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Research paper



Prediction of best cloud service provider using the QoS ranking framework

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Abstract

The ability to utilize the computing resources based on the need has taken the Cloud computing to a greater height and it has increased the potential to extend the flexibility and efficiency of any resource. Considering the advantages, there are various Cloud Services Providers (CSP) that can offer services based on the user request and finding optimal services among those Cloud Services can be a great dispute. The proposed work relies on a QoS Ranking prediction that chooses the appropriate services offered by the various different CSPs. Based on those predicted analysis, the best CSP will be marked with a Ranking framework, according to which the Services will be directed to the users.

Keywords: *Cloud rank1, QoS ranking prediction, cloud service provider.*

1. Introduction

Cloud computing is in other terms a utility computing, and it is made public by a configurable resources that is offered to computers and additional devices as services and it provides certain component of cloud computing – characteristically Iaas (Infrastructure as a Service), SaaS (Software as a Service) and PaaS (Platform as a Service (PaaS) – to the different individuals [1]. Cloud providers are sometimes indicated as cloud service providers or CSPs. Before choosing the cloud provider, there are many factors which have to be considered. Pay per use model is adopted to calculate the consumption cost of the cloud resources. The resources whatever the client has utilized have to be paid irrespective of the complete component cost. The physical locality of the servers possibly will also be a reason for sensitive data. Consistency is dangerous if your data must be accessible. A characteristic cloud storage service-level agreement (SLA) [2], possibly will establish customer viewpoint regarding the service provider's performance and quality in a number of ways. An SLA [1] [2] possibly will stipulate availability, performance and additional parameters for several categories of customer infrastructure. On the other hand, it's significant to comprehend the major feature in that agreement since some cloud providers will offer an access time of less than ten minutes, which may perhaps be extremely long for certain businesses. Security is additional significant scrutiny. A number of organizations, for instance, the Cloud Security Alliance (CSA) [10] provide certification to cloud providers to stand on such criteria. Several cloud applications possibly will receive diverse levels of quality for same cloud services so that the optimal service selection becomes important.

The cloud applications have variant locations, which restricts the user to transfer QoS ranking of cloud services from one user to another user [3]. Not every case can be adopted to apply the irrevocable effects or either the invocations. In other cases, when there are huge number of cloud services have to be evaluated then there is a case, that it can't be evaluated properly. Unlike the traditional architecture, cloud systems have taken the privilege that it is free from the physical storage locations. Cloud computing has enormous amount of functionally equivalent services. Even thought there are various parameters that predict the cloud services, the other possible invocations can be from the poor internet connections which results in the different cloud applications. So in order to overcome all those factors, the selection of optimal services has become a mandatory.

The cloud services can be predicted based on the ranking framework [3][4] and using those values, different ranks will be allocated to the different services. Also it considers the previous experience of other users to adapt the ranking predictions for the current user. The other techniques such as Optimal service selection plays a significant role in cloud and grid computing. Optimal service selection has given a certain importance since its deals with number of functionally corresponding services in the cloud.

The best cloud service provider is chosen using the QoS values which contains the valuable information and are selected and analyzed for the best CSP. On the other hand, [4] [2] the client systems are highly influenced by the unreliable internet connections to understand the performance of the Cloud service. Thus the cloud service varies with the different levels of the quality of the client systems. The QoS prediction framework [5] [6] is obtained using the QoS values gathered from the cloud services.

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2. System model

Fig 1 explains that the service selection process based upon ranking method. It calculates the services before it provided to the user.

User request the Service to the cloud provider, the cloud provider will refer the training dataset for appropriate user details then the similarity computation is used to analyze and it finds out the similar user, and then based upon the ranking the predictions are done by the service user. The training dataset is taking an advantage of precedent user experience of other users.

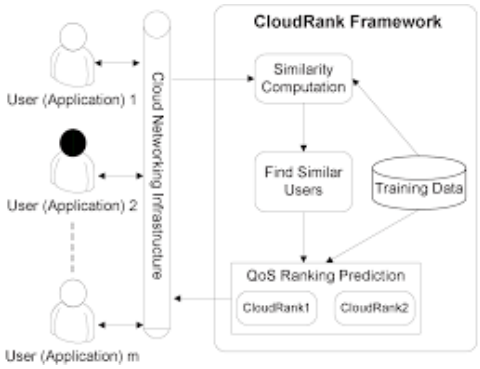

Fig. 1: QoS ranking prediction framework

Different parameters has considered for predicting the QoS values such as response time and throughput value. Finally the framework analyses and offers the better Quality of Service to the user.

3. Literature survey

Zibin Zheng et al., [6] has confirmed that QoS rankings provide valuable details for the purpose of making optimal cloud service selection from a collection of functionally equivalent service candidates. In order to obtain QoS values, real-world invocations on the service candidates are typically required. In order to circumvent the time-consuming and expensive real-world service invocations, the authors have formulated a QoS ranking prediction framework for the purpose of cloud services through taking advantage of the past service usage experiences of supplementary consumers. This framework needs no supplementary invocations of cloud services when making QoS ranking prediction. Two personalized QoS ranking prediction [13] schemes are formulated for the purpose of predicting the QoS rankings directly. Comprehensive experiments are carried out employing real-world QoS data, together with 300 distributed users and 500 real-world web services.

Yilei Zhang et, al., [7] recommended evaluating user-side quality of cloud constituents that turns out to be an crucial and fundamental research complication. On the other hand, invoking all the accessible cloud constituents from user-side for evaluation purpose is costly and unrealistic. In order to address this serious challenge, the authors have formulated a neighborhood-based scheme, called CloudPred, for the purpose of collaborative and personalized quality prediction of cloud components. CloudPred is improved by means of feature modeling on both users and components. This scheme CloudPred needs no supplementary invocation of cloud components in support of the cloud application designers. The wide-ranging experimental results demonstrate that CloudPred accomplishes higher QoS prediction accuracy than other competing schemes.

M. Usha et, al., [8] recommended with a cloud broker that works as an intermediate among various service providers and the cloud users. It will take duty in managing the services offered through Cloud Service Providers (CSP). Some requests from the users will be processed through the cloud broker and the services are assigned to the users in relation to their constraints. This research concentrates on a cloud broker service framework for the purpose of deciding on an suitable service offered through different CSPs depending on the QoS requirements from the users. The framework integrates multi-criteria optimization scheme for the purpose of analyzing the non-dominant or Pareto optimal sets. The Pareto optimization scheme is effectively applied to discover the non-dominated set from the available n number of service providers.

4. System implementation

To compute the QoS based Ranking framework [9], the proposed work focuses on two sets of computation as shown below:

Similarity computation

The degree of similarity can be calculated using the Kendall Rank Correlation Coefficient (KRCC) [9] by taking the values of inversions of service pairs. Consider an assumption of having two users such as A and B which is used to calculate the KRCC values as given below:

$$\text{Simi (A, B)} = \frac{C-D}{n(n-1)/2}$$

N = number of services,
C = number of concordant pairs between two lists
D = number of discordant pairs
Finally n(n -1)/2 pairs are existing for n cloud services

Relevant Users

Relevant users can be identified by predicting the current active user values and other users using the computation values given by Similarity computations. Therefore by having all those values, the QoS Ranking predictions can be calculated.

The below formula is used to identify the active user using a set of similar users S(u):

$$\text{N(u)} = \left\{\frac{A}{B} \in T_A, Simi\ (A,B) > 0, A \neq B\right\}$$

where T_A is a set of the Top-K similar users to the user A and Simi(A,B)>0..

The adapted service ranking is calculated using the CloudRank1 [6] [11] algorithm by considering the previous service experience of relevant users.

Algorithm cloudrank1

Input: an employed service set E, a full service set I, a preference function Ψ
Output: a service ranking ˆρ
F = E;
while F = ∅ do
t = arg maxi∈F qi;
ρe(t) = |E| − |F| + 1;
F = F − {t};
end
foreach i ∈ I do
π(i) = j∈I 8 Ψ(i, j);
end
n = |I|;
while I = ∅ do
t = arg maxi∈I π(i);
ρˆ(t) = n − |I| + 1;
I = I − {t};
foreach i ∈ I do
π(i) = π(i) − Ψ(i, t)
end
end
while E = ∅ do
e = arg mini∈E ρei;
index = mini∈E ρˆ(i);
ρˆ(e) = index;

E = E − {e};
end

5. Conclusion

The proposed work is used to predict QoS ranking for cloud services. The QoS value implies the prediction of the ranking accuracy. We have proposed QoS ranking prediction for computing the service based on the cloud application developers preferences. The current scenario of this paper has focused only on ranking different QoS properties independently; the future relies on investigating on the correlations and groupings of several QoS properties. It will also comprise the grouping of rating-dependent schemes and ranking-dependent schemes, with the intention of users can obtain QoS ranking prediction in addition to comprehensive QoS value prediction.

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