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CLOUD SERVICE BROKER FOR CLUSTERING HOMOGENEOUS SERVICE PROVIDERS

DIVYA C
Assistant Professor, Department of Computer Science and Engineering,
SVIT, Bangalore, India divya.c@saividya.ac.in

SPURTHI G S
Assistant Professor, Department of Computer Science and Engineering,
BNMIT, Bangalore, India spurthigs.89@gmail.com

ABSTRACT

Cloud computing is having a great impact on the evolving IT Enterprise today. It provides on demand services with pay-as-you-go manner. Service consumers struggle traversing through an array of cloud service providers with the different design and management of all the transactions payments, selection of appropriate service providers etc. A solution to this problem is the usage of cloud service brokerage. Cloud brokers acts as an intermediary between the cloud service providers and consumers. In this paper, we discuss the evolution of cloud service broker (CSB) and propose a model within a CSB for the selection of service provider, by forming a cluster of similar service providers

KEYWORDS: Cloud Computing, Service providers, CSB, K-Medoids clustering

INTRODUCTION

Cloud computing is one of the emerging, promising and upcoming technology in recent times. It provides on-demand services with pay-as-you-go manner. Cloud computing is often compared to the supply of electricity and telephone. Services are being offered to the customers without the customers having to know how it is being provided in the easiest way. In the same way, cloud computing offers application developers and customers an overall view of services that captures the most important aspects for an application, ignoring the other details. Services that can be provided over an Internet is called as "cloud".
Cloud computing can be divided into the following types based on their placement:

- Public cloud: where customers are provided with the services offered by the cloud service providers via the internet.
- Private cloud: where selected group of customers, who are part of an enterprise are offered with IT capability.
- Hybrid cloud: in which the environment is created through the usage of combination of private and public cloud offerings by an organization. The architectural service layers of a cloud include:
- Software as a service (SaaS): comprises the top most layer featuring a complete application provided in a multi-tenant environment. Ex of SaaS: Salesforce[1]
- Platform as a service (PaaS): offers a development and deployment middleware layer. Key players include Microsoft Azure Platform[2] as well as Google App Engine[3].
- Infrastructure as a service (IaaS):comprises the lowest layer delivering services like compute storage and networking. Prominent example is Amazon EC2 service[4]

Cloud service brokerage or cloud service broker is an individual or an independent business company that helps the service consumers to choose or to select an appropriate service

provider in order to meet their requirements. Negotiation, consultation and deployment are the other roles played by the cloud broker. The goal of a cloud broker is to make a service more cohesive to a company or to incorporate a composite service, to improve their security which adds more value to the original cloud services being offered. Here, a model for the selection of cloud service provider has been proposed and it has been organized as follows:
In section II, we discuss the previous work in cloud service brokerage. Section III describes the system review. Section IV gives an accurate insight to the proposed model. Section V briefs the conclusion and future work.

LITERATURE SURVEY

In terms of the cloud, cloud broker [5] is as simple as a third party component that can benefit several consumers for a particular service which are being provided by the cloud brokerage service provider. With this, consumers are assured of receiving an appropriate service from a range of offerings. In the same way, the approval of services by the cloud broker can also be beneficial to the cloud service providers.

The categories of opportunities for cloud brokers [6] are:

- Service Intermediation: Placing services on top of an existing cloud platform, such as identifying and managing access to the cloud services.
- Service Aggregation: A composition of multiple services being provided as a single service or more.
- Service arbitrage: A composition of multiple services chosen from multiple agencies.

There are several features for a cloud service broker. A cloud service broker [7]:

- Maintains a valued and permissible relationship with service consumers.
- May or may not have a permissible relationship with service providers.
- Brokers atleast 1 cloud service
- Adds non-trivial value on top of original service.
- Brokers multiple services to many customers, multiple services to a single customer or a single service to multiple customers.

From the observations made, cloud service brokers[8] can provide benefits to cloud providers. An engaged broker can help keep a relationship between provider and customer active. A broker can also implement services and solutions that may not be part of the provider's core business – SLA's, customized user interface design or using cloud application programming interfaces (API's) to integrate for example, the customer's business applications with a mobility solution offered by its cloud provider.
Dharmesh Mistry[9], explores the business and technology challenges for independent software vendors moving to a software as a service model and highlight how cloud brokers can overcome many of them by providing entitlement, analytical, billing/payment and security services.

SYSTEM REVIEW

Figure 1. System Architecture

The above architecture allows a consumer or a group of service consumers (SC's) to obtain a service that they desire for, from a particular cloud service provider (CSP) or from the integration of various service providers. Consumers can belong to the different areas like sales, marketing etc. Service providers can provide service either through public cloud, private cloud or through some managed services.

PROPOSED MODEL

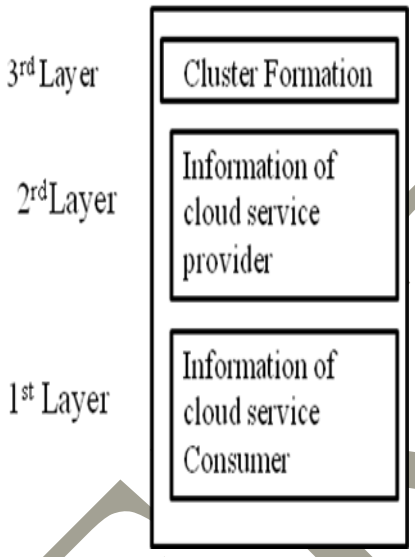

Figure 2. Broker component on cloud

In the 1st layer, information on various service consumers and their requests are accumulated.. In the 2nd layer, the cloud service broker stores some information related to the different service providers and their cost. If there are service providers providing some similar services, it is time consuming for the broker to select an appropriate provider. For this reason, clusters of similar service providers are formed in the 3rd layer using K-Medoids clustering algorithm.

A. ANALYSIS

In order to understand the purpose behind the framework, consider the following cases:
Case 1: let R1, R2 and R3 are the resources being requested by the consumers C1, C2 and C3 as shown in Table 1.

Table 1: Resources requested by the Service Consumers

Consumers	Resources	Quantity
C1	R1	30
C2	R2	90
C3	R3	120

Case 2: In the next case shown below, assume that the consumer C4 requests the resources R2 and R3.

Table 2:Combination of resource requests by a single consumer

Consumers	Resources	Quantity
C1	R1	30
C2	R2	90
C3	R3	120
C4	R2, R3	110

For the combination of resource requests from the service consumers as shown below in Table 3, there exists a set of similar service providers (SP's) satisfying these requests with a specific cost as shown. So, our aim in this paper is to cluster those similar service providers.
Ex: Assume that Service provider S1 is providing resource R1 at the rate of $15. Another service provider S2 is also providing resource R1 at the rate of $50. S3 is providing resources R2, R3 at the rate of $100, and S4 is providing resources R3, R4 and R9 at the rate of $150.
Similarly, there are 'S_n' number of service providers which are providing a combination of R_n resources at the cost of n$ and our idea is to cluster those S_n number of similar service providers using an appropriate clustering algorithm.

Table 3: Combination of resources provided by service providers

Sl. no	Service providers	Resources provided	Cost
1	S1	R1	$15
2	S2	R1	$50
3	S3	R2,R3	$100
4	S4	R3,R4,R9	$150
N	S_n	R_n	n$

B. K-MEDOIDS ALGORITHM

Medoids can be defined as an object of the cluster whose average dissimilarity to all the objects in the cluster is minimal. K-Medoids is a partitional clustering algorithm wherein it tries to reduce the distance between points labelled to be in a cluster and a point assigned as the centre of the cluster. K-Medoids selects data points as centre and works with arbitrary metrics/parameters of distances between data points. K-Medoids is more robust to noise and outliers because it reduces or minimizes a sum of pair wise dissimilarities instead of a sum of squared Euclidean distances.

1. Initialize: randomly select *k* of the *n* data points as the medoids
2. Assignment step: Associate each data point to the closest medoid.
3. Update step: For each medoid *m* and each data point *o* associated to *m* swap *m* and *o* and compute the total cost of the configuration (that is, the average dissimilarity of *o* to all the data points associated to *m*). Select the medoid *o* with the lowest cost of the configuration.

Repeat alternating steps 2 and 3 until there is no change in the assignments.
In our paper, the service providers (SP's) are chosen as initial medoids The remaining service providers gets assigned to the closest medoid based on the proximity of services being provided.

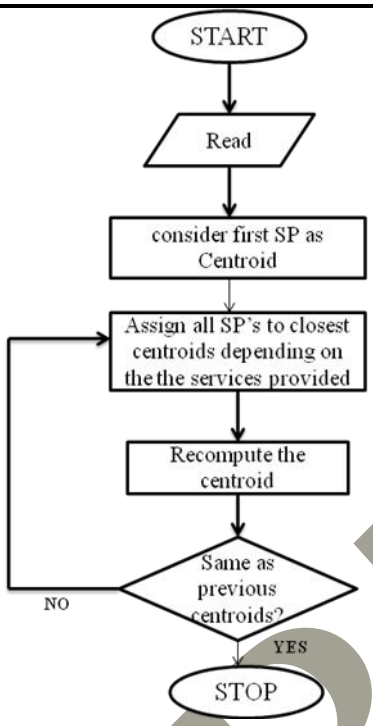

Figure 3. Flowchart for clustering similar service providers using K-Means

CONCLUSION

Though, the cloud broker stores information of various service consumers and providers, the broker may not find it feasible to search for a service provider in order to satisfy the different combinations of requests from the consumers. As a solution to this problem, similar service providers can be clustered based on the services they provide. K-Medoids clustering algorithm is being used for clustering. In future, the proposed model or framework can be implemented and the performance of the clusters and quality of service metrics for the services within clusters are to be monitored.

REFERENCES

1) Saas, *http://www.salesforce.com/*

2) Windows Azure Platform, *http:///www.microsoft.com/windowsazure/*

3) Google App Engine, *http://code.google.com/appengine/*

4) Amazon Elastic Compute Cloud (Amazon EC2*), http://aws.amazon.com/ec2/*

5) *http://www.cbrdigital.com/2012/03/23/* should-i use- cloud services – brokerage – csb - solution. html

6) *http://www.gartner.com/technology/topics/cloud*

7) *http://raydepena.wordpress.com/2012/10/22/*integration-cloud-service-brokerage-what-it-is what-it-isn't.

8) *http://searchcloudprovider.techtarget.com*/feature/A-cloud-broker-can-be-a-cloud-provider- best - friend

9) *http://www.cognizant.com*/InsightWhitepaper/cloudBrokers-can-Help-ISVs-Move-to-saas.pdf

10) Shi Na ,Liu Xumin, *Research on k-means Clustering Algorithm: "An Improved kmeans Clustering Algorithm", Third International Symposium on Intelligent, Information Technology and Security Informatics, 2010*.

11) Ashwini J.P, Divya C, Sanjay H A: "*Efficient resources selection framework to enable cloud for HPC applications", Computer and communication Technology(ICCCT),2013 4th International conference, page(s):34-38*

12) Jaliya Ekanayake and Geoffrey Fox, "*High Performance Parallel Computing with Clouds and Cloud Technologies", First International Conference CloudComp on Cloud Computing October 19 - 21, 2009, Munich, Germany*.

13) Jyoti Yadav, Monika Sharma: "*A Review of K- mean Algorithm", International Journal of Engineering Trends and Technology (IJETT) – Volume 4 Issue 7- July 2013*

14) Bhoomi Bangoria, Nirali Mankad , Vimal Pambhar : "*Enhanced k-means clustering algorithm to reduce time complexity for numeric values", International Journal of Advance Engineer ing and Research Development (IJAERD) Volume 1,Issue 5,May 2014, e- ISSN: 2348 - 4470 , print-ISSN:2348-6406*

15) A. Jain, M. Murty and P. Flynn, "Data Clustering: A Review", *ACM Computing Surveys, Vol.31, No. 3, Sep 1999, pp. 264–323*

BIOGRAPHIES

Divya C is working as Assistant Professor in Sai Vidya Institute of Technology, Bangalore. Her area of interest are cloud computing, Software engineering and Adhoc Networks.

Spurthi G S is working as Assistant Professor in Sai Vidya Institute of Technology. Her area of interest is Cloud Computing and Adhoc Networks.