

A Review on Cloud Ranking Prediction - Based on QoS Parameters

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Abstract

In computer era, cloud computing (CC) enables the network access to a shared pool of computer resources. In cloud computing, the Quality of Service (QoS) ranking provides one of the best tools to select the right cloud provider available in the real world. This work presents a review of ranking prediction which meets the quality of services. The ranking prediction approaches are discussed in this review to predict the ranking-based on QoS meeting the Service Level Agreement (SLA).

Keywords

Cloud computing, Quality of Service, Service Level Agreement, Ranking

Introduction

In the present time, cloud computing is one of the latest technology which spotlight on lower total cost of ownership (TCO), which means pay as you use the cloud services. Cloud computing commits services with client's data, software and do computation over a network. Cloud computing is the latest application on the internet which has two parts such as a cloud client and a cloud service. Common applications of a cloud client are based on web pages and mobile applications. The four kinds of cloud services are: software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS). Functional attributes of the given service are representing by Quality of service (QoS) which is based on quantity or quality. QoS attributes represent the capacity of a system for providing best services. Qualitative attributes of the services are: accountability, agility, cost, performance, assurance, usability, security and privacy. With the growth cloud providers, for cloud clients, it will become the toughest job to decide which provider can fulfill their Quality of Service (QoS) attributes. Cloud service provider (CSP) offers same services with different sets of features at different cost and performance level. While one provider may be cheaper for storage services, they may be expensive for computation. On the other hand, next CSP may be cheaper with performance level but may be expensive for storage and so on. So to choose the right CSP ranking is done based on QoS parameters and service level agreement (SLA) [2,3]. SLA includes different parameters such as agreed service, level of service, the guarantees regarding the Quality of Service, and arrangements. The SLA is a contract that held between the provider of the service and another party who could be one of following; consumer of the service, broker negotiator, or monitoring negotiator. SLA is a formal agreement to promise what is possible to provide and provide what is promised, Sun Microsystems Internet Data Center group (2002).

SLA Categorization

SLA has the following components:

- **Service-level objectives (SLO):** The various services provided by the cloud provider are finalized between the CSP and the client. The service level parameters are availability, performance, and reliability etc.
- **Purpose:** The main reason of using the cloud services is defined, i.e., why we are interested in SLA.
- **Restrictions:** The various restrictions are defined by the client and the CSP. These restrictions may be in the form of time, storage, usage, cost etc.
- **Validity period:** SLA existing time is defined. Here, the beginning of the project and its completion of project is determined from both parties.
- **Scope:** The services that will be provided to the client and services that will not be delivered to the client is clearly defined in the SLA. The structure of SLA is also explained at which level the services are provided to the client.
- **Parties:** SLA is concord between the two parties i.e. cloud service providers and client.
- **Penalties:** If delivered service unable to fulfill SLOs (Service-level objectives) or is below the performance measurement, then some penalties will occur.
- **Optional services:** Services that are not mandatory but might be required as exclusion.
- **Administration:** It defines the policy formed in the SLA to attain and measure its goals.
- **Exclusions:** States what is not included in the SLA.
- **Service-level indicators:** These are those parameters that evaluate the performance of the CSPs.

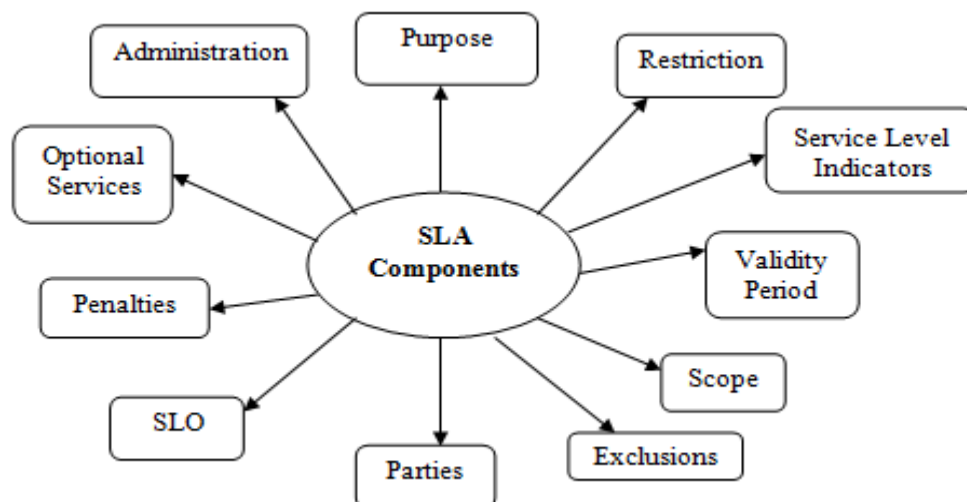


Figure1: SLA Components [1]

SLA and Cloud Computing

It is the blueprint for the CSPs and SLA which acts as the roadmap and sets expectations for both parties to change in the cloud services. It creates the roadmap with clearly explain SLOs. The different parameters of cloud computing will be taken into consideration for architecting the SLA. There is an article written for Educause Quarterly by Trappler". In this paper, the contract in SLA and Cloud computing must be:

- Codifies the specific parameters and minimum levels required for each element of the service as well as remedies for failure to meet those requirements.
- Affirms your institution's ownership of its data stored on the service provider's system, and specifies your rights to get it back.
- Details the system infrastructure and security standards to be maintained by the service provider, along with your rights to audit their compliance.
- Specifies your rights and cost to continue and discontinue using the service.

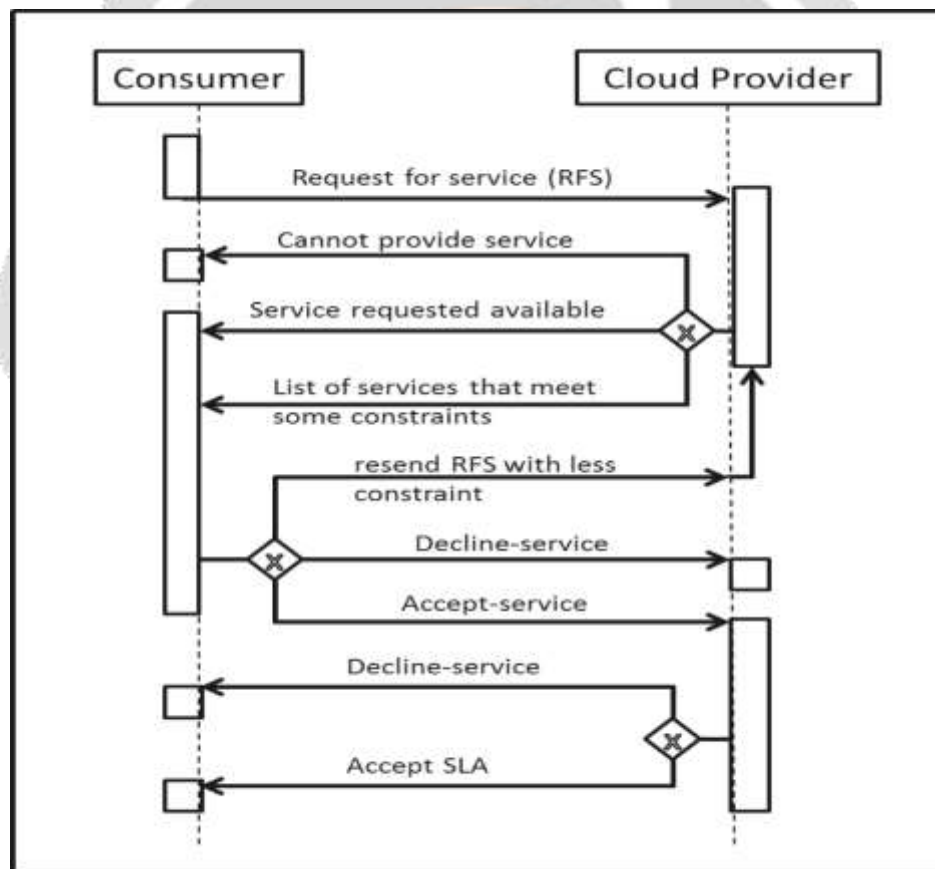


Figure2: SLA and Cloud Computing [1]

QoS Attributes:

The following QoS parameters are describe as [4]:

1. **Service Response Time:** It refers how fast the service can be made available for usage. The service response time includes average response time, and maximum response time promised by service provider.
2. **Sustainability:** Sustainability is the life cycle of the service. It can be divided into two parts: service sustainability and environmental sustainability.
3. **Suitability:** Suitability means at which level the client's requirements are met by a cloud provider and vice-versa.
4. **Accuracy:** It measures the difference between the user expected actual value or result generated by CSPs using the services by the client. It is defined as the frequency of failure in fulfilling the promised SLA.
5. **Availability:** It is the percentage of the time a client can access the services which is provided by the CSPs to the client.
6. **Reliability:** It is the mean time of failure promised by the cloud provider and the failures experienced by the users.
7. **Adaptability:** It is the time taken to adapt the changes or upgrading the service to the next level.
8. **Usability:** The components of usability are operability, learnability, installability, and understandability.
9. **Interoperability:** Interoperability is the ability of a service to interact with other services offered either by the same provider or by the other providers.

QoS parameters include response time, SLA contravention, degree for the job, reliability, availability, throughput, stages of client variation, and charge of service. In cloud computing, additional QoS parameters require to be included like security, privacy, and trust. On the other hand, most of the requirements are still the same for both kinds of services such as availability, scalability, security, and, privacy, etc.

Ranking Based on QoS Parameters and SLA

The proposed work helps in ranking the list of CSPs available in the market that provide similar services at different cost, storage and performance level [5,6]. By considering the QoS parameters and signed agreement named SLA, it will become easy to choose the right cloud service provider. Now, cloud clients read all the parameters that are explained in SLA which cover all the QoS attributes required by them. If they satisfied with all the parameters defined in the agreement then deal between CSP and the client is finalized to select the right CSP.

Conclusion

The proposed work helps to discover the "right" Cloud Service provider that can satisfy the requirements of cloud client which are explained in SLA. A single centre of data is not able to fulfill all the requirements of cloud client. This paper explains components of SLA which is necessary for agreement between the CSPs and the cloud clients so that CSPs must fulfill all the objectives of their cloud clients. The proposed work ranks the list of CSPs on the basis of SLA and QoS parameters. Despite both the functional and non functional parameters of QoS will also be considered as future work.

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