge, the ratio of requests that require limited servers, and services. We also have designed and formulated a profit maximization problem for our double renting scheme and optimized the configuration of a cloud platform by solving the profit maximization problem. So finally we have calculated the different factors comparing both the convolution rental schemes with the proposed rental scheme. The obtained results shows high quality of service and guarantees the performance is nowhere compromised in handling the requests.

Keywords: *Cloud computing, guaranteed service quality, multi-server system, profit maximization, queuing model, service-level agreement, waiting time.*

I. INTRODUCTION

AS an effective and resourceful way to solidify computing resources and computing services, clouding computing has twisted out to be increasingly famous [1]. Cloud computing incorporates management of properties and facilities, and conveys facilitated amenities ended the Internet. The hardware, programming, databases, data, and all possessions are focused and provided to customer's on-request [2]. Cloud computing transform's data innovation into standard products and utilities by the compensation per-utilize evaluating model [3, 4, 5]. In a cloud computing environment, there are always three levels, i.e., foundation providers, services providers, and customers (see Fig. 1 and its elaboration in Section 3.1). A framework provider keeps up the essential hardware and programming offices. A specialist organization rents resources from the framework providers and provides services to clients. A customer presents its demand to a individual co-op and pays for it in bright of the sum and the superiority of the provided benefit [6]. In this paper, we go for examining the multi-server setup of a specialist organization with the end goal that its advantage is expanded. Like all business, the assistance of a specialist organization in cloud computing is acknowledged with two sections, which are the price and the income. For a specialist co-op, the cost is the renting cost paid to the foundation providers in addition to the authority rate caused by dynamism feasting, and the income is the administration charge to customers. As a rule, a specialist organization leases a specific quantity of headwaiters from the framework providers and manufactures distinctive multi-server systems for various application areas. Each multi-server system is to perform a unique kind of direction solicitations and requests.

Subsequently, the renting cost is equivalent to the extent of servers in a multi-server system [2]. The influence ingesting of a multi-server system is directly comparative to the number of servers and the server usage, and to the quadrate of finishing haste [7, 8]. The income of a specialist co-op is recognized with the measure of administration and the quality of administration. To condense, the benefit of a specialist organization is primarily controlled by the design of its administration stage. To design a cloud benefit stage, a specialist organization more often than not embraces a solitary renting scheme. That is to state, the servers in the administration system are all long haul leased. Due to the set number of servers, a portion of the approaching administration demands can't be prepared quickly. So they are first embedded into a line until the point when they can took care of by any accessible server. Be that as it may, the holding up time of the administration demands can't be too long.

So as to fulfill quality-of-benefit necessities, the holding up time of every approaching administration demand ought to be restricted inside a specific range, which is dictated by an administration level understanding (SLA). On the off chance that the quality of administration is guaranteed, the administration is completely charged, something else, the specialist co-op serves the demand for nothing as a punishment of low quality. To acquire higher income, a specialist organization should lease more servers from the foundation providers or scale up the server execution speed to guarantee that more administration demands are prepared with high administration quality. In any case, doing this would prompt sharp increment of the renting cost or the power cost. Such expanded cost may stabilizer the pickup from punishment lessening. Taking everything into account, the single renting scheme is not a decent scheme for specialist organizations. In this paper, we propose a novel renting scheme for specialist co-ops, which can fulfill quality-of-benefit prerequisites, as well as can get more benefit. Our commitments in this paper can be abridged as takes after.

- A novel twofold renting scheme is proposed for specialist co-ops. It joins long haul renting with here and now renting, which cannot just fulfill quality-of-benefit prerequisites under the changing system workload, yet in addition diminish the asset squander incredibly.
- A multi-server system embraced in our paper is demonstrated as a M/M/m+D lining model and the execution pointers are investigated, for example, the normal administration charge, the proportion of solicitations that need here and now servers, et cetera.
- The ideal design issue of specialist co-ops revenue driven boost is figured and two sorts of ideal arrangements, i.e., the perfect arrangements and the genuine arrangements, are gotten individually.
- A series of correlations are given to confirm the execution of our scheme. The outcomes demonstrate that the proposed Double-Quality-Guaranteed (DQG) renting scheme can accomplish more benefit than the looked at Single-Quality-Unguaranteed (SQU) renting scheme in the preface of ensuring the administration quality totally.

II. RELATED WORK

In this segment, we audit late works important to the benefit of cloud specialist organizations. Benefit of specialist co-ops is connected with many factors, for example, the value, the market request, the system arrangement, the customer fulfillment et cetera. Specialist organizations normally wish to set a higher cost to get a higher overall revenue; however doing as such would diminish the customer fulfillment, which prompts a danger of debilitating interest later on. Subsequently, choosing a sensible evaluating methodology is imperative for specialist organizations.

The valuing techniques are separated into two classes, i.e., static estimating and dynamic evaluating. Static valuing implies that the cost of an administration ask for is settled and known ahead of time, and it doesn't change with the conditions. With dynamic evaluating a specialist co-op postpones the estimating choice until after the customer request is uncovered, so the specialist co-op can change costs as needs be [9]. Static estimating is the overwhelming procedure which is generally utilized as a part of genuine and in explore [2, 10, 11]. Ghamkhari et al. [11] embraced a level rate estimating system and set a settled cost for all solicitations, yet Odlyzko in [12] contended that the transcendent level rate evaluating empowers squander and is incongruent with benefit separation. Another sort of static estimating procedures are utilization based valuing. For instance, the cost of an administration ask for is relative to the administration time and errand execution prerequisite (measured by the quantity of directions to be executed) in [10] and [2], individually.

Utilization based valuing uncovers that one can utilize resources all the more efficiently [13, 14]. Dynamic evaluating develops as an appealing contrasting option to better adapt to eccentric customer request [15]. Mac'ıas et al. [16] utilized a hereditary calculation to iteratively streamline the estimating approach. Amazon EC2 [17, 18] has presented a "spot valuing" highlight, where the spot cost for a virtual case is progressively refreshed to coordinate free market activity. Be that as it may, purchasers despise costs to change, particularly in the event that they see the progressions to be "uncalled for" [19, 20].

After correlation, we select the use based evaluating system in this paper since it concurs with the idea of cloud computing generally.

The second factor influencing the benefit of specialist organizations is customer fulfillment which is dictated by the quality of administration and the charge. Keeping in mind the end goal to enhance the customer fulfillment level, there is an administration level understanding (SLA) between a specialist co-op and the customers. The SLA embraces a value remuneration instrument for the customers with low administration quality. The system is to ensure the administration quality and the customer fulfillment with the goal that more customers are pulled in. In past research, distinctive SLAs are embraced.

Ghamkhari et al. [11] embraced a stepwise accuse capacity of two phases. In the event that an administration ask for is taken care of before its due date, it is ordinarily charged; however in the event that an administration ask for is not dealt with before its due date, it is dropped and the provider pays for it because of punishment. In [2, 10, and 21], accuse is diminished persistently of the expanding holding up time until the point when the charge is free. In this paper, we utilize a two-stage charge work, where the administration demands presented with high caliber are regularly charged, something else, are served for nothing. Since benefit is an imperative worry to cloud specialist co-ops, many works have been done on the best way to help their benefit. A substantial group of works have as of late centered around diminishing the energy cost to expand benefit of specialist organizations [22, 23, 24, 25], and the sit without moving server killing methodology and dynamic CPU clock recurrence scaling are embraced to decrease energy cost. In any case, just decreasing energy cost can't acquire benefit expansion.

Numerous scientists researched the exchange off between limiting cost and amplifying income to improve benefit. Both [11] and [26] balanced the quantity of exchanged on servers occasionally utilizing diverse procedures and distinctive benefit amplification models were worked to get the quantity of exchanged on servers. Be that as it may, these works did not consider the cost of asset setup.

Chiang and Ouyang [27] considered a cloud server system as a M/M/R/K lining system where all administration asks for that surpass its most extreme limit are rejected. A benefit expansion work is characterized to locate an ideal blend of the server measure R and the line limit K with the end goal that the benefit is boosted. In any case, this technique has encourage suggestions other than simply losing the income from a few services, since it additionally infers loss of notoriety and along these lines loss of future customers [3]. In [2], Cao et al. regarded a cloud benefit stage as a M/M/m show, and the issue of ideal multi-server design revenue driven expansion was defined and fathomed. This work is the most applicable work to our own, however it embraces a solitary renting scheme to arrange a multi-server system, which can't adjust to the shifting business sector request and prompts low administration quality and extraordinary asset squander. To conquer this shortcoming, another asset administration methodology is utilized as a part of [28, 29, 30, 31], which is cloud league. Utilizing league, diverse providers running services that have corresponding asset prerequisites after some time can commonly team up to share their individual resources to satisfy every one's request [30]. Notwithstanding, providers should settle on an astute choice about usage of the organization (either as a benefactor or as a customer of resources) contingent upon various conditions that they may confront, which is a convoluted issue.

In this paper, to defeat the deficiencies specified over, a twofold renting scheme is intended to arrange a cloud benefit stage, which can ensure the administration quality of all solicitations and decrease the asset squander enormously. In addition, a benefit amplification issue is planned and explained to get the ideal multi-server arrangement which product would be able to more benefit than the ideal design in [2].

III. DESIGN METHODOLOGY

A. Existing Methodology

All in all, a specialist organization leases a specific number of servers from the framework providers and constructs distinctive multi-server systems for various application spaces. Each multi-server system is to execute a unique sort of administration requests and applications. Subsequently, the renting cost is corresponding to the quantity of servers in a multi-server system. The power consumption of a multi-server system is straightly corresponding to the quantity of servers and the server use, and to the square of execution speed. The income of a specialist organization is identified with the measure of administration and the quality of administration. To outline, the benefit of a specialist organization is primarily controlled by the design of its administration stage.

To configure a cloud benefit stage, a specialist organization normally embraces a solitary renting scheme. That is to state, the servers in the administration system are all long haul leased. As a result of the predetermined number of servers, a portion of the approaching administration requests can't be handled quickly. So they are first embedded into a line until the point that they can deal with by any accessible server.

Drawbacks of Existing System:

1. The holding up time of the administration requests is too long.

2. Sharp increment of the renting cost or the power cost. Such expanded cost may stabilizer the pickup from punishment diminishment. All in all, the single renting scheme is not a decent scheme for specialist co-ops.

B. PROPOSED SYSTEM

In this paper, we propose a novel renting scheme for specialist organizations, which can fulfill quality-of-benefit prerequisites, as well as can acquire more benefit.

A novel twofold renting scheme is proposed for specialist organizations. It consolidates long haul renting with here and now renting, which cannot just fulfill quality-of-benefit prerequisites under the differing system workload, yet additionally decrease the asset squander extraordinarily.

A multi-server system embraced in our paper is displayed as a M/M/m+D lining model and the execution markers are investigated, for example, the normal administration charge, the proportion of requests that need here and now servers, et cetera.

The ideal design issue of specialist co-ops revenue driven expansion is detailed and two sorts of ideal arrangements, i.e., the perfect arrangements and the genuine arrangements, are acquired separately.

A series of examinations are given to confirm the execution of our scheme. The outcomes demonstrate that the proposed Double-Quality-Guaranteed (DQG) renting scheme can accomplish more benefit than the thought about Single-Quality-Unguaranteed (SQU) renting scheme in the start of ensuring the administration quality totally.

Favorable circumstances of Proposed System

- Since the requests with holding up time D, are altogether allotted to temporary servers, it is obvious that all administration requests can ensure their due date and are charged in view of the workload as per the SLA. Subsequently, the income of the specialist organization increments.
- Increase in the quality of administration requests and augment the benefit of specialist organizations.
- This scheme consolidates here and now renting with long haul renting, which can diminish the asset squander extraordinarily and adjust to the dynamical request of computing limit.

IV. PROPOSED SYSTEM ARCHITECTURE

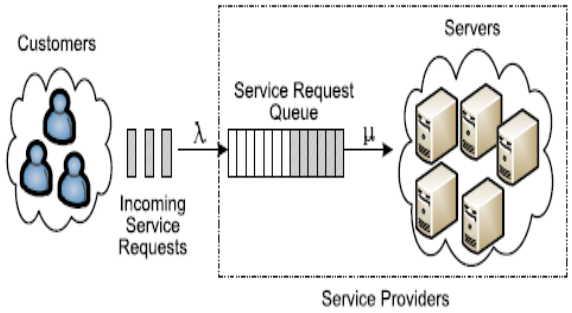

Fig1: Proposed System Architecture

A. MODULES:

1. Service provider's module
2. Infrastructure provider's module
3. Customer's module.
4. Queuing model.

5. Double Renting Scheme.

B. MODULES DESCRIPTION

1. Service Provider's Module:

A specialist co-op rents resources from infrastructure providers and readies an arrangement of services as virtual machine (VM). Infrastructure providers provide two sorts of asset renting schemes, e.g., long-term renting and here and now renting. By and large, the rental cost of long-term renting is substantially less expensive than that of here and now renting. A customer presents an administration demand to a specialist co-op which conveys services on request. The customer gets the coveted outcome from the specialist co-op with certain administration level assertion.

2. Infrastructure Provider's Module:

In a genuine cloud computing stage, for example, Amazon EC2, IBM blue cloud, and private clouds, there are many work hubs oversaw by the cloud managers, for example, Eucalyptus, OpenNebula, and Nimbus. The clouds provide resources for employments as virtual machine (VM). Likewise, the clients present their business to the cloud in which a vocation lining system, for example, SGE, PBS, or Condor is utilized.

In the most essential cloud-benefit model - and as indicated by the IETF (Internet Engineering Task Force) - providers of IaaS offer PCs – physical or (all the more regularly) virtual machines – and different resources. Iaas alludes to online services that theoretical client from the detail of infrastructure like physical computing resources, area, information dividing, scaling, security, reinforcement and so forth.

3. Customers Module:

A customer presents an administration demand to a specialist co-op which conveys services on request. The customer gets the coveted outcome from the specialist organization with certain administration level understanding. The customer lease the two sorts of renting scheme viz long term and here and now renting. The income model is determined by the valuing methodology and the server-level assention (SLA). In this paper, the use based estimating methodology is embraced, since cloud computing provides services to customers and charges them on request. The SLA is an arrangement between specialist organizations and customers on the administration quality and the cost. In view of the restricted servers, the administration requests that can't be taken care of instantly in the wake of entering the system must hold up in the queue until the point that any server is accessible. Be that as it may, to fulfill the quality-of-benefit necessities, the holding up time of each administration demand ought to be restricted inside a specific range which is determined by the SLA. The SLA is broadly utilized by many sorts of organizations, and it receives a value remuneration instrument to ensure benefit quality and customer fulfillment.

4. Queing Model:

At the point when the approaching administration requests can't be prepared instantly after they arrive, they are firstly set in the queue until the point when they can be taken care of by any accessible server. The first-come-first-served (FCFS) lining discipline is embraced. Since the settled computing limit of the administration system is constrained, a few requests would sit tight for a long time before they are served. As per the lining hypothesis, we have the accompanying hypothesis about the holding up time in a M/M/m lining system.

5. Double Renting Scheme:

It consolidates long-term renting with here and now renting, which cannot just fulfill quality-of-benefit prerequisites under the shifting system workload, yet in addition lessen the asset squander enormously. The Double-Quality Guaranteed (DQG) asset renting scheme which consolidates long-term renting with here and now renting. The primary computing limit is provided by the long-term leased servers because of their low cost. The here and now leased servers provide the additional limit in top period. The requests are doled out and executed on the long-term leased servers in the request of arrival times.

V. CONCLUSION AND FUTURE SCOPE

In order to guarantee the quality of administration requests and amplify the profit of specialist co-ops, this paper has proposed a novel Double-Quality-Guaranteed (DQG) renting scheme for specialist organizations. This scheme consolidates here and now renting with long-term renting, which can decrease the asset squander extraordinarily and adjust to the dynamical request of computing limit. A M/M/m+D queueing model is worked for our multi-server system

with varying system size. And after that, an ideal arrangement issue of profit maximization is formulated in which many elements are taken into contemplations, for example, the market request, the workload of requests, the server-level understanding, the rental cost of servers, the cost of energy consumption, et cetera. The ideal arrangements are understood for two distinct circumstances, which are the perfect ideal arrangements and the real ideal arrangements. What's more, a series of estimations are led to look at the profit acquired by the DQG renting scheme with the Single-Quality-Unguaranteed (SQU) renting scheme. The outcomes demonstrate that our scheme beats the SQU scheme in terms of both of administration quality and profit.

In this paper, we just consider the profit maximization issue in a homogeneous cloud environment, in light of the fact that the investigation of a heterogeneous environment is substantially more convoluted than that of a homogenous environment. In any case, we will stretch out our study to a heterogeneous environment in the future.

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