# A Double Layered Auction Technique for Cloud Data Channel Allocation


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**Abstract—The bulk of recent research on cloud resource allocation has focused on analyzing the interactions between cloud administrators and users. However, in order to catch up on backlogs of work and attract new customers, fleet management is tempted to lease additional capabilities from CPs as a result of the present change in customer expectations and the growth of public cloud services (CPs).Understanding how the cloud administrators and the CPs interact is also critical in light of this. In this work, we investigate both correlations using a two-auction system. We construct the notion of cloud resource allocation using options available sequence auctions (OBSAs) for communications between users and service managers. When compared to earlier works, our design is able to handle customers with a variety of expectations, give sincerity as the dominant strategy, enjoy a simple winner choice process, and avoid the delay entry issue. We do provide one of the first OBSAs in the research with a higher output. In regard to the trades between cloud administrators and CPs, we propose two concurrent markets for energy collection. We can assess how narcissistic the CPs are by looking at the price they provide. We thoroughly examine the two markets to identify the bid strategies used by the cloud operators.**

***key words : CPs, Auction Mechanism, CCN, OBSA***

## I. INTRODUCTION

The effective processing of enormous amounts of data collected from many sources such as wireless sensors and statistical surveys is critical in modern society, and cloud computing is an ideal platform for this.

Various cloud-based services have been provided, notably Microsoft Azure, Google Cloud, and Amazon EC2, with many more firms preparing to enter this lucrative sector. The recent increase in consumer demand has prompted the concept of resource sharing in cloud networks, in which cloud owners can temporarily borrow surplus resources from one another to deliver better services to customers.

For the community of increasing effectiveness, the quick processing of the enormous volumes of data acquired from several sources, including remote monitoring and analytical surveys, is crucial, and cloud technology is an appropriate platform for this. Numerous internet solutions are available, like Windows Azure, Cloud Computing, and Ec2, and many more companies wish to join this profitable market. The unexpected increase in consumer demands gave birth to the idea of regional cloud server collaboration, wherein sky owners would temporarily rent extra capacity from one other to provide better services to customers. According to forecasts, large organizations may eventually dominate the whole cloud-based market by renting cloud services from smaller or privately held companies [1].

Price volatility is one of the finest options in this scenario to represent the relevant cloud resource allocation because to its simplicity and flexibility, since it works well with the query and reply paradigm employed by cloud servers. Prior to this, Prime Spot Instance was made available as a simple platform for resource allocation based on auctions, where clients could bid for the servers, they desired. The mathematics of the auction's theory may be used to distribute money by a group of wealth purchasers or even a group of capacity producers. Significant research on spectrum access in cognitive radio systems and other contexts for resource allocation appears to be dead.

Based on their technical and software configurations, virtual servers in modern networking may be categorized into a wide range of categories. Additionally, it could be necessary to combine many public clouds to simultaneously meet the demands of the various user bases. Older solutions that solely include a single cloud storage type and work type are thus unable to adequately represent the condition of the sector. On the other hand, customers may join and leave your market at any moment, and csps often switch between busy and idle phases. For capturing this dynamic, repetitive sales are preferred over single bidding. One simple tactic is to perform a succession of single bids over time. However,

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they often lose the honesty quality when discrete fair marketplaces are extended to successive bids. The honesty component ensures that consumers cannot falsify their honest assessments of the goods in order to get more rewards. This idea motivates us to expand the existing separate auction research and identify practical sequential market solutions.

Our method is most closely related to and introduces a special bidding language is based on grouping people into different groups in accordance with their characteristics. Users may be categorized into three groups: task users, asset users, and wealth users with night before bed fresh investments. In addition, trustworthy sites cloud auctions method is built over these buying languages [2]. However, the original sample only included one kind of public cloud. The estimated time period has been extended by the researchers, and an instance involving several occupations and computers is now being worked on. The final model must first resolve an optimisation problem in order to acquire the approach and compute a complex reward functional for each task that is created. These challenges become significant when handling real resource distribution on cloud servers with a large task traffic load.

Recent research has largely focused on using traditional stochastic auctions for online resource allocation to explain the many types of servers and customers with varied demands. It is well known that selecting the winner and collecting payment in combinational auction sites is NP-hard, making someone to unrealistic in a market place with real-time requirements, like cloud servers. This is true even though in theory complex mathematical bids can ensure certain useful characteristics (such as sincerity). These bids are often placed in a single sale. Numerous studies have been conducted on how to address winner identification using more simple solutions or to apply such to serial combination auctions as a result of these issues with combination bids. The authors presented a real method for subsequent recurring auctions. When a work requires a group of EC2 instances for more than one unit of time, this design requires users to bid in many rounds in addition to performing sophisticated winner selection and pay screening. The design is thus worthless when customers want continuous job performance [3]. An online randomized auction is used to represent how users engage with cloud service providers. The model utilized in this research takes into consideration both the various user expectations and the various categories of public clouds. It also considers a particular kind of auctioneer where the winners are selected via a series of one-round optimization tasks. Analyzed is an honest marketing strategy. However, since each round prior to the bidding process requires the use of experimental research to answer a number of optimizations, the structure is complex and physically taxing. All of the earlier papers and the most of the contemporary research focus on modeling client-internet communication while the data produced for public management is largely ignored. The ground-breaking study describes a comprehensive architecture for global reach networks where several bids are utilized to control interactions between users and cloud hosting. The interaction between cloud services as they exchange resources to suit the demands of their customers is then simulated using a consortium game. This research is one of the first to explore the interactions between customers and cloud hosting as well as between the virtual servers as a whole, despite the fact that consumers with package demands were simply not taken into consideration [4]. Another important challenge with distributed cloud resource allocation that is often overlooked in the research referenced is the delayed entrance problem. This problem arises when a user delay entering the market while aware of the market's anticipated future actions. Assume that during a recurring creative auction, some consumers discover that they may save money on cloud services by delaying their purchase. Every user has information on that side;therefore, this situation hinders their entrance into the market. This condition causes a large market to have uneven trade and congested entrances.

Finally, it can be concluded that the existing study on simulating the interactions between cloud administrators and customers has at least one of the following four potential constraints: Lack of the reality feature, (ii) expensive processing required to choose the winner plus payments, (iii) susceptibility to the postponed entry issue, and (iv) inability to manage customers' varying needs, which requires a range of different sites These issues will be attempted to resolve in our job. Additionally, to the best of our knowledge, our research is one of the first to analyze interactions between cloud computing management and privatized cloud hosting (CPs) using auction theory. Auction theory more accurately portrays the CPs' self-interest via the range of prices they are willing to provide.

### *1.1. Novelty and Contributions:*

To address the issues with the earlier studies mentioned in paragraph 1 and to address the interactions between (a) users and sky executives and (b) cloudy executives and CPs, a novel multiple auction structure is provided in this study. 1. We specifically consider cluster of skies systems (CCNs), which are made up of users with various demands and extensive cloud resources. An administrator is in charge of managing each CCN's activities. The CCN operators are looking to rent equipment from CPs to expand their pool of assets and eventually benefit their viable market users. The recommended architecture's initial phase is inspired by the interactions between customers and CCN supervisors, where each customer seeks to get the resources, they have requested from a CCN and is driven by possible of bids (OBSAs). 1 To the best of our knowledge, we are among the first to employ OBSAs to address the primary issues with earlier attempts to deploy flexible cloud servers. 2 We also provide the accompanying quality analysis, which is based on a novel Markov chains model that hasn't yet been investigated in the literature. The following step of the recommended framework describes the interactions between different CCN management on various CPs, where the Cc directors fight for resources of CPs. In contrast to the previous model, we construct a special paradigm for this stage that consists of two concurrent economies for purchasing cloud services: square industry and bid market. This paradigm better reflects the hunger of the personal CPs (by incorporating provided price) than the previous model. I conclude the CCN management's adwords ads in light of their inherent attributes in a secure market setting after conducting a complete investigation using the Henry equations [5].

centered on supplying during auctions. In the smooth sector, the CPs charge a set amount for their servers. When the prosecution supplied its computers together with their recommended rates, the CCN management made a bid in either a series or a sale to purchase the server while honoring the CPs' stated pricing in the sale industry (i.e., at least anticipated price would lease the matching servers).

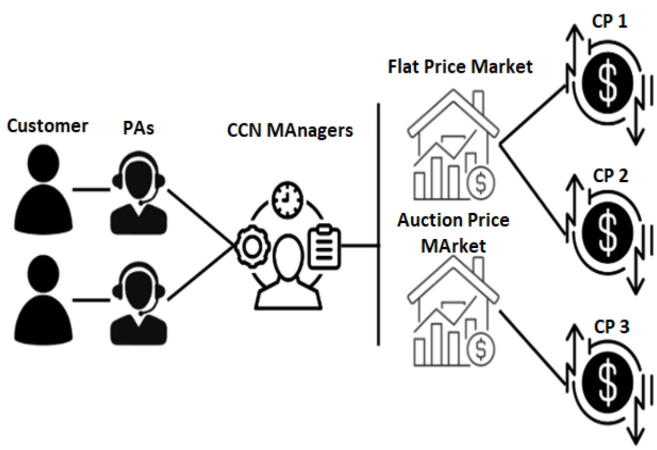


*Fig 1: Market model.*

Since the flat-price business model is more suitable for renting out servers with prolonged periods of idleness. Since he won't be using the system anytime soon, the CP wants to buy it for a set price in this case. Systems that are centered on the assessment of OBSAs, however, benefit more from the selling price market. Figure 1 models and analyzes the relationships between the CCN controllers and the CPs. The simulation's results are presented in Section 6. Section 7 concludes the article and provides some future choices.

## II. SYSTEM MODEL

A CCN consists of a number of cloud storages with different filtering rates; some are more suitable for GPU computing, while others are better suited for parallel computing and real-world data processing. In addition to their own servers, CCNs could rent computers from CPs to help them with their backlog of projects and to serve new customers. Small online merchants called CPs generate revenue by leasing out extra processing capacity to CCNs. Clients with various dispersed demands may join your CCN at any moment and need the simultaneous operation of several types of equipment. Inspiringly, proxy agencies (PA) are included into our strategy as reliable middlemen that connect customers with the proper CCN. Each client sends an idle PA a request, and the idle PA tries to fulfill the request utilizing the resources of the CCN. Each CCN's operations are managed by a CCN administrator who collaborates with CPs or PAs.

Due to the variety of job types and motivational reasons, which are meant to be known to their individual PAs, consumers may have variable preferences for different (combinations of) sites. The identical bid language used by the PAs and BNC managers in this approach reflects the expectations and values of the customers. However, exploring the negotiating phrase is beyond the scope of this research. Curious readers are referred to the resources provided in this article for more information. The concept of anonymity auctioned for the allocation of bandwidth in cellular connections has also attracted a lot of attention. In order to protect bidders' locations and bid amounts, these works focus on implementing effective encryption techniques to stochastic markets and double lotteries. In this research, we assume that the corresponding PAs instantly get both the purchase values and the customers' private information. Future study is needed to determine how to adapt realistic encryption techniques to our proposed auction strategy in order to protect this data.

In this work, we provide a system that allows CCN directors to lease servers via local police by participating in one of two neighboring markets, a square market, or a temporary idle period. In this case, the CP could soon need its tools for internal usage. As a consequence, in an effort to employ servers more rapidly, CPs compete with one another by decreasing the price of their servers [6]. In a same vein, a Cnd administrator who must rent a capacity immediately and for a long period of time is more likely to join the horizontal market than the other CCN management, who prefer to utilize the bid market. As shown in Figure 1, the recommended paradigm involves two processes for acquiring and distributing the assets. In contrast to those between the PAs and management of CCN, communications between Bnc administrators and the Prosecutors are revealed in two phases. The next parts will talk about and analyze the two stages.

## III. INTERACTIONS BETWEENCCNMANAGERSANDPAS: OPTIONS-BASED SEQUENTIALAUCTIONS

An auction is often used to sell products when there are several interested buyers. A series of sales events are held by the seller in a serial bidding process. Given that the seller may change the interval between them, sequence bidding is applicable in the following situations: I The availability of retail items fluctuates over time, making them unavailable in some circumstances; (ii) Since bidders approach the business at different times, the seller must wait for a specific period of time even before the number of customers reaches a certain threshold in order to guarantee one specific financial gain. In light of these facts, one may argue that consecutive bids are the best form of bids to use when renting out cloud hosting to PAs.

Both conventional and second-price serial auctions have been studied in the literature. However, one of the main issues with such bids when customers are presented with several successive auctions is the lack of a dominant strategy that can satiate various customer wants. Consider the two following situations:

1) A customer with diverse requests and a little expenditure needs products from one of the 2 successive auctions, never from each.
2) A bidder with a small budget needs items concurrently from both consecutive bidding.

**Algorithm 1:** Price Matching Process for first price

**Input:** Current Price that the PA has to pay when the current auction begins, entering and patience time of the winner PA ($P_{cur}$, $t_{enr}$, $t_{pat}$), clock time (T), winner of current auction bid ($b_w$)

**Output:** Price that the PA has to pay ($P_{out}$ (T))

$P_{out}$ (T) <-- $P_{cur}$
**If** (t>= T and $b_w$< $P_{cur}$ ) **then**
    $P_{cur}$ <-- $b_w$
**end**

In either case, a bidder cannot use a dominant strategy to distribute the funds across several subsequent bids. Running an alternative approach sale for each type of client would produce scenarios for the contacts between Jamais and the CCN directors, assuming the Jamais as customers and the Cc management team as marketers, but each computer as good classical periodic auctions are completely irrelevant and not the aforementioned cases [7]. When incremental, iterative, and recurrent bidders are used in our setting, the issue of delay entry arises because PAs may purposely delay entering the market in order to get a higher price. The undesired flood of new visitors caused by this phenomenon causes the market to become unstable.

The need for an auction process that can: I collect a market's fluidity with its sequences style of ownership; (ii) enjoy sincerity as the dominant strategy so that PAs cannot increase their profits by attempting to manipulate their own true market values; and (iii) address the problem of the delayed opening are all problems that point to the necessity for such a process. We propose using the options offered by sequencing auctions (OBSA) into our study in order to achieve this. Along with the benefits already stated, OBSA also improves the level of trust between bids and a bidder, which raises the auctioneer's long-term earnings. OBSAs also offer an easy application process and enable speedy winner identification.

In essence, OBSAs are iterative auctions with the choice's component re-included. Consider a standard sequential sale with a first- or third-core item in our case. The PA who makes the best offer prevails in the first- (second-)price scenario and is required to make a salary equal to his (her) suggestion. In our example, the possibilities feature guarantees the winning PAs the lowest payment throughout the course of their patient duration, where its tolerance period is defined as the amount of time the PA may wait before using its newly learned skills [8]. As a result, the PAs' pay is no longer based on whether or not they win an auction. Winners PAs in OBSAs have the option of use CCN resource for all necessary services ahead to paying taxes. The main way that the possibilities feature manifests in OBSAs as compared to traditional sequence auctions is via the price pairing process. Third spine OBSAs without even using applied mathematics. In this article, we introduce readers to recent online research, adapt it for resource allocation in the cloud, and give computational equations for a number of pertinent performance indicators. Furthermore, we provide the first-price internet OBSAs, which provide the basis for analysis for the third backhaul OBSAs

### 3.1. First and Second-Price OBSAs and PA's Role:

The succeeding without sacrificing generality examines the conversations between an excessive number of PAs and a CCN management. Please be aware that we consider methods for confidential bidding, in which PAs do not communicate with one another and are uninformed of one another's bid. The first-price or second-price basis, for which a separate sequence of sales is offered for each sort of unit, is how a CCN management executes OBSAs for its owned cloud servers. The activities that go along with the second- and first-price OBSAs are covered in the next section:

**Determining the proposal by each event of concern:** The PA submits a bid for the relevant auction that is equivalent to the customer's maximum, restricted benefit. Using this purchase strategy, the PA secures those server types that might be profitable for the linked client.

**Obtaining the lowest price (pricing verification):** Every PA in such an auction has two operational modes participation phase versus observer mode. When a PA joins a CCN, he joins the corresponding active bidding as a participant. When the PA accepts the auction, he immediately enters witness duty for that particular bidding. In this manner, the observers PA follows the steps below to decrease the cost of a winning server: 4

**Algorithm 2: Price Matching Process for second price**

**Input:** Current Price that the PA has to pay when the current auction begins, entering and patience time of the winner PA ($P_{cur}$, $t_{enr}$, $t_{pat}$), stored bumped PA's ID in this PA's memory ($ID_{mem}$), clock time (T), bid and ID of the current auction's winner ($b_w$, $ID_w$), bid and ID of the current auction's bumped PA ( $b_{bumped}$, $ID_{bumped}$)

**Output:** Price that the PA has to pay ($P_{out}$(T))

```
Pout (T) <-- P
If (t>= T) then
    If ( IDmem =! Null) then
        If IDw = IDmem then
            IDmem <-- ID bumped
            Pcur <-- bbumped
        end
    else
        If bw< Pcur then
            IDmem<-- Null
            Pcur <-- bw
        end
    end
else
    If bw < Pcur then
        Pcur <-- bw
    end
end
end
```

**OBSAs with a first-price foundation:** If the victor of the auction places a smaller bid than the observed PA's existing payment, the watcher PA reduces his current reimbursement to the winner's bid. Nevertheless, the observant PA somehow doesn't alter his existing payment in any way. Algorithm 1 describes the cost matching procedure for the initial-price OBSA.

**OBSAs with the second–price foundation :** In this scenario, every PA has a unique identity that is modified each when he enters your markets n service of a client. The winning PA records the name of PA who made the proposal.

**B-1) The pushed PA won the subsequent bidding:**

The observed PA reduces his previous payout to the 2 bid of the subsequent bidding and innovates his memories by noting the name of the PA who offered this proposal.

**B-2) The PA who was bumped remains at the auction but wins a next sale:**

This suggests that the winning offer was greater than observation PA's existing rate of pay. This is because honesty is a key tactic in second-price OBSAs and the genuine value of the bumping PA is thing. In this scenario, although neither witness PA's memories nor its present payout will alter.

**B-3) The PA who was rejected exits the sector:** The observer PA decreases his current contribution to each successive winner's offer if it is smaller than his existing contribution after cleaning his memory (same as the first-price backbone). A description of the cost matching process for the second-price OBSAs is shown in Table 1.

TABLE 1: Simulation setting for the dynamic market between the CNN and the CPs managers.

| Parameters | Values |
|---|---|
| u | 6 |
| μ | 0.8 |
| $\lambda_A$ | 0.5 |

| | |
|---|---|
| $\lambda_{CCN}$ | 0.6 |
| $\lambda_{CP}$ | 0.8 |
| **z** | 110 |
| **a** | 0.05 |

**Leveraging the winning servers:** At the end of the PA's waiting time, he chooses the servers that will optimize the linked customer's utility. The PA chooses a collection of all processors s logically, where s = arg max[v(s) p(s)], S is the maximum profit of $0 and vmax may be a maximum value determined by market research. Furthermore, it is envisaged that each auction's PA bids would be distributed equally and separately. Furthermore, it is assumed that the mean of the markets' PAs exhibits a Poisson distribution with the mean, with a portion of them taking part in the auction at each round [9]. As a consequence, each auction's PA count had a mean that followed a Distribution function. 7 Any dispersion of the PA bids is compatible with the study that follows, but more accurate bid distributions are necessary to offer information that may be utilized to draw inferences. For this purpose, two specific patterns of PA bids that are representative of a wide variety of markets are considered. the quantity of public cloud sold and the total number of awards sold are both shown. Figure 2 also displays the linked CCN manager's income. Each of the 10 types of servers that are taken into account in this simulation executes 1000 bids synchronously once per minute, with the total number of computer types needed for each PA being split equally across the time period. The server arrival rates (per minute) are i.i.d. and uniformly distributed between [1/15, 1]. This time was determined using data that indicates that the majority of job executions take under 15 minutes. Customers shouldn't be allowed to leave the store without getting the resources they ordered (long patience time). Implementing the OBSAs enhanced resource use, customer satisfaction, and the CCN owner's income, as demonstrated in figure 2.

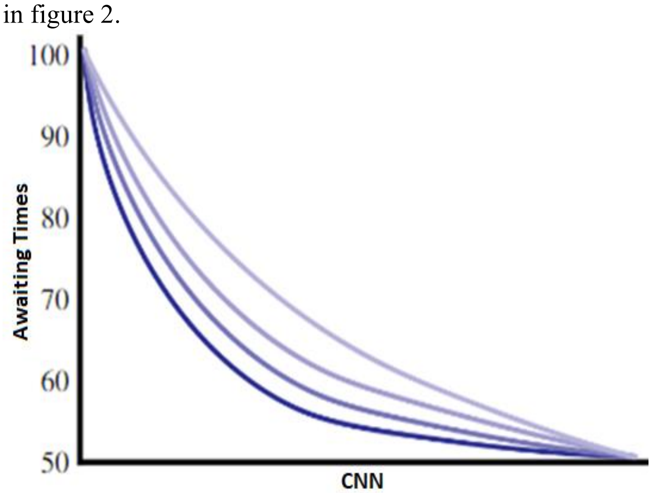


*Fig 2: The proposals first from CCN administrators on the remaining awaiting times for various rates on marginal utility.*

TABLE2: Simulation setting for the dynamic market between the PAs and the CNN managers.

| Auction Mechanism | Bid's Range | Distribution | Parameters |
|---|---|---|---|
| First Price / Second Price | [51, 143] | Uniform / Sampled Laplace | $\delta = 2$<br>$\mu = 75$<br>w = 55 |

**Market Stability:**For different PA numbers (N) and residual patience periods, compare the winners' rewards for the sequential combinatorial auction with the second-price OBSA described in Scenario 1. (). Data-based analyses of the volatility of past payments revealed a market that was simpler for the CCN administration to predict. Despite the fact that they likewise yield the identical outcomes, the first-price OBSAs are not included due to space restrictions [10].

According to Table 2, there were, respectively, and, and PAs in the sequential combinatorial auction and the second-price OBSA. The number of PAs provided at each time instant in this scenario is seen as a Poisson random variable with a mean of 93, and there is one auction conducted at each time instant. This statistic is generated on the assumption that 10% of all PAs will participate in each round of the auction. Each PA is free to put off their participation. 20% of these PAs need to be familiar with upcoming market circumstances. The market will typically get the 10 lowest proposals from the participating PAs. To show how people who are taught PAs postpone entering the market, which results in an unfavorable burst of arrival, sequential combinatorial auctions may be employed. However, the proposed OBSAs are effective in masking this issue.

## CONCLUSIONANDFUTUREWORK

In this research, we propose a comprehensive, multi-paradigm paradigm to describe how resources are distributed and collected in modern cloud networks. In the first step, the connections between PAs and the CCN management are discussed. Figure 3 shows that OBSAs are recommended for this stage together with the conceptual model, which have an easy winner selection process and provide the veracity attribute. In the second stage, the relationships between CPs and CCN controllers are modeled.

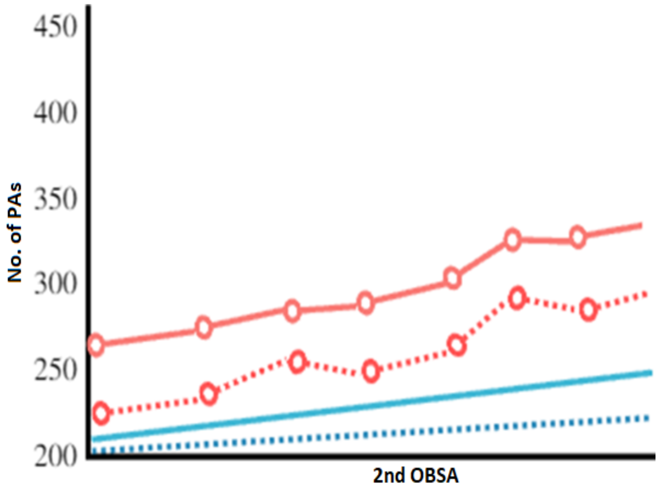


*Fig 3: Comparison of a 2nd OBSA and also the sequentially creative bidding for different numbers of PAs within scheme (N)*

At this stage, a fictitious framework is developed to examine the purchasing habits of the CCN managers. Future research might take the route of examining the welfare benefit or other significant factors optimal. Examining the capital allocation and network capacity problems together is also intriguing. Here, a CCN controller need to examine the websites of servers using CPs to figure out the greatest wealth redistribution.

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