Prioritizing Cloud Infrastructure Using MCDM Algorithms

Babu R, Jayashree K

ABSTRACT--- Cloud computing is ending up massively mainstream owning to its preferences, for example, flexibility, accessibility and on-request registering. As a matter of fact, the quantity of cloud providers and their offered administrations is quickly developing, specifically for Infrastructures as a Service. An immense number of IaaS providers and administrations is getting to be accessible with various configuration choices including estimating arrangement, pricing and performance of computation. In this way, IaaS provider determination and administration configuration requires an abnormal state of aptitude. Hence, we intend to help tenderfoot clients in settling on instructed choices with respect to the specialized needs of their application, their inclinations and their past encounters. To do as such, we propose Multi-Criteria Decision Making Algorithms for prioritizing the cloud infrastructure based on the given client's preferences and inputs.

1. INTRODUCTION:

Cloud Computing (CC) has increased tremendous popularity over the most recent couple of years. It offers evident focal points as far as expense and reliability contrasted with the conventional processing models, which utilize a committed in-house framework. There is a high development in the Cloud Service Providers (CSPs), for example, Google, Amazon, Rackspace, Microsoft, and GoGrid. They offer different alternatives in the Quality of service (QoS) and estimating of CSPs. The nearness of many CSPs brings up an issue: "How complete a cloud provider perform better contrasted with others?"

A response to this inquiry benefits the two- client and CSPs. The appropriate response could assist potential clients with choosing a Cloud Service (CS) that best fits their execution and cost needs. For example, they may pick a CS for capacity concentrated applications and another CSP for calculation serious applications. For CSPs, such answer could point them the correct way for development. Because of the expansion of CSPs with fluctuating attributes, it moves toward becoming difficult to choose ideal

CSPs need to fulfil client prerequisites and business methodologies, with destinations that occasionally conflict with each other. The most appropriate CSPs ought to be looked for considering different contrary quantitative and subjective criteria. Along these lines, the choice of cloud administrations can be seen as a Multiple Criteria Decision Making (MCDM) problem. MCDM for the most part plans to uncover the best choice among the majority of the attainable options within the sight of numerous antagonistic choice criteria. The main aim of MCDM here is to assess and rank all the available CSPs based on the several quality attributes and parameters associated to cost, and help the clients to choose the one of their needs.

Analytic hierarchy process (AHP) is one of the MCDM approaches where its factors are arranged in a hierarchic structure. AHP-based positioning calculation for web administration determination, considering distinctive QoS qualities of web service utilizes various QoS attributes for acquiring different QoS data and limitations (tendency, weighting, relationship, gathering, and so forth.) of web services. In spite of the fact that AHP is an efficient approach for deciding, it doesn't consider the vulnerability of choice in determining pairwise comparison of the services. In this content, we have introduced weighted sum and weighted product to overcome the difficulties faced by the AHP algorithm.

2. LITERATURE SURVEY:

In this section, we discussed various previous research work for evaluating, comparing the performance and approaches of different CSs.

Ching-Ling Hsu et.al., [3] suggested a methodology called grey scale relational model for CS selection. Grey model works by identifying the different service parameters of consumers and evaluates quality attributes for service selection. Trusted third party like Cloud Harmony posses data sources based on user feedback and benchmark defined. The proposed methodology utilized fuzzy logic and grey scale technique to assign weights for different parameters associated with CSs and prioritizes that CSs. Yongwen Liu, et al. [4] introduced a system to identify the best CS based on rough set theory as assessment method that considers performance as a major factor. In order to calculate the performance of CSs several other attributes such as memory, storage space, memory, number of cores of CPU and operating system were considered. Rough set theory works by calculating preferences of the requirements and approximate the same based on lower and upper approximation space and neglect the parameters that falls on lower space. CS classified the attributes as either very important, important, good and bad based on the score.

Ruby Annette et.al., [5] discovered a framework to help the users to identify the right CS involving QoS and reputation. Reputation is evaluated by collecting consumer feedback where user can give values from 1 to 10 for various attributes in which 10 depicts highly satisfied and 1 showcased highly dissatisfied. The selection model posses a reputation manager module to gather and calculate user service ratings and store it in a special database.

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Lie Qu et al., [6] introduced a context aware CS selection model that selects appropriate CS based on consolidated values from both subjective and objective assessments that involves user feedback and performance testing. The assessments works by determining the similarity of result in different contexts and utilized that in overall performance evaluation of CS. Fatima Zohra Filali et al., [7] proposed a opinion model to evaluate trust of CSs and provides the best suited CS for the users. Trust assessment based on opinion model involves feedback of users, Qos, performance and direct trust that makes it a exact method for CS selection.

Manar Abourezq et al., [8] suggested an agent based CS research and selection system. There are three agents utilized for selection namely queries processing agent, skyline processing agent and CS research agent. Ontology is used to fix the user query and to select the best CS.

Fan et al., [9] introduced an evidential reasoning approach that combines perception based trust value and reputation based trust value for multi dimensional trust aware best CS selection. Historical user feedback is also utilized for predicting the trustworthiness of CS. Deepak Kapgate et al., [10] proposed a model to predict the best CS by utilizing Weighted Moving Average Forecast Model (WMAFM). The main intention of this methodology is to drastically reduce the response time in delivering the CS. WMAFM model also considered service request time, hourly loading, number of CPU and virtual machine cost for selection.

3. PROPOSED MODEL:

The proposed model considered different CSPs or instances of it from various computing environment with different cloud data centres. The IaaS core computing capabilities are simulated to store service related information of numerous CSPs in a database for further use. The user requirements are collected and processed using different algorithms like AHP, weighted sum and weighted product algorithms. The best service that matches the requirements of the customer are identified, ranked and reported to the user. The user can select a service from the proposed list and start using that CS.

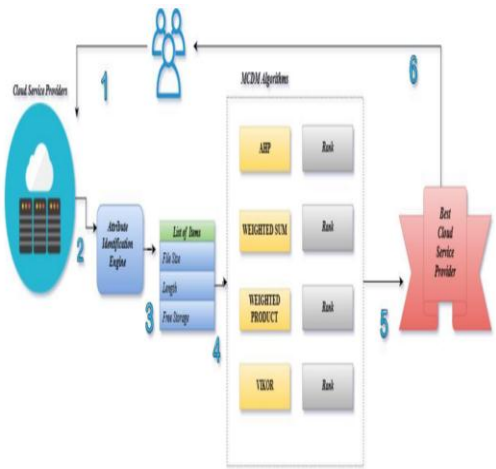

Fig 1. Architecture diagram for prioritizing cloud infrastructure

During the implementation, the customers has to provide the values for the attributes based on which the cloud service are being prioritized.

4. IMPLEMENTATION AND RESULT:

4.1. AHP ALGORITHM:

Steps:

1. Get input criteria
2. Provide the input for the criteria
3. Generate the matrix based on the parameter
4. For all cloud IaaS For all parameter
   Identify whether given is beneficial or non-beneficial attribute
   If beneficial divide by max value
   Else
   Divide by min value
5. Sum the row values
6. Rank Cloudlet based on the sum values

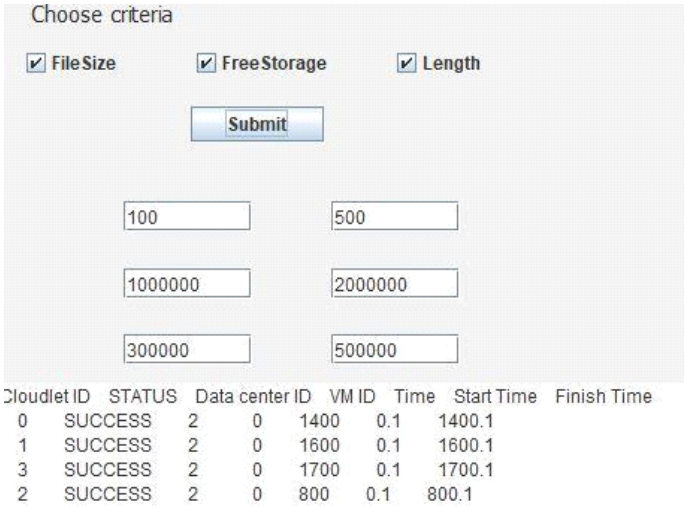

Fig 4.1.Result for AHP Algorithm

4.2. WEIGHTED SUM ALGORITHM:

Steps:

1. Get input criteria
2. Provide the input for the criteria
3. Generate the matrix based on the parameter
   For all cloud IaaS
   For all parameter
   Identify whether given is beneficial or non-beneficial attribute
   If beneficial divide by max value
   Else
   Divide by min value
1. Provide the weight for the parameters
2. Multiply the values of the parameters with the matrix
3. Sum the value of the rows
4. Rank Cloudlet based on the sum value

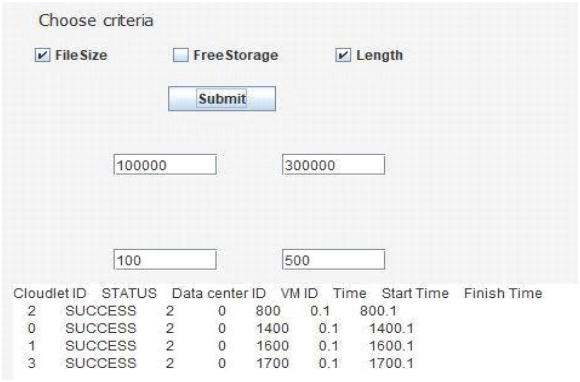

Fig 4.2.Result for Weighted Sum Algorithm

4.3. WEIGHTED PRODUCT ALGORITHM:

Steps:

1. Get input criteria
2. Provide the input for the criteria
3. Generate the matrix based on the parameter
   For all cloud IaaS
   For all parameter
   Identify whether given is beneficial or non-beneficial attribute
   If beneficial divide by max value
   Else
   Divide by min value
1. Provide the weight for the parameters
2. Multiply the values of the parameters with the matrix
3. Product the value of the rows
4. Rank Cloudlet based on the product value

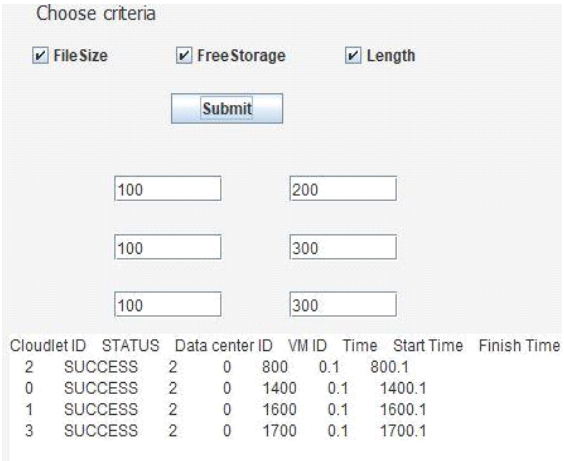

Fig 4.3.Result for Weighted Product Algorithm

5. CONCLUSION:

This paper investigates the challenges of selecting appropriate private cloud infrastructure and services. We proposed a new hybrid approach such as AHP (Analytic Hierarchy Process), Promethee models that transform the IaaS services. Our solution aims to involve users in the selection process and takes into consideration their personal preferences and their previous experiences in addition to the functional requirements of their applications. In order to provide the appropriate CS as per user requirement, weighted sum and weighted product model is implemented.

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