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Abstract:
We present a cloud resource obtaining approach which not only operates the selection of an appropriate cloud vendor but also implements dynamic pricing. Three possible mechanisms are suggested for cloud resource acquisition: Cloud-Dominant Strategy Incentive Compatible (C-DSIC), Cloud-Bayesian Incentive Compatible (C-BIC) and Cloud Optimal (C-OPT). C-DSIC is based on the VCG mechanism and is a low-bid Vickrey auction. C-BIC is used to achieve budget balance. It does not satisfy individual rationality. In C-DSIC and C-BIC, the cloud vendor who charges the lowest price per unit QoS is announced the winner. In C-OPT, the cloud provider with the least virtual cost is declared the winner. C-OPT overcomes the limitations of both C-DSIC and C-BIC. C-OPT is not only Bayesian incentive but also individually rational. Our experiments indicate that the resource procurement cost decreases with the number of cloud vendors irrespective of the techniques. We also suggest a procurement module for a cloud broker who can implement C-DSIC, C-BIC and C-OPT to perform resource procurement in a cloud computing context. A cloud broker with such a procurement module enables users to operate the choice of a cloud provider among many with diverse offerings is an essential first step towards implementing dynamic pricing in the cloud.

Keywords: Cloud computing, mechanism design; cloud Broker, Multi-agent, and Dynamic pricing.

I. INTRODUCTION:
Cloud computing is a popular domain of offering services through the internet. It is an active area of research and this domain is more popular and grows rapidly. Cloud services are provided by many companies like Google, IBM etc. Cloud computing is the means of accessing a shared set of computing resources that can be rapidly used provided, used and released with minimal effort. It has been emerged as a very flexible service. It provides the computing infrastructure enabling the users to provision the resources for their needs and by removing the costs of their system. Clouds give the users to compute resources based on demand and make them to pay for the resources for the short time. It reduces the time required to adapt heavy resources and boot the new instances in a short period of time. In the present cloud computing system, the resource allocation is not much efficient and flexible due to the cost.

II. EXISTING WORK:
The main advantage of cloud computing is that avoiding the problems of over provisioning which are commonly seen with organizations that have wide requirements. The resources include storage, CPU processing power and so on. These resources are geographically distant from users. Adaptation of cloud resources is an unexplored area in cloud computing domain. The vendors of cloud will always follow a fixed pricing process it is said as “pay as you go”. It means that the users will pay for the particular resource they need and there will not be any incentive provided to the users based on the availability or other factors. Most of the cloud vendors use the pay as you go model. The default process will always benefits only the vendors not the users, which may result in mismatch user requirements. An important feature of economic models is the distribution of incentives to bidders, which are cloud vendors in our domain. However, this means that cloud providers may not react truthfully and may seek to increase their credentials using improper behavior. In this process the user will upload the file for the space requirement. The uploaded file will viewed by the broker and the space will be allocated to user randomly. Here exact file space will not be allocated to the user. The broker will give random amount of resource allocation space to the user. He will send the user specification to the cloud vendors. Based on the result of the cloud vendors, the broker will allocate the space to user. Here, the provider will only allocate the resource space, the user cannot select for allocation space. So in the existing system there will be wastage of space, less efficiency. Due to this, there will be more energy consumption and have a high cost.

III. RELATED WORK:
[1] It introduces the SOC based approach and it achieves the maximised resource utilization. It is designed to deliver optimal execution efficiency.
[2] It is designed to keep the migration time minimum as well as minimizing the number of migrations.
[3] It proposes a system which increases the efficiency of the scheduling algorithm for the real time cloud computing services. The algorithm utilizes the turnaround time.
[4] It introduces a new concept of allocating resources to a data analytics cluster in the cloud.
[5] This paper proposed a new mechanism to allocate resources with minimum wastage and provides maximum profit based on...
different parameters like time, cost, number of processor request etc.

[6] The proposed system has been applied to minimize the cost of procuring resources without compromising the quality of service.

IV. PROPOSED WORK:

We proposed a new approach for dynamic autonomous resource management in computing clouds. In this, each cloud user has resource requirements. The users perform reverse auctions of procuring resources which are also called as procurement auctions. Three possible mechanisms are suggested for cloud resource procurement: cloud-dominant strategy incentive compatible (C-DSIC), cloud-bayesian incentive compatible (C-BIC) and cloud optimal (C-OPT).

Cloud vendors offers resources, but with varying costs and quality metrics. The main motive of the cloud user is to reduce the total price of procuring resources without compromising the quality of service. To minimize the procurement cost it is necessary for the cloud users to know the actual costs of cloud providers. A user announces its specification for desired resources and quality of service to all cloud vendors, with the broker acting as a middleman. The cloud vendors participate in the auction based on the information and submit their bids to the broker. The broker then sends the cloud specifications to the user. The user analyses the specifications and selects the cloud vendor. Here, based on the user’s space requirement, the cloud broker allocates the exact space to the user, which avoids energy consumption and increases efficiency.

V. ARCHITECTURE DIAGRAM:

VI. ALGORITHM:

A. C-DSIC: This is a Dominant Strategy Incentive Compatible technique. The best approach for a cloud vendor is to bid openly. In this process both Price and QoS parameters are computed for each Cloud provider. The Provider who has the least ratio of price to QoS parameters is said to be the winner. The users pays the cost as per the next lowest bid. C-DSIC algorithm achieves the efficiency and individual rationality but it is not budget balanced. This algorithm can be preferred when all the Cloud providers use the same distribution of price and QoS parameter.

The allocation rule used for calculating the cost and QoS parameters is given as:

\[ g(\hat{p}) = \begin{cases} 1, & \text{if } \frac{c_i}{q_i} = \min\left(\frac{c_1}{q_1}, \ldots, \frac{c_n}{q_n}\right) \\ 0, & \text{otherwise} \end{cases} \]

Where, \( g = \) Allocation function
\( c = \) True cost provided by resource

\( q = \) Reported QoS

Algorithm 1: C-DSIC

\[ \text{Input : Set of bids } \hat{b}_1, \hat{b}_2, \ldots, \hat{b}_n \]
\[ \text{Output: Winner and payments for participants } (\hat{b}_1, \hat{b}_2, \ldots, \hat{b}_n) \]

\[ \min \left\{ \begin{array}{ll} \text{min} & \text{for i = 1 to n do} \\
\text{winner} & \text{for i = 1 to n do} \\
\text{end} & \end{array} \right. \]

\[ \text{if } \left(\frac{\hat{c}_i}{\hat{q}_i}\right) < \min \text{ then } \min \left\{ \begin{array}{ll} \text{min} & \text{for i = 1 to n do} \\
\text{winner} & \text{for i = 1 to n do} \\
\text{end} & \end{array} \right. \]

\[ \text{for i = 1 to n do} \]

\[ \text{end} \]

B. C-BIC: This is a Bayesian Intensive Compatibility technique. In this process each cloud provider provides a participation amount. This amount is used for paying other cloud providers. So C-BIC Algorithm is budget balanced and efficient. Here the provider with the low cost and the QoS parameters is said to be the winner. When compared to C-DSIC that obtained cost of the user is less. Here, the individual rationality is not achieved. This process is mainly suitable for government organizations. The loss of cloud providers’ amount in the C-BIC can be seen as the pay for participating in the acquired auction.

The payment rule is given as:

\[ h(\hat{b}) = \sum_j (\hat{b}_j) - \left( \frac{1}{n-1} \sum_{j \neq i} \sum_{t}(\hat{b}_t) \right) \]

Algorithm 2: C-BIC

\[ \text{Input : Set of bids } \hat{b}_1, \hat{b}_2, \ldots, \hat{b}_n \]
\[ \text{Output: Winner and payments for participants } (\hat{b}_1, \hat{b}_2, \ldots, \hat{b}_n) \]

\[ \min \left\{ \begin{array}{ll} \text{min} & \text{for i = 1 to n do} \\
\text{winner} & \text{for i = 1 to n do} \\
\text{end} & \end{array} \right. \]

\[ \text{if } \left(\frac{\hat{c}_i}{\hat{q}_i}\right) < \min \text{ then } \min \left\{ \begin{array}{ll} \text{min} & \text{for i = 1 to n do} \\
\text{winner} & \text{for i = 1 to n do} \\
\text{end} & \end{array} \right. \]

\[ \text{for i = 1 to n do} \]

\[ \text{end} \]

\[ \text{for i = 1 to n do} \]

\[ \text{end} \]

\[ \text{end} \]

\[ \text{end} \]

\[ \text{end} \]
C.C-OPT: This is a Cloud Optimal process which is used to overcome the drawbacks of C-DSIC and C-BIC. The process of determining the winner and the payment process are unique. Virtual Cost (function of cost and QoS) is computed for every Cloud provider to determine the winner. Cloud providers are ranked through virtual cost. The provider whose virtual cost is low is determined to be the winner. The payment is done based on the quoted cost and the expectation of the space allocation.

Algorithm 3: C-OPT

Input: Set of bids \( b_1, b_2, \ldots, b_n \)
Output: Winner and payments for participants \( (h_1, h_2, \ldots, h_n) \)

\[
\begin{align*}
\min & \rightarrow \infty; \\
\text{winner} & \rightarrow 0; \\
\text{for } i & \leftarrow 1 \text{ to } n \text{ do} \\
\quad & \text{Compute } H_i; \\
\quad & \text{if } (H_i < \min) \text{ then } \min \rightarrow H_i; \\
\quad & \text{winner } \rightarrow i; \\
\text{end} \\
\text{for } i & \leftarrow 1 \text{ to } n \text{ do} \\
\quad & \text{// Pay each cloud vendor } i \\
\quad & \text{// based on (11)} \\
\quad & h_i(b_i) = c_{g_i}(b_i) + \int_{c_i}^{\infty} X_i(y, \hat{q}_i) dy
\end{align*}
\]

VII. MODULES:

A. FILE UPLOAD:
New users have to register to use the cloud space. The information required for registration is Username, Password, Mail ID, Mobile Number etc. The Username and Password are used for the purpose of Login. The user uploads the file, which he wants to store in Cloud. Then the user selects a specific broker and sends their requirements. The broker now Login and views the user specification.

B. CLOUD RESPONSE:
The Broker sends request to the various Cloud Vendors available. There are lots of cloud vendors like Google, Yahoo and so on. The specifications of these cloud vendors are not uniform. Each Cloud has its unique features. The cloud broker, request cloud vendors for resource (space allocation) and sends their specification to all the cloud vendors. The cloud vendors respond with cost and QoS parameters of their service.

Figure 2. Parameters of their

C. CLOUD SELECTION AND PAYMENT:
The Broker will be receiving responses from various cloud vendors with their own unique features. The broker then selects a cloud based on BIDDING technique that satisfies user’s requirements. After selecting the particular Cloud the payment is made through online. Once the payment is made successful the space is allocated to the broker by that Cloud Vendor.

Figure 3. Vendor

D. BROKER RESPONSE:
When the broker is ready with the space to be allocated for the user, he now provides the payment details to the user. The amount is fixed based on the file size uploaded by the user. The user then receives payment details provided by the broker.

Figure 4. Broker, payment details, User

E. USER BIDDING:
After the user receives payment details from the broker, the user has to go through the specifications of the broker to obtain the service within budget and of the desired quality. If the user is satisfied with the specifications and the cost, he stops the bidding and accepts with that broker. The payment has been done and the file will be deployed in the cloud. The file can be downloaded by the user for their future reference. If the user is not satisfied he may opt for another broker for better price and specifications. This process (bidding) continues until the user gets satisfied with the specifications and cost.
VII. IMPLEMENTATION RESULT:

In this acquiring mechanism it can be used by the grid users to obtain the resources in the computational grid with the resource providers. This process is carried out mainly in a decentralized manner. The price and the tasks are distributed uniformly. The obtained cost will be calculated and compared. Virtual cost is computed for each and every cloud vendor. The vendor with the lowest cost will be said as winner. Calculation will be done on QoS parameters and the cost. Payment will be based on the cost and the expectation of the allocation.

QoS parameters can be positive or negative. Negative parameters are scaled by,

$$\beta_{i,j} = \left\{ \begin{array}{ll} \frac{\alpha_{i}^{\text{max}} - \alpha_{i}^{\text{min}}}{\alpha_{i}^{\text{max}} - \alpha_{i}^{\text{min}}} & \text{if } \alpha_{i}^{\text{max}} \neq \alpha_{i}^{\text{min}} \\ 1 & \text{otherwise} \end{array} \right. $$

where,

- $\beta_{i,j}$ = normalized value of QoS parameter
- $\alpha_{i}^{\text{max}}$ = maximum value of QoS of cloud vendor i
- $\alpha_{i}^{\text{min}}$ = minimum value of QoS of cloud vendor i
- $\alpha_{i}$ = value of QoS parameter

Positive parameters are scaled by,

$$\beta_{i,j} = \left\{ \begin{array}{ll} \frac{\alpha_{i}^{\text{min}} - \alpha_{i}^{\text{min}}}{\alpha_{i}^{\text{max}} - \alpha_{i}^{\text{min}}} & \text{if } \alpha_{i}^{\text{max}} \neq \alpha_{i}^{\text{min}} \\ 1 & \text{otherwise} \end{array} \right. $$

IX. CONCLUSION:

In the present system, the cloud user pays a fixed price for resources. On the flip side, there is no provision for incentives for users in fixed strategy. Resource procurement is not an important issue in cloud computing but is also an unknown area. At present, resource management is done manually and there is a need to automate it. In order to automate procurement, we have three mechanisms, C-DISC, C-BIC and C-OPT. C-DISC and C-OPT are a low-bid Vickrey auction. C-BIC is a weaker strategy compared to C-DISC and it is Bayesian incentive compatible. C-OPT achieve both Bayesian incentive compatibility and individual rationality, which the other two techniques cannot achieve. This mechanism is immune to both overbidding and underbidding. C-OPT is more general when compared to both C-DISC and C_BIC. Hence, C-OPT is the preferred mechanism in more cases in the real world. The experiment reveals an interesting pattern. The resource procurement cost reduces. The cost in C-BIC reduces more significantly, compared to the other two mechanisms.

X. REFERENCES:


