Feedback based Optimized Scheduling Algorithm for Cloud Broker using Rough Set and Fuzzy Logic

Anandi Lal Jangir

***Abstract*— As the basic definition of cloud says that pay only for that which u have used. Cloud computing has two components one is cloud broker which deals with users and second is the service provider. Cloud middlemen or Broker provides cloud arbitrage services to users that allow end users to shift between platforms to get the best pricing so that user can purchase the services with low prices. Main objective of this paper is implementing an algorithm for cloud broker to enhance the reliability and enhancing the satisfaction of customer. The algorithm calculate the optimal fuzzy value on the basis of rating of each cloud service provider and customer feedback and allot the new customer with the CSP which have maximum fuzzy value. The algorithm is implemented in cloud simulator with the help of net-beans.**

***Index Terms*— Cloud Computing, Cloud Service Providers, Rough Set Theory, Fuzzy logic.**

I. INTRODUCTION

Cloud Computing provides flexible and reliable on-demand services with high-performance. Cloud computing is associate degree awing technology that have plow ahead and annex the computing world. Cloud Computing is a term used to describe both a platform and type of service usage. As its fundamental definition says that pay and use. We have to pay only for that which we have used. The cloud is a metaphor for the Internet. Cloud Computing infrastructure allows enterprises to achieve more efficient use of their IT hardware and software investments. Cloud computing have two parts front end and back end. The front end only can be seen by user or client but how the process actually happening is fully related to backend. Cloud broker is mediator of cloud service provider and user.[1][2][7]

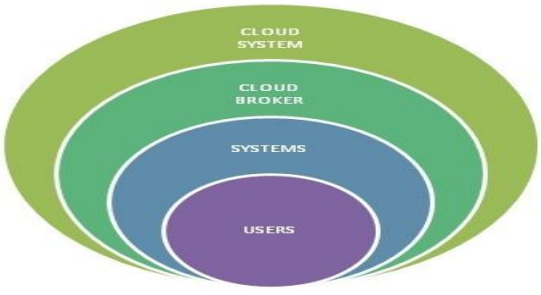

Fig. 1 Simple Structure of Cloud Broker

II. PROBLEM DEFINITION

Standardization of cloud is an essential need because some standard are very old and some are too late and some are not adequate or duplicate or inappropriate. All cloud service provider cannot provide all services optimally all-time because some are specialized in few services some other provides other services better, if we are investing a lot of projects in cloud then we expect the excellent and reliable services .Here the problem is developing an algorithm which optimally schedules the task of users and provides the appropriate and adequate cloud service provider (CSP).

- For this we are checking whether the CSPs providing the service reliably?
- Comparing the CSPs given standard and the user feedback.
- Rating the CSPs based on their reliability.
- Finally developing an optimized scheduling Algorithm for cloud Broker.

III. METHODOLOGY

A. Rough Set

Rough set concept was given by Zdzislaw. This concept says that sometime an object neither belongs to positive nor to negative then it is belongs to boundary, thus a set said to be rough if the boundary region is not empty. The main goal of rough set is to combine approximation concepts with actual data.[4] [6]

Here we are using this concept to identify the services to generate a kind of rating based on some parameter. Using this concept we will be able to classify the service whether it is able to satisfy or not on the basis of this concept the set is divided into

- Lower approximation –the CSPs which are not suitable to assign the users. As they do not provide satisfied services.
- Upper approximation- which provide satisfied services.[5]

B. Fuzzy Set

Fuzzy sets are defined by employing the fuzzy membership function, which involves advanced mathematical structures, numbers and functions. In this approach an element can belong to a set to a degree k($0 \leq k \leq 1$).The value 1 and 0 are presented for the CSP. We have formed on the basis of relevance to users and CSP's. The relevance generates a threshold value for each attribute out of a scale of 10.[4][1][6]

C. Information System

We have represented the CSP and their attributes in a tabular form called Information System. The rows of the table contain the list of cloud service providers and the columns consist of the attributes of the respective cloud service provider.[3][5]

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IV. PROPOSED ALGORITHM

Our proposed algorithm is as follow

Step1 Take Input from CSPs.

- Survey on CSPs and ask to give rating to their services from 10.
- Prepare Table using these ratings.

Step 2 Divide table into lower and upper approximation.

- Fix a boundary value like 5.
- Change the Table values in binary values.
- If corresponding table value is ≥ boundary value make it 1.
- Else make it 0.

Step 3- Take Input through user feedback

- Based on some questionnaires user gives rating to the services of different CSPs.
- Prepare Table using these ratings.

Step 4 Divide table into lower and upper approximation.

- Fix a boundary value like 5.
- Change the Table values in binary values.
- If corresponding table value is ≥ boundary value make it 1.
- Else make it 0.

Step 5 Perform logical AND operation

- If values of both tables are not same then it means some services of that CSPs are not as much satisfactory as they are telling
- So we perform AND operation so only those values which are satisfactory will be remain

Step 6 Now Drop all value which are 0.

- Now we have just one Table which have values 0 or 1.
- Here value 0 shows that the service is not satisfactory.
- Value 1 show that service is satisfactory.
- Now drop the row which contains value 0.
- Now we have only CSPs which provide satisfactory services.

Step 7 Prepare fuzzy values

- Find the biggest value in column and divide every value of column.
- Perform this operation with all columns.
- Addition of all value of a row is fuzzy cost for that CSP.

Step 8 Allot the optimal Fuzzy value to users

- We now have all fuzzy cost for each service and each CSP.
- Now allot the optimal fuzzy cost based on customer's requirement.
- The first customer will get largest fuzzy value and so on.

NOW WE ARE TAKING AN EXAMPLE AND PERFORMING ALL THE STEPS ON THAT.

Table1. An example of node information system provided by CSPs

CSP	P1	P2	Pk	Pn
A	6	3	7	4
B	5	6	7	7
C	7	6	4	5
D	5	7	8	7
E	6	5	7	6
F	8	8	6	8

Table2 Values after Threshold cut off either 0 or 1

CSPs	P1	P2	Pk	Pn
A	1	0	1	1
B	1	1	1	1
C	1	1	0	1
D	1	1	1	0
E	1	1	1	1
F	1	1	1	1

Table3. Rating Based on User Feedback

CSP	P1	P2	Pk	Pn
A	5	3	6	3
B	4	6	7	7
C	7	6	4	5
D	5	7	8	7
E	6	5	6	6
F	7	8	6	8

Table4. Values after Threshold cut off either 0 or 1

CSPs	P1	P2	Pk	Pn
A	1	0	1	0
B	0	1	1	1
C	1	1	0	1
D	1	1	1	1
E	1	1	1	1
F	1	1	1	1

Table5. Values after AND operation

CSPs	P1	P2	Pk	Pn
D	1	1	1	1
E	1	1	1	1
F	1	1	1	1

Table6. Values after calculating cost of service

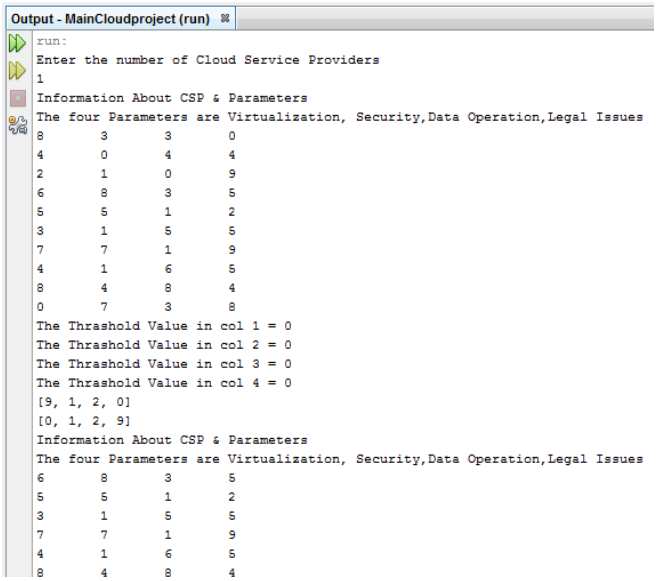
CSPs	P1	P2	Pk	Pn
D	5	7	8	7
E	6	5	6.5	6
F	7.5	8	6	8

Table7. Fuzzy cost for CSPs and Services

CSPs	P1	P2	Pk	Pn	Fuzzy cost
D	0.67	0.87	1	0.87	3.41
E	0.80	0.62	0.81	0.75	2.98
F	1	1	0.75	1	3.75

V. IMPLEMENTATION AND RESULT

The proposed algorithm is specially designed for cloud brokers who want long relationship with user and try to provide his excitation in marketplace. The cloud user feedback is also introduced for enhancing performance of Cloud Broker system. The algorithm is implemented using cloud simulator.



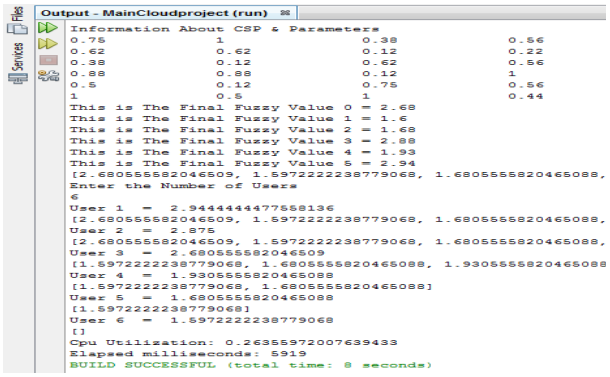


Fig.2 Screen-shots of output

VI. EXPERIMENTAL RESULT

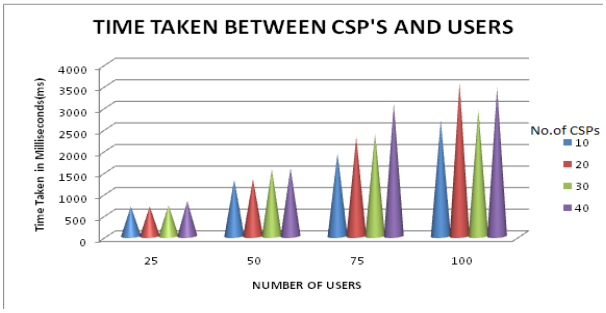


Fig. 3 Time Taken between CSPs and Users

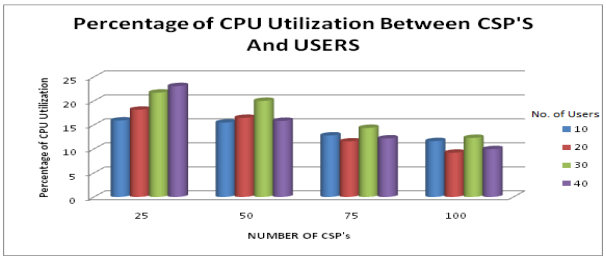


Fig. 4 Percentage of CPU Utilization between CSPs and Users.

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