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Improving Accuracy of Ranking Prediction for Cloud Services

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Abstract: **Cloud computing is an emerging technology. So popularity of cloud computing makes building high quality cloud applications. There are different cloud Service providers which present services with different qualitative characteristics. Determining the best cloud computing service for a specific application is a serious problem for users. So to determine which service is better for the users ranking of the services is required. Ranking compares the different services offered by different providers based on quality of services in order to select the most appropriate service. The attributes of the cloud services are selected and the values of this attributes are determined by using performance monitoring and analysis tools to rank and measure the QoS of various cloud services according to user's applications on which ranking algorithms are applied so users can select the most appropriate service that satisfies their requirement which increases the accuracy of predicting the ranking of the services.**

Keywords: **Cloud services; QOS; cloud rank; Skewness**

I. INTRODUCTION

CLOUD COMPUTING is a new paradigm for delivering on demand resources (e.g., infrastructure, platform, software, etc.). There are certain services and models working behind the scene making the cloud computing feasible and accessible to end users. The Deployment models define the type of access to the cloud, i.e., how the cloud is located? Cloud can have any of the four types of access: Public, Private, Hybrid and Community cloud..

A public cloud is a publicly accessible cloud environment owned by a third-party cloud provider. The IT resources on public clouds are usually provisioned via the previously described cloud delivery models and are generally offered to cloud consumers at a cost or are commercialized via other avenues.

A private cloud is owned by a single organization. Private clouds enable an organization to use cloud computing technology as a means of centralizing access to IT resources by different parts, locations, or departments of the organization. When a private cloud exists as a controlled environment, the problems described in the Risks and Challenges section do not tend to apply.

A hybrid cloud deployment is simply a combination of two or more of the previous deployment models with a management framework in place so that the environments appear as a single cloud, typically for the purposes of "cloud peering" or "bursting." A community cloud model, more than one group with common and specific needs shares the cloud infrastructure.

Cloud services means services made available to users on demand via the Internet from a cloud computing provider's servers as opposed to being provided from a company's own on-premises servers. Cloud services are designed to provide easy, scalable access to applications, resources and services, and are fully managed by a cloud services provider.

With the growth of public Cloud offerings, for Cloud customers it has become increasingly difficult to decide which provider can fulfill their Quality of Service (QoS) requirements. Each Cloud provider offers similar services at different prices and performance levels with different set of features. While one provider might be cheap for offering tera-bytes of storage, renting powerful VMs from them might be expensive.

The rest of the paper is organized as follows .Section 2 represents an overview of related work. Section 3 describes process of Cloud Application Ranking. Section 4 algorithm which is going to use in this project. Section 5 represents experimental result of this project. Finally Section 6 concludes the paper and shows features of our work.

II. RELATED WORK

Different techniques have been proposed for ranking the cloud services. One approach is SVD [1]. Singular Value Decomposition (SVD) technique, which is a statistical technique for cloud service ranking. The proposed approach introduces a service mapper called cloud service provider mapper for service ranking. This mapper generally consists of three main layers. The lower layer named as information gathering layer is responsible for collecting two types of information which are Service providers' information and attributes represented by each provider. Second layer is named as apply SVD. In this layer, a matrix named as Provider Quality (PQ) is generated. The generation procedure of this matrix is as follows. First, providers' information is set at rows of the matrix. Then, qualitative attributes of providers are set at columns of the matrix. Now, the second layer is responsible for applying SVD technique on the matrix. Then, three singular values are extracted from the matrix and results are sent to the third layer. The third layer receives singular values and qualitative values of user requirements. Then, it can extract the most appropriate service among selected services

The second approach developed a system called Service Ranking System (SRS) [2]. is proposed in this approach. Seven key attributes are selected for service comparison and ranking in this approach. The proposed key attributes are throughput, availability, reliability, cost, response time, and security and user feedback. After determining these key attributes, the proposed algorithm for dynamic ranking is as follows. In the first phase, the key attributes are presented to the user. Then, the system asks the user to specify the important attributes. In the second phase, some services that provide user requirements are selected and qualitative values of attributes are measured by service monitoring. In the third phase, user should enter the importance of key attributes in weight format. The sum of entered weights must be equal to one. In the last phase, services are ranked intelligently and represented by means of two completely clear formulas based on entered weights from user. This formula multiplies entered weights to the value of each attribute. Then, the calculated numbers are sorted and presented as a ranking result.

In the third approach the main motive of this work [3] is to provide the user with that cloud that delivers best services according to his requirements. This approach works by taking difference between how much provider offers and how much user requires. The difference will tell how much a cloud provides in addition to minimum user requirement. The more is the difference, the greater is the benefit of user. The difference is then raised to power with weight assigned to the parameter which is contained in user weight table.

The algorithm which is used has four steps. First, Find the eligible clouds by matching services offered by clouds (as contained in cloud provider table) with user requirements (as contained in requirement table). The clouds that provide the service equal to or above the user requirements are eligible and remaining are not eligible. Second, calculate the points for each cloud .Third, Arrange these points in descending order and rank them. The cloud that gets the highest points gets the 1st rank and is the best cloud for given x requirement. The step 2 will be repeated for all x requirements, where x=1….p. .Fourth, repeat above steps for all requirements.

III. CLOUD APPLICATION RANKING

Our approach for ranking the Cloud applications is that two Cloud applications Cloud application 1 and cloud application 2.Each of these applications will have their own attributes based on which these applications are ranked. And both these applications are running on one physical host.

The attributes are cpu process speed, memory, usage, disk read and write. And as these applications are running on the same physical host these attributes will use the values of the Physical machine. Both the cloud applications will work as two different virtual machines which are running on the single physical host.

As two different applications are running on the machine so both these applications will have different cpu process speed, usage and disk read and write.

Now based on these attributes working rate of both the applications are found. Working rate is the rate at which cloud application runs per unit time. This working rate is found using the performance analysis algorithm called skewness algorithm [4].

Based on these working rates both the cloud applications are compared. But before comparing both the cloud applications need to be clustered so that comparison can be done.

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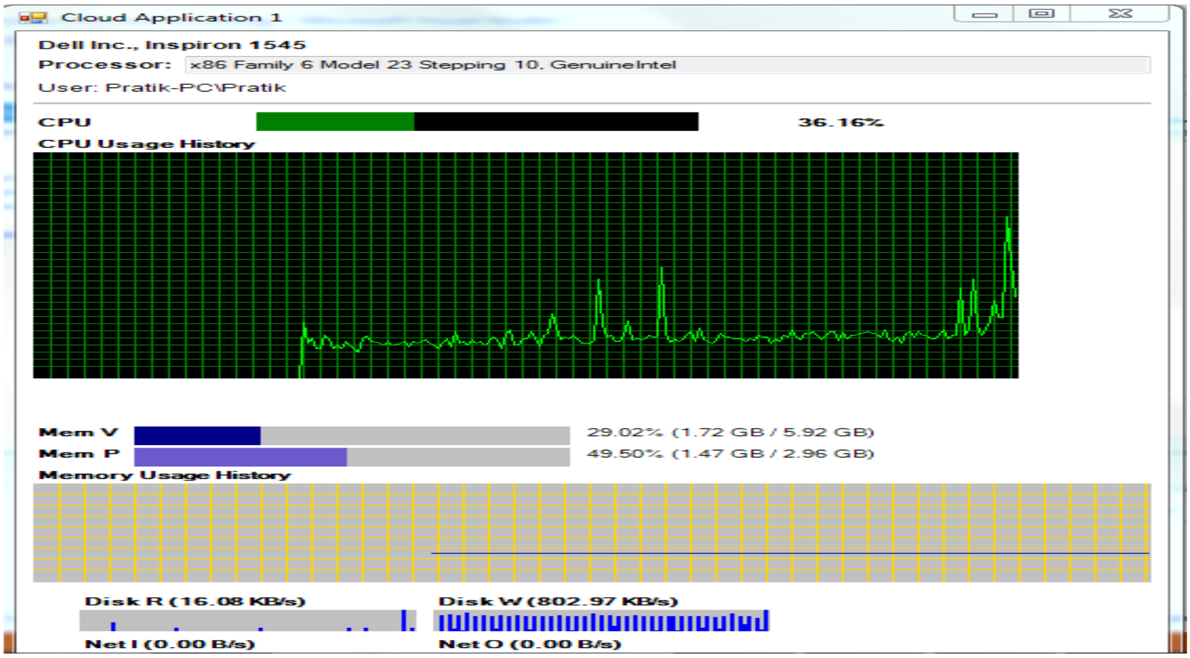

Figure.1 cloud application 1 attributes

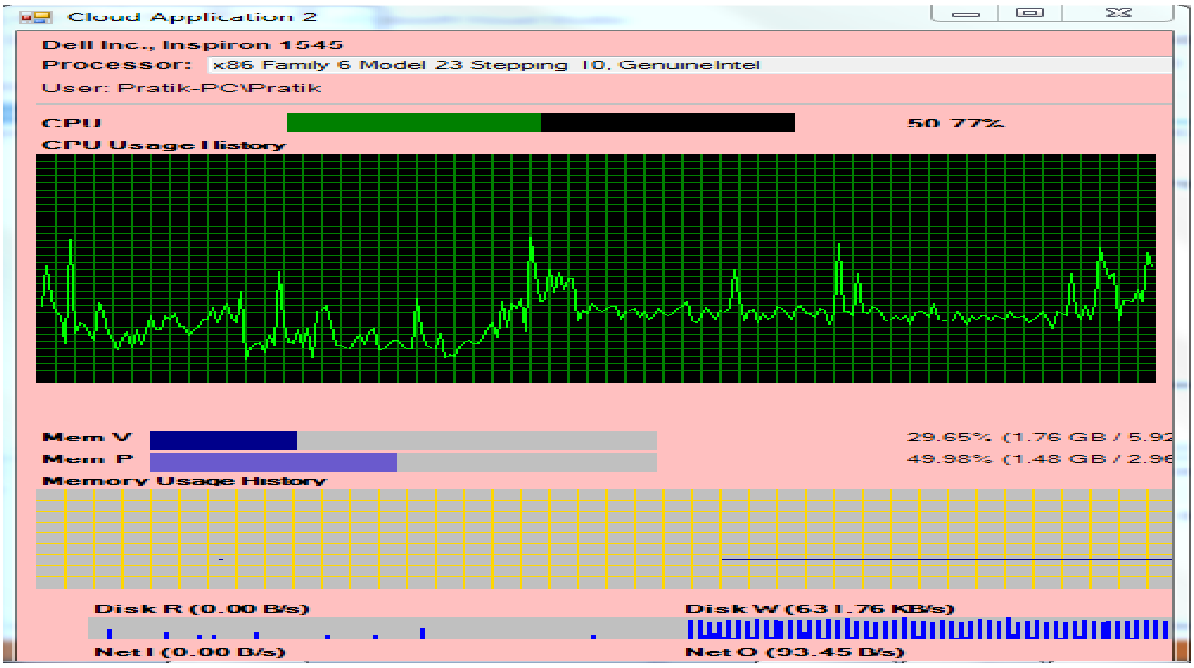

Figure.2 Cloud application 2 attributes

Based on these working rates both the cloud applications are compared. But before comparing both the cloud applications need to be clustered so that comparison can be done.

IV. RANKING ALGORITHM

Cloud rank algorithm is used to rank the Cloud application for finding an approximately optimal ranking. The Algorithm includes the following steps:

- Step 1 (lines 1-6). Rank the employed cloud services in E based on the observed QoS values. P(t) stores the ranking, where t is a cloud service and the function P_e (t) returns the corresponding order of this service. The values of P_e(t) are in the range of ,where a smaller value indicates higher quality.

- Step 2 (lines 7-9). For each service in the full service

  set I, calculate the sum of preference values with all

  other services by $\pi(i) = \sum_{j \in i} \phi(i,j)$ .Since ϕ(i ,i) = 0 including ϕ(i,i) in the calculations does not influence the results. Larger $\pi(i)$ indicates value indicates more services are less preferred than i. In other words, service i should be ranked in a higher position.

- Step 3 (lines 10-18). Services are ranked from the highest position to the lowest position by picking the service t that has the maximum $\pi(i)$ value. The selected service is assigned a rank equal to n - ǁ I ǁ +1 so that it will be ranked above all the other remaining

services in I. The ranks are in the range of [1,n] where n is the number of services and a smaller value indicates higher quality. The selected service t is then removed from I and the preference sum values β(i) of the remaining services are updated to remove the effects of the selected service t.

Algorithm Cloud Rank
Input: A cloud service set C, a full service set I, a preference function ϕ.
Output: a service ranking β.
B = C;
while B ≠ 0 **do**
  t = arg max $_{i \in B}$ q_i ;
  $P_e(t)$ = ǁBǁ - ǁCǁ +1;
  B = B - {t};
end
for each i € I **do**
  $\pi(i) = \sum_{j \in i} \phi(i,j)$;
end
n = ǁ I ǁ ;
while I ≠ 0 **do**
  t = arg max $_{i \in I}$ $\pi(i)$;
  Ƥ(t) = n - ǁ I ǁ + 1 ;
  I = I – {t} ;
  For each i € I **do**
    $\pi(i) = \pi(i) - \phi(i,t)$;
  end
end
while E ≠ 0 **do**
  e = arg min $_{i \in C}$ P_e i ;
  index = min $_{i \in C}$ β(i) ;
  Ƥ(e) = index ;
  C = C – {e};
end

Figure.3 The algorithm for ranking cloud application

- Step 4 (lines 19-24). Step 3 treats the employed services in C and the non employed service in I – C identically which may incorrectly rank the employed services. In this step, the initial service ranking β is updated by correcting the rankings of the employed services in C. By replacing the ranking results in β with the corresponding correct ranking of P_e, our approach makes sure that the employed services in C are correctly ranked.

V. EXPERIMENTAL RESULT

Two cloud applications are selected and attributes of these applications are selected which are cpu process speed ,memory, usage and based on these attribute working rate is found. So the application which is having less working rate will have high priority and will be ranked 1 and the one which is having high working rate will have less priority will be ranked 2. We used a core i3 computer with 2.4 GHz processor and 2GB main memory. We ran our implementation using Microsoft DotNet framework using C#.

Table.1 Result

CLOUD APPLICATION 1		CLOUD APPLICATION 2	
PM Name	2	PM Name	1
PM Ip Address	192.168.43.51	PM Ip Address	192.168.43.51
Working Rate	161	Working Rate	120

In the above table two cloud applications are ranked using cloud rank algorithm. PM name describes the physical machine , Ip address on the machine on which the cloud applications are running and the working rates of both the application.

VI. CONCLUSION

Several algorithms have been proposed for ranking the services, but the problem of predicting has not been discussed thoroughly. In our study, we have addressed the ranking of the cloud applications. Our algorithm populates the prediction of the ranking of the cloud application. The applications are running on the single physical machine. So the future work is to compare the cloud applications which are running on more than physical machines.

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