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Ranking of Cloud Computing Services With The PRASPM Model Using Shortest Path Algorithms

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Abstract

Cloud computing has become an important paradigm for outsourcing various IT needs of organizations, by enabling them to offer access to their infrastructure and application services on a subscription basis, there are many Cloud providers offer different Cloud services with different price and performance attributes. It has also become challenging for Cloud customers to find the best Cloud services which can satisfy their QoS requirements in terms of parameters such as performance and security. In this project we design the system Architecture for improving the service and avoid the delays using the shortest path algorithms combinations of RIP, OSPF, IGPs with different access points. During the services the fault tolerance is increased in between customer and cloud providers .To overcome this problems we introduce the PRASPM Models and these models easily prevent and detect the failure components and automatically replace the components. The failure components also take another components work without disturbing the Services. The quality of service attributes are given in the proposed systems and forming the service index to compare the various cloud providers and choose the best service provider from the list and also improve the service level agreements of service provider and customers.

Key words: Cloud Computing, Service Index, RIP, OSPF, IGP, PRASPM Model

Introduction

Cloud computing has emerged as a paradigm to deliver on demand resources (e.g., infrastructure, platform, software, etc.) to customers parallel to extra utilities (e.g., water, electricity and gas). The three prevailing classes of cloud computing are Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), and Infrastructure-as-a-Service (IaaS). SaaS describes systems in which high-level functionality (e.g., SalesForce.com, which provides customer relationship management software as an

on-demand service) is hosted by the cloud and exported to thin clients through the network. The most important feature of SaaS systems is that the API offered to the cloud client is for a complete software service and not programming abstractions or resources. Commercial SaaS systems typically charge according to the number of users and application features.

The traditional computing model that u ses dedicated, in-house infrastructure, cloud computing offers unprecedented advantages in terms of cost and reliability. A cloud customer need not pay a large upfront cost (e.g., for hardware purchase) before launching services, or over-provision to accommodate future or peak demand. Instead, the cloud's pay-as-you-go charging model enables the customer to pay for what she actually uses and promises to scale with demand. Moreover, the customer can avoid the cost of maintaining an IT staff to manage her server and network infrastructure. Cloud computing offers significant benefits to these businesses and communities by freeing them from the low-level task of setting up IT infrastructure and thus enabling more focus on innovation and creating business value for their services:

Due to such business benefits offered by Cloud computing, many organizations have started building applications on the Cloud infrastructure and making their businesses agile by using flexible and elastic Cloud services. But moving applications and/or data into the Cloud is not straightforward. Numerous challenges exist to leverage the full potential that Cloud computing assures. These challenges are often associated to the fact that existing applications have specific requirements and characteristics that need to be met by Cloud providers.

In this context, the Cloud Service Index (CSI) has identified metrics that are combined in the form of the Service Index (SI), offering comparative evaluation of Cloud services. These index indices can be used by customers to compare different Cloud services. In this paper, based on these identified characteristics of Cloud services, we are taking the state of the art one step further by proposing a framework (SI Cloud) that can compare different Cloud providers based on user requirements. The SI Cloud would let users match up to dissimilar Cloud offerings, along with their priorities and along more than a few dimensions, and choose whatever is suitable to their needs.

Several challenges are tackled in realizing a model for evaluating QoS and ranking Cloud providers. The initial is how to determine various SI attributes of a Cloud service. Many of these attributes vary over time. For example, Virtual Machine (VM) performance has been found to vastly vary from the promised values in the Service Level Agreement (SLA) by Amazon J. Varia (2011). However, without having precise measurement models for each aspect, it is not possible to match up to different Cloud services or even determine them. Therefore, SICloud uses historical dimensions and merges them with guaranteed values to find out the actual value of an aspect. We also give exact metrics for each computable attribute. Additionally we are going to introduce the PRASPM Model and this Model can easily prevent and detect the failure components and automatically replaces the components. The failure components work also take the another components without disturbing the services.

Service Index (SI)

SI attributes are designed based on the International Organization for Standardization (ISO) by the CSIC consortium. It consists of a set of business-relevant Key Performance Indicators (KPIs) that provide a standardized method for measuring and comparing business services. The SI framework provides a holistic view of QoS needed by the customers for selecting a Cloud service provider based on: Accountability, Performance, Agility, Assurance of Service, Privacy, Cost, Security and Usability. There are currently no publicly available metrics or methods which define these KPIs and compare Cloud providers. SI is the first effort in this direction. The following defines these high level attributes:

- **Accountability**—this group of QoS attributes is used to measure various Cloud provider specific characteristics. This is essential to make the trust of a customer on any Cloud provider. No association will want to set up its applications and store their critical data in a place where there is no accountability of security exposures and compliance. Functions serious to responsibility, which SI considers when computing and score services, include audit ability, sustainability, compliance, data ownership, provider ethicality, etc.
- **Agility**—the most important advantage of Cloud computing is that it adds to the agility of an association. The association can enlarge and modify rapidly without much expenses. Agility in SMI is calculated as a rate of modify metric, showing how rapidly new capabilities are included into IT as needed by the corporation. When allowing for a Cloud service's agility, associations want to recognize whether the service is expandable, convenient, adaptable, and flexible.
- **Cost**—the first question that arises in the mind of organizations before switching to Cloud computing is whether it is cost efficient or not. Therefore, cost is obviously one of the very important aspects for IT and the business. Cost tends to be the exacting most quantifiable metric nowadays, but it is essential to communicate cost in the characteristics which are appropriate to an exacting business association.
- **Performance**—there are many different solutions offered by Cloud providers addressing the IT needs of different associations. Each result has different performance in terms of functionality, service response time and accuracy. Associations need to realize how their applications will perform on the different Clouds and whether these deployments meet their expectations.
- **Assurance**—this characteristic indicates the likelihood of a Cloud service performing as expected or assured in the SLA. Each association looks to enlarge their production and offer better services to their clients. Therefore, consistency, resiliency and service strength are important factors in selecting Cloud services.
- **Security and Privacy**—data protection and privacy are important concerns for nearly every organization. Hosting data under another organization's control is always a critical issue which requires stringent security policies employed by Cloud providers. For example, economic associations usually

require compliance with regulations involving data integrity and privacy. Security and Privacy is multi-dimensional in nature and includes many attributes such as protecting privacy and confidentiality, data reliability and availability.

- **Usability**—for the rapid adoption of Cloud services, the usability plays a vital role. The easier to use and learn a Cloud service is, the more rapidly an association can switch to it. The usability of a Cloud service can depend on multiple factors such as convenience, Installability, Learnability, and Operatibility.

SI Cloud Architecture

We propose the Service Measurement Index Cloud framework—SI Cloud—which helps Cloud customers to find the most suitable Cloud provider and therefore can initiate SLAs. The SI Cloud framework provides features such as service selection based on QoS requirements and ranking of services based on previous user experiences and performance of services. It is an assessment manufacturing tool, designed to provide assessment of Cloud services in terms of KPIs and user requirements. Customers provide two categories of application requirements: essential and non-essential.

Essential requirements allow the customer to specify ‘deal-breakers’, i.e. if a certain SI attribute does not meet the required level, then the service is improper, apart from of how all the other aspects are scored. The essential and non-essential requirements depend both on customers and their application needs. For example, for an academic user, the security level may not be an ‘essential’ requirement if their project is of no commercial significance. The SI Cloud Structure Service Framework is given in figure 1.

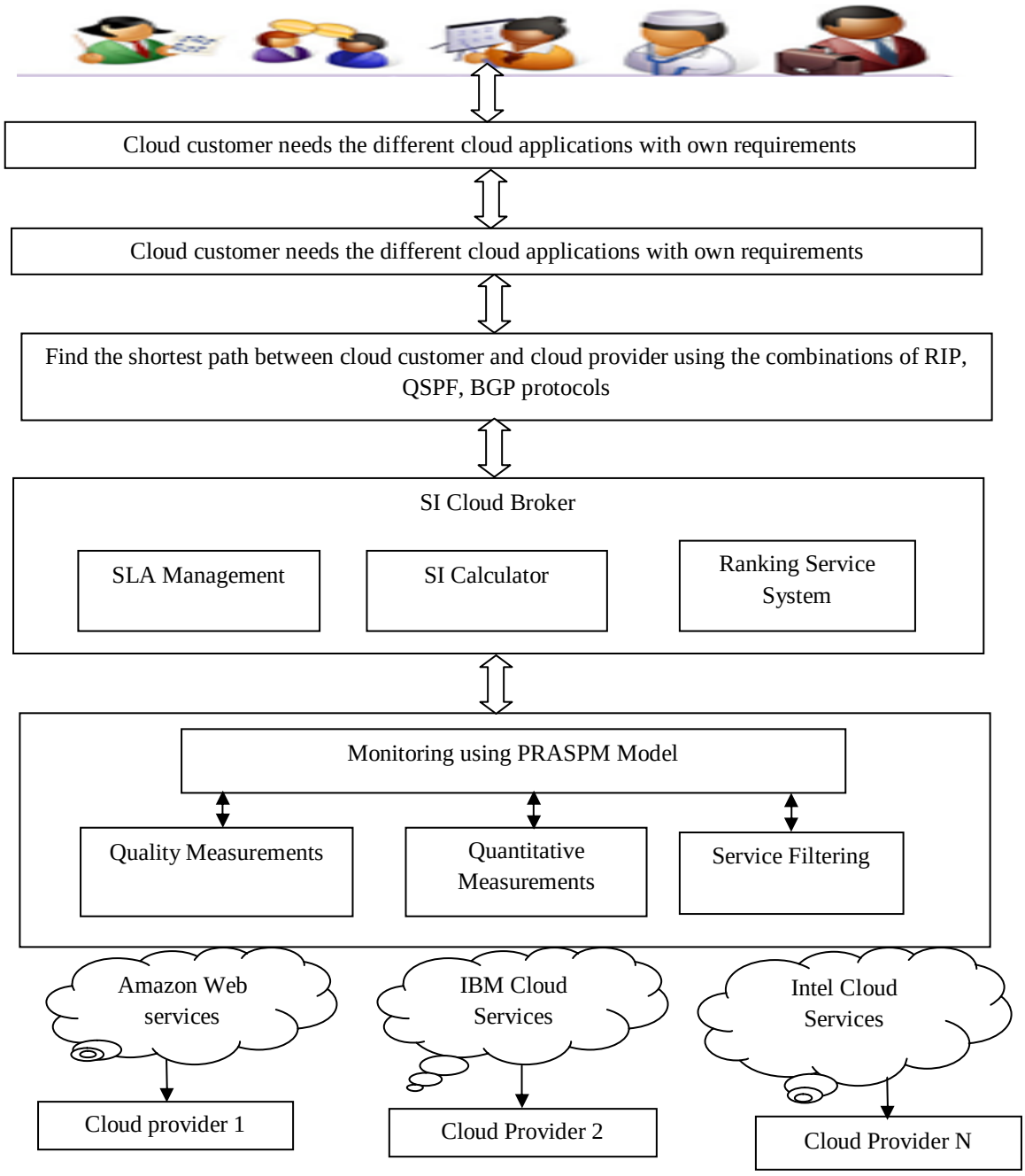

Figure 1: SI Cloud Structure Service Framework

The components in SI cloud architecture are as follows:

- **SI Cloud Broker:** This component is responsible for interaction with customers and understanding their application needs. It collects all their requirements and performs discovery and ranking of suitable services using other components such as the SI Calculator and Ranking systems. SLA

Management is the component that keeps track of customers' SLAs with Cloud providers and their fulfillment history. The Ranking System ranks the services selected by the Cloud Broker which are appropriate for user needs. The SI Calculator computes the various KPIs which are used by the ranking system for prioritizing Cloud services.

- **Monitoring using PRASPM Model:** This component first discovers Cloud services that can satisfy users' essential QoS requirements. Then, it monitors the performance of the Cloud services with the support of the PRASPM for example for IaaS it monitors the speed of VMs, memory, scaling latency, storage performance, system latency and accessible bandwidth. It also maintains way of how SLA requirements of previous clients are being satisfied by the Cloud provider. For this level, various tools are accessible, some of which we discuss about in the associated work segment.
- **Service Catalogue:** It stores the services and their features advertised by various Cloud providers.

IAAS Provider Quality Model

Cloud computing services can be estimated based on qualitative and quantitative Key Performance Indicators (KPIs). Qualitative are those KPIs which cannot be quantified and are mostly inferred based on user experiences. Quantitative are those which can be calculated using software and hardware monitoring tools. For example, providers' ethicality and security attributes are qualitative in nature. Since these KPIs represent generic Cloud services, only several of them are essential for particular applications and Cloud services. For instance, the installability aspect in usability is more important to IaaS providers than SaaS providers since in SaaS there is almost no installation on the client end. Additionally, the same KPI can have different descriptions based on the service. A few of these parameters depend on client applications and a few are independent. For instance, suitability is dependent on the client while elasticity is determined by the provider.

Therefore, it is complex to define precisely the SI values for a provider, particularly when there are various parameters involved and parameter definitions also depend on many sub-aspects. Here we give some instance descriptions for the most important quantifiable KPIs, mostly in the perspective of IaaS. However, most of these proposed metrics are valid for other types of services. The modeling of qualitative attributes is beyond the scope of this paper.

Proposed System Scheme

The optimal routing in shortest-path data networks—such as Internet protocol (IP) networks—using open shortest path first (OSPF), routing information protocol (RIP), and other interior gateway protocols (IGPs). We propose a combinatorial algorithm for solving the optimal shortest-path routing problem with different access points using dijkstra Algorithms.

RIP protocols are used to find short route in within Autonomous system in small networks only with use of hop count metrics. In huge networks it is not applicable to find the shortest route. In order to find short route in larger networks we can introduce OSPF protocols to find the short route with use of shortest path algorithms. We can't find the whether the cloud customer comes under small or large networks that why we can combine the RIP and OSPF protocols to find the shortest path between the cloud provider and customers. Additionally to communicate the different networks we use the Border Gateway protocols. Finally we combine the three protocols to find the shortest paths between the cloud provider and customers.

In order to increase the quality of service or avoid the delay of the service the cloud customer gets the cloud service from the cloud provider. During the cloud access the cloud customer use the different access point because one access points is not sufficient to access the cloud services means the customer choose the another access points with shortest path between the cloud provider and cloud customer without delay of the services. Hence the theoretically analysis the different access points with the shortest route. Finally find the shortest path from the combination of protocol using the dijkstra algorithms with the support of different access points.

These approaches were very efficient and effective compared to previous approaches because the previous approaches consider only the shortest path .There is no different access point concepts and always depend the one access points. These access points some time may get in sufficient bandwidth to access the cloud services. To overcome these problem use the different access point using the three protocol to find the shortest point and communicate the client and cloud server.

Praspm Model For QOS

When the cloud customer access the cloud service, some of the software and hardware components may fail to provide the service to customer. Here service delay occurs and customer gets low quality of service from the cloud providers and also affects the cloud customer business because the customer can't finish the project within the expected date and customer time and cost will be wasted. In order to increase the quality of service we introduce the PRASPM model.

We can analyze theoretically and measure the performance of the quality of service. These performances are better than other component tools service of performance. The PRASPM model has the self healing, adaptive, proactive, reactive, preemptive migrations components tools. These components have unique functionalities. So we combine and provide the quality of service to customer. If any cloud components is failed automatically, we detect and replace the cloud components without delay of the services. Automatic failure of the components work is carried out to another component. These models are adapting the cloud provider environments and monitor the cloud customer services. Hence the PRASPM model detect the weak components and replace the components prevent the delay of failure services and provide the quality of service to customers and also get the customer satisfactions because the customer finish the project within the expected date and get the more profit from the project. The business is improved automatically with the support of PRASPM model

Performance Evaluation

In this section, we will present our simulations of the Cloud partial Paths algorithm. Quality of Service (QoS) [12] plays a critical role in the affective reservation of resources within service oriented distributed systems. The Cloud Computing is promoted by the business rather than academic which determines its focus on user purposes. Different users contain different QoS constraints. So along with the particular target and resources, the proposal is formulated on scheduling model from the user's perspective. The first is how to measure various QOS attributes of a Cloud service. Many of these attributes vary over time. However, without having precise measurement models for each aspect, it is not possible to evaluate different Cloud services or even discover them. The attributes are Accountability, Agility, Assurance of Service, Security and Privacy, and Usability.

Accountability

This group of QoS attributes is used to measure various Cloud provider specific characteristics. This is important to build the trust of a customer on any Cloud provider. No association will desire to deploy its applications and store their critical data in a place where there is no accountability of security exposures and compliance.

Service Response Time

The efficiency of service availability can be measured in terms of the response time, i.e. in the container of IaaS, how rapid the service can be made accessible for usage. For example, if a user requests a virtual machine from a Cloud provider, then the service response time will represent the time taken by the Cloud provider to serve this demand. This contains provisioning the VM, booting the VM, allocating an IP address and starting application deployment. The service response time depends on various sub-factors such as average response time, maximum response time promised by the service provider, and the take of time this response time stage is missed.

Reliability

Reliability reflects how a service operates without failure during a given time and situation. Therefore, we are going to use the PRASPM Models. This model is easily prevented and detects the failure components and automatically replaces the components. The failure components work also take the another components without disturbing the Services. Hence it provides high reliability service to customer.

Stability

Stability is defined as the variability in the performance of a cloud service. Only vary the performance but achieve the stability of a service. For storage, it is the variances in the average read and write time.

Performance

There are many different solutions offered by Cloud providers addressing the IT needs of different associations. Every result has different performance in terms of functionality, service response time and accuracy. All these service performance is

very high because of PRASPM Model. Associations require understanding how their purposes will perform on the different Clouds and whether these deployments meet their expectations.

Assurance
This characteristic indicates the likelihood of a Cloud service performing as expected or promised in the SLA with the support of PRASPM Models. Each association seems to enlarge their production and provide better services to their clients. Therefore, consistency, resiliency and service strength are important factors in selecting Cloud services. The PRASPM Model provides the satisfactions and assurance to cloud customers.

Security and Privacy
Data protection and privacy are important concerns for nearly every organization. Hosting data under another organization's control is always a critical issue which requires stringent security policies employed by Cloud providers. Therefore we introduce Data Masking Technique for hiding the important data in the important databases. For example, financial associations usually require compliance with regulations involving data integrity and privacy. Security and Privacy is multi-dimensional in nature and includes many attributes such as protecting privacy and confidentiality, data reliability and accessibility**.**

Cost
Our proposed models provide the quality of service to customer with low cost and no delay in the services**.** Thus, cost is obviously one of the essential aspects for IT and the business. Cost tends to be particular mainly quantifiable metric today, other than it is essential to communicate cost in the characteristics which are relevant to a particular business organization.

Conclusion

The cloud computing was one of the important technologies because each and every information technology companies need the cloud computing services and not only the company and also for individual customers. The cloud computing provide the efficient effective and business solutions to reduce the cost and increase the profit. In order to select the best service from the different cloud provider to construct the cloud service index, this index are formed with the different parameters like available resources, time, cost, security tools, infrastructure etc. After selection of the best service automatically find the shortest path between the cloud provider and the client with more than one access points supports. In order to avoid the delay of the service or failure of the service we use the PRASPM Model .In future this infrastructure was not enough to get the service from cloud provider and customer. Finally internally and externally update the technologies in both side of client and cloud server or cloud providers.

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