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Refundable Service through Cloud Brokerage

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***Abstract*—Due to the lack of fairness in pricing and SLA violation of cloud computing, customers are dissatisfied with the existing pricing model of current cloud computing environment, and there have an immense chance to lose those dissatisfied customers. Therefore, we wish to provide a solution that can preserve customers' appreciation by refundable service. In this paper, we propose a unique technique that can boost up customer satisfaction and diminish cloud service provider anxiety for continuing their business. We are going to apply a third party cloud broker that can handle all of the business procedure instead of cloud service provider. Our method offers refunding in case of unutilized resource as well service quality degradation.**

***Keywords*-Refundable Service; Service Level Agreement (SLA); Service Estimation; Pricing; Cloud Broker.**

I. Introduction

Cloud computing has achieved tremendous consideration by its significant impact for the distribution systems of computing resources. The flexibility, customization, scalability and adaptable pricing methods are key characteristics which indicate that cloud computing will rapidly turn out to be a utility, available anytime, anywhere. The cloud computing business operation merely depends on both in terms of availability of the service and quality of service (e.g., response time), and it must meet consumer requirements (*i.e*., service level agrement(SLA)) at all times. However, this approach does not necessarily benefit the consumer while SLA falls through. One of the core components in cloud computing is a pay-as-you-go pricing model. It enables users to scale their capacity upwards or downwards according to their computing requirements change. However, pay-as-you go means that the cost of computing will be different for every month, and this method has significant variation in the user cost among different users from an economic viewpoint. It also violates fairness in both of personal and social perspective. Actually, personal fairness means that the price of a service should be low. Conversely, the social fairness primarily inspects whether all users have the equal cost for the same service. The most unwanted fact is that the unfair pricing method could foster dissatisfaction from users, and thus the cloud service provider might lose customers. A number of studies [4, 5] have been dedicated to measure the cost of adopting the pay-as-you-go cloud in terms of monetary cost, performance, and availability. Therefore, a pay-as-you-consume pricing scheme has been proposed [3], which charges users according to their actual resource consumption without interference. Although, the pay-as-you-consume method reflects the favorable cost of accomplishing the task and provides a fair cost to users, but the pay-as-you-consume model reduces the cloud providers' profit.

For the aforementioned drawback, we are going to propose a new cloud broker-based computing model that can ensure the SLA management along with refundable service for service quality degradation. Some sorts of penalty method are exist to considered with SLAs violation from a single cloud service provider. However, in our method we consider different cloud service provider to obtain cloud service for a particular cloud consumer, and cloud consumer will receive refund from its dedicated cloud service provider for SLA violation as well as the service cancelation. To the best of our knowledge, this is the first work that can certify above requirements at the same time. Our contributions can be summarized as follows:

- We propose a cloud brokerage model that can be able to ensure the Service-level Agreement (SLA) through cloud broker.
- Our model provide refundable service in case of unused resource and service deterioration.

II. Related Works

Service Level Agreements(SLAs) are a common method for specifying the precise conditions under which services are to be delivered. *Buyya et al*. [2] suggested SLA-oriented resource management system by using Aneka [1] for Cloud computing. A service-oriented resource broker is applied to discover select, reserve and assign best combined resources. The better quality and low cost of services for all over the world is a vital issue in cloud computing.

III. Proposed refundable service model

In our proposed architecture, cloud resource consumers(CRC) are end users who access services through a web browser. The cloud broker(CB) is a negotiator between

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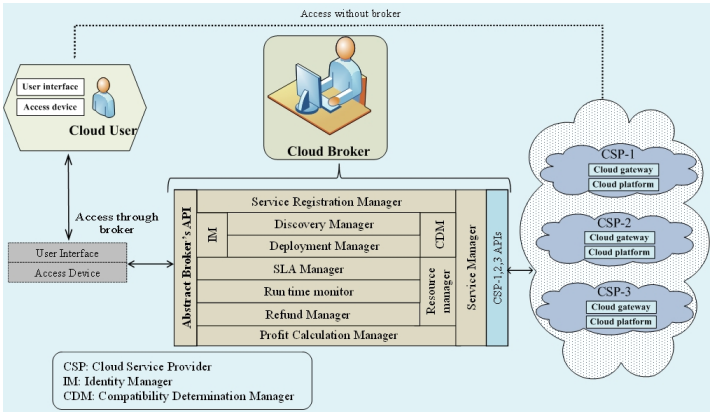

Figure 1. Cloud Architecture with Brokerage model

the CRC and multiple cloud service providers. In figure-1, we can see CB includes an application programming interface (APIs), and a standard abstract API used to manage cloud resources from different cloud providers. A cloud service provider (CSP) is an authority who needs to handle peak load demands. Every single CSP includes an application programming interface (API), cloud gateway, and cloud platform (figure-1). A standard abstract API used to manage cloud resources. In our model, CSP deploys their resource in the form of services by the help of a CB, where users can easily find resources throughout the service-oriented architecture. From the figure-1, we can see that, (1) CRCs request for their demanded service to the CB,and (2) CB search for the compatible CSP. After finding appropriate CSP,cloud broker assign to the requested CRC, and finally (3) CRC is receive services from compatible CSP.

During the service consumption, CB will observe the amount of utilization of registered resources and quality of service. And if CRC request to discontinue the remaining service and claim for the refund of unutilized service then CB determine the refund amount according to the equation in the below:

$$R_t = R_{f_1} + R_{f_2} .....(1)$$

$$R_s = (1 - \frac{\delta}{100}) .....(2)$$

Where, δ is an utilized resources, R_s consider as the unutilized resources value, R_t is the total refund amount, R_{f1} is the refund amount for unutilized resource, and R_{f2} is refund amount for the service quality degradation.

$$R_{f_1} = R_s * P_0 * (\frac{\delta}{100}) .....(3)$$

$$R_{f_2} = (\frac{S_a}{S_q} * \frac{N}{100}) * (P_0 - R_{f_1}) ....(4)$$

Where, P_0 actual service price, S_q is promised service quality that is SLA, S_a is the acquiring service's quality, and N is the ratio of refund amount. Refund rate depends on several attributes such as amount of unutilized resources, service quality.

IV. Conclusion

Business part of cloud computing is very much challenging. Pricing is an unpredictable aspect almost in every business, it is almost impossible to set a strict price for a distinctive service due to the numbers of competitor in the cloud business. As we know, pay-as-you go pricing model is very much popular in cloud computing. However, pay-as-you go pricing model has several drawbacks in terms of fairness. Therefore, we have been proposing new pricing algorithm based on user characteristic and service reservation duration. Finally, we have proposed refundable service that is noble algorithm, until now no work has done to consider with refundable service.It has been proved that our refundable service is significantly effective for the cloud computing. In future, we would like to extend our work for service estimation and setting up a precise service price.

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