Resource Bill Prediction and the Comparison System for Cloud Consumers to achieve Cost Effective Uses

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***Abstract*— Cloud computing that in short called as "cloud" is a collection of resources, software, and information that form a pool can be accessed over a network (Internet). Cloud provides different services based on "Pay for as you use" principle, i.e., one can pay only for those resources utilized for a particular time. The resources and services provided to various devices like how one uses as a utility (like an electricity grid). Users of the cloud need to know the usage accounting infrastructure that provides billing as an accounting application, it must also support all kinds of applications. Most of the time service provider, fail to understand and provide the requirements of the customers, and hence they try to add additional capacity from a Trusted Third Party (TTP) provider. The consumer is unaware that they are dealing with an additional cloud service provider. Thus, there is an increase in cost to be paid by the consumer. Billing must ensure that the customers will be charged correctly and only for the resources that are consumed. As billing options changes, the meter rate also change, based on the options chose and the time of the day. The proposed system, provides the consumer to keep track of their billing account. It also predicts the different schemes matching with the current requirement of the customer with the costs of the resources of different providers. Consumers can know different scheme provided by various providers. It allows customers to select different pricing scheme that is best matching to their requirements.**

***Keywords- Cloud Computing, Price Prediction, Price Comparison, Pricing Models*.**

I. INTRODUCTION

In Cloud Computing, dynamically scalable and often virtualized resources are used as a service over the internet. Consumers pay for the resources that they utilize and use as much as capacity required. There are three dimension based on which Pricing for cloud platforms and services like Bandwidth, Compute & Storage. Based on the application characteristics, cost of deploying an application could vary based on the selected platforms. Besides the unit pricing, it is also required to calculate monthly development, deployment and its maintenance costs of the application at client side.

Cloud users must be provided with the unambiguous accounting of the resources, calculating the billing charges of the resource usage based that they have used for particular duration. The data is collected on behalf of the consumer over a given time. The customers use the resources and calculate the usage. To control it customers can use applications for keeping alarms, controlling their IT budget.

The issue is raised [1] is the *accountability* of the resource usage data. In this paper the account of the data that is used and preserved, and performs the measurement to collect the resource usage data from the provider, the consumer, a trusted third party (TTP), or some combination of them. Provider side accountability is like traditional utility services. To generate bills for water, gas and electricity, providers make use of metering devices (trusted by consumers) that will be deployed in the consumers' premises.

The above issue has raised an improvement in the current system. The proposed system keeps the records of resource billing. The system keeps track of the bills of the customers and also provides the upcoming bill for a given time- hourly, days or monthly.

This system helps the costumers to maintain and control their IT budgets for resources that they use. The proposed system also searches for other providers with the same resources and their costs charged.

II. RELATED WORK

The calculation of the resources is based on the operations, payload, and traffic. Different solutions are offered by various authors to calculate the accounting of the services used. Various schemes are available in the market for comparing the costs of different providers.

Keeping the solutions together and bringing them on the same platform then the consumers, who are non-expert users, can also perform accounting of bills and selecting of the schemes on the same platform. Thus reduces one's

search on individual provider's site for checking of the costs.

Satisfaction of the users is evaluated using a utility measure that depends on the resource properties and user's preference to choose certain providers. The customers get the freedom to choose two or more providers with the same resource capacities, with economic price comparison list. Different providers can be selected by the user due to the user's choice behavior and loyalty. The task of optimally pricing cloud resources are used to attract users and improve revenue is very challenging.

The paper shows how the cloud resource metering and bill prediction methods can be utilized to help the consumer to control their IT budget for a particular duration of time. It also provides a non-expert user to access the pricing details of the cloud resources from various providers and select the best-suited scheme as per their requirements.

Table I. Analysis of Existing System

Sl. No	Method	Advantage	Disadvantage
1.	Weak and strong resource accounting model	Budget Controlling. Dynamic adjustment of resource capacity throughout the life cycle of the cloud-based application to stay within bounds of predetermined cost.	Difficulties to collect metering data even for infrastructure level services that are conceptually quite simple
2.	Ontology-based algorithm	Non-expert users can also deploy the services faultlessly	Requires small number of alternatives and limited objectives.
3.	Compute the price for the cloud provider 'i' in a duopoly market	The best suitable price that matches to their service qualities	
4.	1) Cloud Dominant Strategy Incentive Compatibility (C-DSIC) 2) Cloud Bayesian Incentive Compatibility (C-BIC) 3) Cloud-Optimal (C-OPT)	Optimal Cost calculations is done using cost-optimal algorithm.	
5.	Markov Decision Process that produces the solution as Markov Perfect Equilibrium	Provides the cost calculation efficiently	
6.	Agent-based cloud computing	Software tools and testbeds used for managing cloud resources Complex cloud negotiation mechanism was devised to support cloud commerce. A multi-criteria search engine used for budgetary requirements from consumers	
7.	Hidden Markov Model	To estimate the acquisition of cloud nodes	

IV. PROPOSED SYSTEM

Nowadays pricing has become an important research and very challenging topic. The proposed system provides the bill of the consumed resources, predicts the bill for a given period. It also compares the cost of different provider's resources and services for the selection of increasing cost effective selection of the provider by the users.

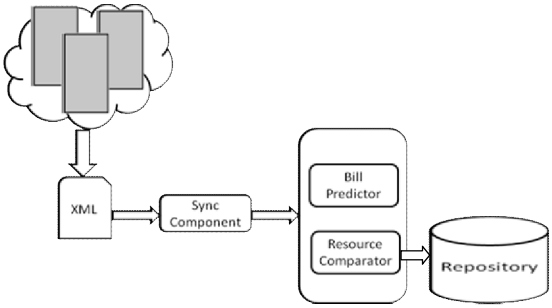

Figure 1. Architecture of Proposed System.

The proposed system shown in Figure 1 has three modules. Resource Comparator(RC), Bill Predictor (BP), and Sync Component. The BP module generates the current bill of the resources consumed by the consumer and also it predicts the bill for a given timestamp. The bill prediction is done based on three parameters, hourly, daily and monthly. This module will inform the customer that how much budget is required for the upcoming period.

The RC is next module. It compares different prices of various providers in a single platform so as to help consumers to select the best suitable price for their requirements. The selection of the providers can be carried out on the parameters like, most recently used resource combinations.

The last module is the sync module that will link the system to the cloud providers. It updates the repository consistently with latest metadata provided by cloud providers.

V. MATHEMATICAL MODEL

$AqCost(S_v)$= Cost (a_v,p_k) X T + Cost(cm_v,p_l) X T + AppTransCost(k,l)

where

$$AppTransCost(k,l)= \begin{cases} 0, & \text{if } k=l; \\ Size(a_v,p_k) \times Cdext(P_l), & \text{if } k\neq l. \end{cases}$$

ii. $TransCost(e\{v,v'\})=Size(Data_{e\{v,v'\}})Xc_{dint}$

iii. $DecomCost(S_v)=CostPerUnit\ X\ SizeOfData_v$

iv.

TC=

$$\sum_{v\in V}(AqCost(S_v)) + \sum_{v\in V}(TransCost(e\{v,v'\})) + \sum_{v\in V}(DecomCost(S_v))$$

VI. ALGORITHM

Algorithm: GenerateBill

Data: CpuUsage
Data: predictedPrice
Data: timestamp
Data: noOfVM

begin CreateBill

foreach *noOfVM[i = 1 ... n]* do
CpuUsage ← getCpuUsageAtTimeStamp(timestamp)
predictedPrice ← getPriceAtTimeStamp(timestamp)
billAmount ← vmCpuUsage * predictedPrice
store(noOfVM[i], billAmount)
end

end

begin getCpuUsageAtTimeStamp

Data: timestamp
Result: CpuUsage
CpuUsage ← getCpuUsageAtTimeStamp(timestamp)
return CpuUsage

end

begin getPriceAtTimeStamp

Data: timestamp
Result: predictedPrice
predictedPrice←
getpredictedPriceAtTimeStamp(timestamp)
return predictedPrice

end

The above algorithm takes the number of CPUsage and the timestamp. Computes the price which is predicted. The algorithm calculates the CPUUsage in hours and then finds the product of CPUUsage and PredictedPrice. Stores this bill amount into the storage.

VII. RESULT

TABLE II. USAGE AND BILLING RESULT

Product Name	Rate	Usage Quantity	Cost	No. ofHrs
Amazon S3	0.05	7	0.35	1
Amazon S3	0.05	6	0.9	3
Amazon S3	0.05	8	0.8	2
Amazon S3	0.05	10	0.2	4

The above Table II shows the usage quantity of product and the cost billed for that product.

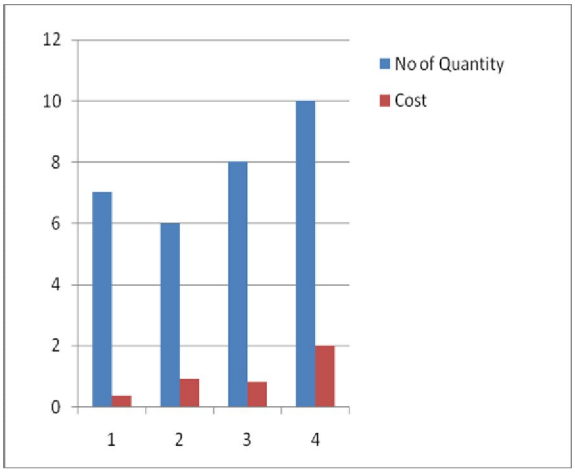

FIGURE 2. Usage versus Cost

VIII. CONCLUSION

Many resources are pooled in a single place that is called as Cloud. Users hire resources based on "pay-as-you-use" strategy. Most of the time, consumers of the cloud may not know the usage of the current resources and may cross the limit of the budget. To understand and control the budget, one has to keep calculating the cost and usage of the resource quantity manually. There are different ways of pricing. If consumers can get a platform to check their bills and also predict the bill at a single platform, it may save the consumer's time of doing the work manually. The proposed system also allows selecting the best resource schemes from different providers in the same platform. Using this system, the users can control the budget as well as they can also check various available schemes in the same platform. It helps the cloud consumers to select the resources from the number of providers as per there need effectively.

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