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MULTI-OBJECTIVE NATURE OPTIMUM SERVICE SELECTION FOR CUSTOMERS IN OPEN NETS

N.Shyam Prasad[1], M.Gayatri[2]

[1]M.Tech Student, Dept of CSE, Malla Reddy College of Engineering & Technology, Hyderabad, T.S, India

[2]Associate Professor, Dept of CSE, Malla Reddy College of Engineering & Technology, Hyderabad, T.S, India

ABSTRACT:

Within this work, we are designed for facing the above mentioned challenges by proposing three novel contributions. The fuzzy sets theory can be used to convey vagueness within the subjective preferences from the customers. The majority of the available approaches aren't able to handle uncertainty within the expression of subjective preferences from customers, and can lead to wrong (or sub-optimal) service selections in existence of rational/selfish providers, exposing untrustworthy indications concerning the caliber of service levels and costs connected for their offers. Cloud platforms encompass a lot of storage services you can use to handle the requirements of customers. All these services, provided by another provider, are characterized by specific features, limitations and costs. In existence of multiple options, it is vital to decide on the best answer fitting the needs from the customer when it comes to service quality and charges. Additionally, because of its multi-objective nature, the perfect service buying process produces a very complex task to become managed, whenever possible, inside a distributed way, for well-known scalability reasons. We present empirical proof of the suggested solution effectiveness through correctly crafted simulation experiments. The service selection is resolved using the distributed use of fuzzy inference or Dempster-Shafer theory of evidence. The choice technique is also complemented through the adoption of the game theoretic method for promoting truth-telling ones among providers.

Keywords: Optimization, Decision Making, Fuzzy Set Theory, Genetic Algorithms, Dempster-Shafer Theory, Game Theory.

1. INTRODUCTION:

Cloud Computing is facing the issue to be victim of their overwhelming success, in which the large amount of customers can lead to severe scalability problems. Particularly, to guarantee the scalability of storage services, large public cloud providers don't depend on one data center hosting sources for those their clients, but replicate such infrastructures in multiple distinct locations distributed worldwide, each serving a particular geographic area or supplying business continuity through redundancy with other areas in situation of disaster [1]. The present practice would be to offer flexible storage prices policies so the customer pays only for what he/she uses. Therefore, the storage sources provided inside a cloud platform may largely vary from the caliber of service (QoS) perspective to be able to fit the character from the data that buyers wish to store and could exhibit different costs because of the heterogeneity of the adopted hardware technologies. This really is further exacerbated when thinking about federated clouds. However, several big companies/enterprises are coming up with their very own private cloud platforms, because of the necessity of maintaining control of both IT infrastructure and knowledge security. The storage sources obtainable in a personal cloud are calibrated around the typical usage patterns observed with time inside an organization. Therefore, companies choose to adopt hybrid cloud solutions by which an element of the data (e.g., during load peaks) is moved and processed on public cloud sources. Thus, we are able to imagine we have some data centers among which customers can choose to store their data of great interest, by choosing the connected Storage Company (SSP). This type of selection can be created by hand through the customers, since a number of them have regulatory or policy needs that govern where their data must reside. The choice process needs to be driven with a multi-objective optimization strategy inducing the storage service that most closely fits your budget and need for customers, typically composed in some QoS features (e.g., performance, reliability and/or security) frequently expressed inside a quite vague way, by presenting a particular margin of uncertainty within the whole process [2]. Our work faces these complaints by proposing three novel solutions. First, the fuzzy logic can be used to correctly offer the qualitative and vague preferences from no expert customers. Second, two different solutions according to fuzzy inference or Dempster-Shafer theory of evidence are suggested to conduct the service selection inside a distributed way. Third, the sport theory is used to advertise truth telling ones among SSPs, by maximizing the satisfaction of user needs and minimizing the cost from the storage plan to be compensated. We've tailored our solution for storage service selection however; it's naive to note that it may be extended towards the broader type of service selection with slight alterations in the formulation from the problem.

2. PROBLEM DEFINITION:

A cloud based storage service infrastructure could be modeled as an accumulation of M storage services implemented inside a hybrid cloud, or perhaps a federation of clouds. The profile from the j-th service, indicated as OJ, includes a quantitative way of measuring the standard options that come with the storage service, and it is symbolized with a vector of N number values. Because of the heterogeneity from the quality features, their values haven't only different ranges, but additionally opposing meaning, causing difficulties within their comparison. Such heterogeneity requires normalization to have all of the quality features presuming float figures lying between and 1 and getting exactly the same meaning. Within this paper, we've used the normalization [3]. A storage resource broker, located between your services and also the customer, collects the standard profile, capacity and cost information in the connected storage services, selects the best service and redirects all of the customer demands towards the selected SSP. Actually, cloud storage services characterized by a top quality are usually probably the most costly ones, so maximizing the consumer satisfaction implies having to pay a greater cost. Therefore, an effective tradeoff backward and forward objective is needed. In addition, not every the N possible QoS features may have a similar importance for that user that has to point a potential preference included in this. On the other hand, those announced through the cloud providers are formulated with different detailed and rigorous monitoring from the service behavior, to be able to offer an objective perspective. Finally, the standard profiles came back through the cloud providers might not be truthful, since such providers may assume a rational/opportunistic behavior by communicating false profiles to be able to get more customers.

3. METHODOLOGY:

Within our opinion, the preferences tend to be more helpful if expressed as fuzzy variables accepting numerous fuzzy linguistic terms, given that they convey the client feeling regarding their needs and therefore are approximate instead of fixed and exact to become quantifiable having a number. To cope with it, we advise a fuzzy inference approach, like the ones presented, mixing both subjective and objective quality features for picking a cloud storage services. The normal method of indicating customer preferences using a number isn't viable, mainly in the situation of the no expert customer, along with the alternative solution of expressing the provided QoS inside the range (acceptable, optimal). For instance, let's think about a customer requesting a cloud storage service having a QoS feature whose values laying inside an interval [a b -], which is inside the interval of permitted values. In tangible use cases, there's no such sharp distinction, and things are not only seen black and white-colored but could have numerous shades of grey between black and white-colored. To convey it, we want a subscription function that presents an even interpolation between what's unacceptable and what's acceptable to prevent this sharp change and also to better convey imprecise, vague and unsure information. For this aim, we are able to use Fuzzy Set Theory by expressing the client preferences as fuzzy variables characterized by a few fuzzy set, each one of these, namely A~ characterized with a proper membership function _A~ having a triangular, trapezoidal or any other shapes. Such fuzzy sets could be connected to some given linguistic term expressed in natural language. In addition, using adjective to qualify the attached nouns is a very common practice in natural language. This is often modeled using a hedge like a modifier of the fuzzy value and remodeling the relative membership function. The tuning from the parameters characterizing the membership functions for those linguistic terms inside a fuzzy variable can be created by experts and should be tailored towards the specific options that come with the measure it represents. Therefore, this option would be vulnerable to the point the membership functions aren't realistic based. Therefore, this option would be vulnerable to the point the membership functions aren't realistic based. Goal to decide on the configuration for that three membership functions, which best describes the assumed through the services participating towards the selection regarding confirmed QoS feature, indicated as data set. The aim function to become enhanced through the formula may be the Fuzzy Entropy from the set C of c clusters partitioning information set [4]. An inherited optimization formula (GA), you can use to aid this parameter quantification task, creates two important elements: Chromosome, i.e., a representation of the certain means to fix the given optimization problem, and Population, i.e., an accumulation of chromosomes which are examined in a given iteration from the formula. Within our work, a chromosome consists of a permutation vector, containing all of the possible figures the eight parameters from the three membership functions can assume inside the interval, divided based on the sampling interval. The formula explores the answer space of the given optimization problem by moving from a current population to some newer one. The subjective QoS needs expressed through the customer needs to be compared with the aim QoS offers manifested by cloud storage providers to be able to pick a qualified service that maximize. The issue is to check correspondingly fuzzy variables and crisp figures. You'll be able to follow two different approaches to cope with this issue: (i) the crisp figures are fuzzyfied and fuzzy rules are applied and (ii) fuzzy sets are defuzzyfied and multicriterion making decisions is conducted. Both approaches can be treated inside a distributed excess of the cloud, greatly improving scalability and longevity of the choice process. Our solution strongly depends upon the aim QoS measures openly manifested by each SSP and, for distributed approaches, around the correct behavior from the election participants. The aim of the players would be to attract the utmost quantity of customers and reduce the relative costs. Our game is one of the types of personal data games, where each selfish player holds by itself certain data, namely the actual value for that provided QoS level and also the real cost. In game theory, a formalized game is resolved by finding its equilibrium points. In mechanism design the resolution is inverted: given a particular goal, the sport structure is selected to achieve the intended goal. You could do since hanging around there's an agent, known as the main, that isn't a person, but decides the payoff structure from the players [5]. The aim of our option would be to define a mechanism that's strategy-proof, i.e., the social choice can't be strategically manipulated by imposing a repayment structure to every player to ensure that their dominant technique is the reality-telling one.

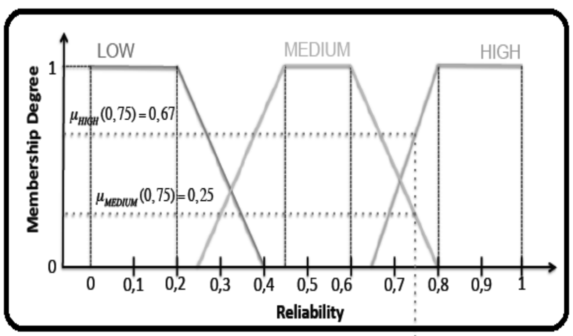

Fig.1.Fuzzification example

4. CONCLUSION:

This paper addressed the issue of storage service selection within a cloud platform, or perhaps a federation of heterogeneous clouds. We've resolved the choice trouble with the fuzzy inference or dempster-shafer theory of evidence to consider concerning the best service matching the client preferences, so we also have suggested a distributed formulation of both strategies to find optimal solutions inside a more effective way. The primary limit in our jobs are thinking about one customer at any given time and assigning just one plan to fulfill the customer request. Probably the most promising approaches might be according to “controlled anonymity” or “recommendation trust”.

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