A Novel Model for Competition and

Cooperation Among Cloud Providers

**ABSTRACT**

The cloud market is nowadays fiercely competitive with many cloud providers. On one hand, cloud providers compete against each other for both existing and new cloud users. To keep existing users and attract newcomers, it is crucial for each provider to offer an optimal price policy which maximizes the final revenue and improves the competitive advantage. The competition among providers leads to the evolution of the market and dynamic resource prices overtime. On the other hand, cloud providers may cooperate with each other to improve their final revenue. Based on a Service Level Agreement, a provider can outsource its users’ resource requests to its partner to reduce the operation cost and thereby improve the final revenue. This leads to the problem of determining the cooperating parties in a cooperative environment. This paper tackles these two issues of the current cloud market. First, we solve the problem of competition among providers and propose a dynamic price policy. We employ a discrete choice model to describe the user’s choice behavior based on his obtained benefit value. The choice model is used to derive the probability of a user choosing to be served by a certain provider. The competition among providers is formulated as a non-cooperative stochastic game where the players are providers who act by proposing the price policy simultaneously. The game is modelled as a Markov Decision Process whose solution is a Markov Perfect Equilibrium. Then, we address the cooperation among providers by presenting a novel algorithm for determining a cooperation strategy that tells providers whether to satisfy users’ resource requests locally or outsource them to a certain provider. The algorithm yields the optimal cooperation structure from which no provider unilaterally deviates to gain more revenue. Numerical simulations are carried out to evaluate the performance of the proposed models.

**EXISTING SYSTEM:**

In the Existing System cloud computing has received significant investments in the industry. Many cloud providers are participating in the market, forming a competitive environment, Since the amount of resources in a user’s request is much smaller than the capacity of a provider, the user’s request can be satisfied by any provider. The user’s satisfaction can be evaluated through a utility measure which depends not only on the resource properties but also on the user’s preference to choose certain providers, i.e., two providers with the same resource capacities and usage price may be considered different for a user due to

the user’s choice behavior and loyalty.

**Disadvantage:**

In the current Cloud Market two problems are there

* Competition and
* Cooperation among the Cloud Providers

**PROPOSED SYSTEM:**

In the Proposed System we are introducing the concept i.e dynamic pricing strategy, here the price will be set dynamically based on the user’s resource request. Due to this we can satisfies both the cloud provider as well as user. In this the Broker will acts as an interface between the cloud provider and the cloud user, Broker should play the crucial role. the realistic case of the current cloud market where providers may have different operation costs. Cooperation among providers may reduce the operation cost and therefore improve the final revenue

**Advantage:**

* Maximizing the final revenue of the cloud providers and satisfying the users with resonable prices

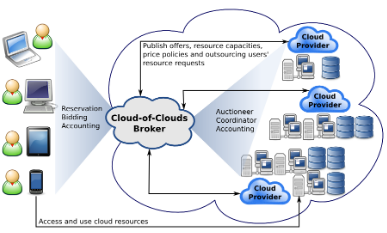
**PROBLEM STATEMENT:**

Increasing resource demands with different requirements from users raise new challenges which a single provider may not be able to satisfy, given that the resilience of cloud services and the availability of data stored in the cloud are the most important issues. Scaling up the infrastructure might be a solution for each provider, but it costs a lot to do so, and the infrastructure may be under-utilized when demand is low. A multiple cloud approach, which is referred to as Cloud-of-Clouds is a promising solution in which several providers cooperate t build up a Cloud-of-Clouds system for allocating resources to users.

**SCOPE:**

By using this novel model Small and big entrepreneurs have started utilizing cloud computing on a larger scale and this is a result of developments in the domain and different benefits associated with it. Gone are the days when IT experts would hire traditional web hosting services. Contrary to it, cloud computing pay-as-you-use model to reduce unwanted cost to company. Higher number of SMEs (Small Medium Enterprises) found this technology very useful as they cannot afford to purchase large space for storage, applications and other resources. Next, we introduced a novel approach for the cooperation among providers. The cooperation algorithm results in a win-win situation where both cooperation partners can improve their final revenue. The cooperation structure found by the algorithm is the optimal one for each provider. Thus, no provider has any incentive to unilaterally deviate to gain more revenue.The simulation results show that our approach is scalable and can be adopted by actual cloud providers.

**PROCESS:**



**MODULE DESCRIPTION:**

# **Number of Modules**

After careful analysis the system has been identified to have the following modules:

1. **Cloud Computing Module.**
2. **Dynamic Resource Pricing And Competition Among Cloud Providers module.**
3. **Cooperation Among The Cloud Providers Module.**
4. **Markov Decision Process Module.**
5. **Cloud Computing Module:**

Cloud Computing is the computing paradigm where the large pool of systems are connected in private or public networks to provide dynamically scalable infrastructure for application. Data and file storage with the advent of this technology. The cost of computation, application hosting, content storage and delivery is reduced significantly. Cloud computing is a practical approach to experience direct cost benefits. The two key advantages of this model are ease of use and cost effectiveness. The network of computers that make up the cloud handles them instead. Hardware and software demands on the user's side decrease.

**2. Dynamic Resource Pricing And Competition Among Cloud Providers Module:**

A novel pricing demand scheme designed for a cloud cache that offers querying services and aims at the maximization of the cloud profit with predictive demand price solution on economic way of user profit The proposed solution allows: on one hand, long term profit maximization with price minimization on request of same demand, and, on the other, dynamic calibration to the actual behaviour of the cloud application, while the optimization process is in progress.

In the current cloud market, users can easily compare resource prices of all providers and calculate the obtained utility before deciding to be served by a certain provider. Understanding the user’s choice behavior can help providers to strengthen their competitive advantage.

**3.Cooperation Among The Cloud Providers Module:**

Increasing resource demands with different requirements from users raise new challenges which a single provider may not be able to satisfy, given that the resilience of cloud services and the availability of data stored in the cloud are the most important issues. Scaling up the infrastructure might be a solution for each provider, but it costs a lot to do so, and the infrastructure may be under-utilized when demand is low. The Cloud-of-Clouds system can facilitate expense reduction (i.e., savings on the operation cost), avoiding adverse business impacts and offering cooperative or portable cloud services to users. The architecture of a Cloud-of-Clouds system determines in which a dedicated broker is responsible for coordinating the cooperation among providers. The broker has all information about the resource capacities and price policies of all providers. Based on the user’s resource requests, the broker will run a cooperation decision algorithm to decide with whom a particular provider should cooperate.

**4.Markov Decision Process Module:**

The idea of reinforcement learning is to use the reward feedback to build up a value function that reflect the expected future payoff of visiting certain states and taking certain actions. We can use such a value function to make decisions of which action to take and thus which states to visit. This is called a policy To formalize these ideas we start with simple processes where the transitions to new states depend only on the current state. A process which such a characteristics is called a Markov process. MarkovDecisionProcess can satisfies Bellman’s Principle of Optimality which indicates that “an optimal policy has the property that whatever the initial state and initial action are, the remaining actions must constitute an optimal policy with regard to the state resulting from the first action”, it can be solved via dynamic programming.

**SOFTWARE REQUIREMENTS**:

Operating System : Windows

Technology : Java and J2EE

Web Technologies : Html, JavaScript, CSS

IDE : My Eclipse

Web Server : Tomcat

Tool kit : Android Phone

Database : My SQL

Java Version : J2SDK1.5

**HARDWARE REQUIREMENTS**:

Hardware : Pentium

Speed : 1.1 GHz

RAM : 1GB

Hard Disk : 20 GB

Floppy Drive : 1.44 MB

Key Board : Standard Windows Keyboard

Mouse : Two or Three Button Mouse

Monitor : SVGA

**CONCLUSION**

Finally the conclusion is to maximizing the final revenue of the cloud providers and to satisfy the customers with the dynamic and reasonable pricing rates based on the users resource requests. Here the main thing is to establish the competition along with the cooperation among the cloud providers . the current fiercely competitive cloud market, many providers are facing two major challenges: finding the optimal prices for resources to attract a common pool of potential users while maximizing their revenue in the presence of other competitors, and deciding whether to cooperate with their competitors to gain higher revenue after receiving their own users’ resource requests.