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A Hypothetical Model for Clustering Similar Service Providers Using Cloud Service Broker

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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-Means data clustering

I. 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. Provisioning of services over the internet is called as "cloud".

Cloud computing can be divided into the following types based on deployment:

- Public cloud: where the services being offered by cloud providers are available for the customers via the internet.
- Private cloud: where IT capability is offered to a selected group of consumers who are part of an enterprise. The cloud service provider may be an internal IT organization or a third party.
- 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): forms the top layer featuring a complete application provided in a multi-tenant environment. Ex of SaaS is Salesforce[1]
- Platform as a service (PaaS): providing 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): 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. The role of a cloud broker includes negotiation, consultation, deployment etc. The goal of a cloud broker is to make a service more adherent 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, we propose a model for the selection of cloud service provider and it has been organized as follows:
In section II, we discuss the previous work in cloud service brokerage. Section III describes the system overview. Section IV gives an insight to the proposed model. Section V mentions the conclusion and future work.

II. LITERATURE SURVEY

In terms of the cloud, cloud broker [5] is nothing but a third party component that can benefit several consumers for a particular service which are being provided by the cloud brokerage service provider. By doing 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: Deploying 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.

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➢ Service arbitrage: A composition of multiple services chosen from multiple agencies.

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

- Maintains a legitimate 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.

III.SYSTEM OVERVIEW

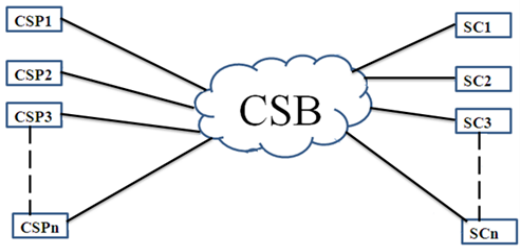

Fig 1. System Architecture

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.

IV. PROPOSED MODEL

In the 1st layer, information on various service consumers and their requests are collected. 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-Means clustering algorithm.

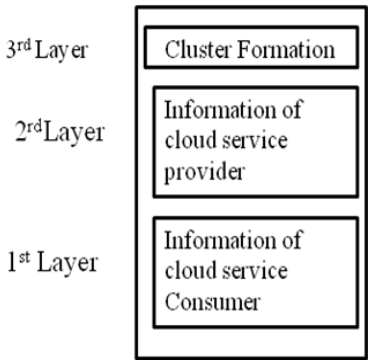

Fig 2. Broker component on cloud

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 I

Resources requested by the Service Consumers

Consumers	Resources	Quantity
C1	R1	50
C2	R2	100
C3	R3	150

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

TABLE II

Combination of resource requests by a single consumer

Consumers	Resources	Quantity
C1	R1	50
C2	R2	100
C3	R3	150
C4	R2, R3	200

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 IIII

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. General K-Means Algorithm

K-Means algorithm for clustering data objects is initialized by choosing first K initial centroids, where K is the user specified parameter. Each data object is the assigned to the closest centroid and each collection of data objects assigned to a centroid is a cluster. This is repeated until no object changes clusters, or equivalent until the centroid remains the same. The algorithm proceeds as follows:

1) Select K data objects as the initial centroids
2) Repeat
3) Form K clusters by assigning all data objects to the closest centroid
4) Recompute the centroid of each cluster
5) Until the centroid doesn't change

Euclidean distance is often used for data points in Euclidean space in the basic K-Means algorithm.

In our paper, the service providers (SP's) are chosen as initial centroids. The remaining service providers gets assigned to the closest centroid based on the proximity of services being provided.

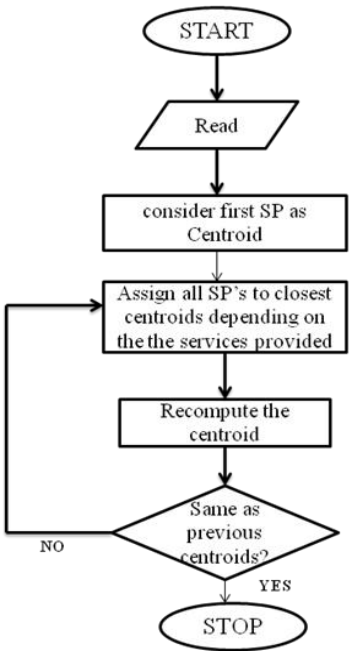

Fig 3. Flowchart for clustering similar service providers using K-Means

V. 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-Means 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] GoogleAppEngine, 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-iswhat-it-isnt
[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

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