Vibhavari Patel, Prof. Nisha Shah / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com
Vol. 3, Issue 4, Jul-Aug 2013, pp.1699-1702

A Proposed Service Broker Policy For Inter Region Data Center Selection in Cloud Environment

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ABSTRACT

In 21st century Cloud computing is the boon for all who want to reduce upfront capital expenditure on hardware and software. Cloud computing provides software, infrastructure, platform and data storage on pay-as-you-use basis. Data centers located at different locations provide services to the users. Proper Data center selection is important for proper resource utilization and good response time. Existing service broker policies are used to find the closest and cheapest Data center from intra region. But in case of single Data center failure or temporary Data center down, data center selection is random for inter region. We have proposed a new policy to select the inter region data center based on number of users running on it. In this paper we want to show that this proposed policy gives better response time compare to existing service broker policy.

Key Words- cloud computing, service broker policy, cloud analyst, data center, user base

I. INTRODUCTION

Information and Communications Technology is growing very fast, and it may possible that computing will come 5th utility (after water, gas, electricity and telephony)[1]. Computing is defined by any goal-oriented activity acquiring, benefiting from or creating computers[2]. Cloud computing is the latest computing which is the boon for IT industry.

In cloud computing users do not own physical infrastructure; rather they rent the required services from a third-party provider. These services are categorized as Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and Data Storage as a service (dSaaS)[4]. In the field of IT, main advantages of these services are cost effectiveness and location independence. With cloud computing users can concentrate more on core business rather than spending time and money on required resources to manage their business. Chapter 2 is about the cloud analyst tool which is cloud-sim based tool for cloud environment. In chapter 3, different service broker policies for Data center selection are discussed. In chapter 4, proposed policy is discussed with pseudo code. In chapter 5, closest data center service broker policy is compared with proposed service broker policy. Finally in chapter 6, we concluded that proposed service broker policy gives better performance for inter region data center selection compared to existing service broker policy.

II. CLOUD ANALYST TOOL

CloudAnalyst is a new GUI based simulation tool to study the behavior of large scaled Internet application in a cloud environment. CloudAnalyst is GUI based simulator developed on cloudsim framework. There are many open source solutions available for Cloud computing. Different simulators available are like Xen Cloud Platform (XCP), Nimbus, OpenNebula, Eucalyptus, Tplatform, Apache Virtual Computing Lab (VCL), Elastic Computing platform [5]. Following features of CloudAnalyst tool make it better than other toolkit[6].

- It provides high level of configurability and flexibility.
- Visualization capability separates the simulation experiment set up exercise from a programming exercise.
- Developers can concentrate on the simulation parameters rather than the technical programming.
- Simulations can be executed repeatedly with modifications in parameters quickly and easily.
- Graphical output makes result analysis more easy and efficient.
- Any problems related to performance can be highlighted quickly.

Figure 1 shows the GUI of cloud analyst tool. Main advantage of Cloud Analyst tool is that there is no need to write code for each simulation. User can run repeated simulations with different input parameters very quickly and easily[6].
Figure 2 shows the architecture of cloud analyst tool.

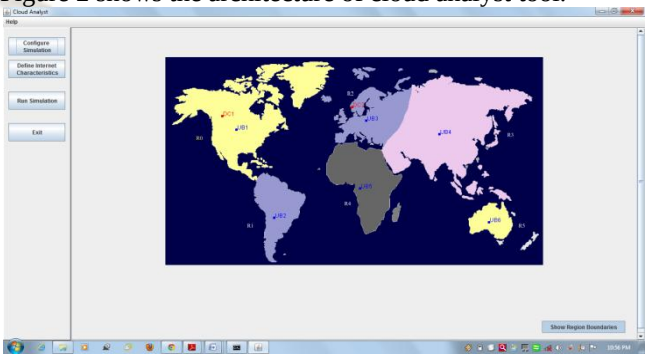

Figure1. GUI of Cloud Analyst Tool

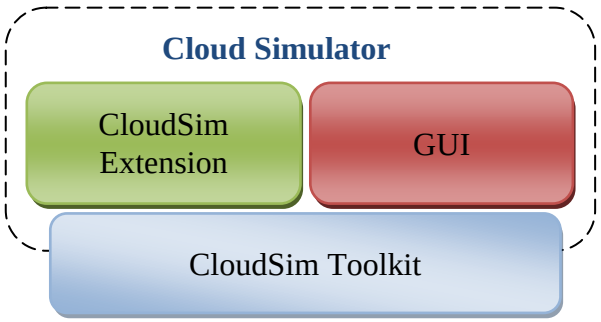

Figure 2. Architecture of CloudAnalyst tool

In CloudAnalyst tool UserBase is a representation of many users as a single unit. Figure 3 shows the routing of user request in CloudAnalyst tool.

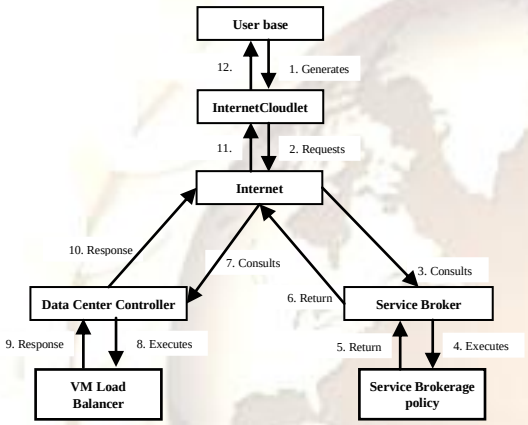

Figure 3 Routing of user request in CloudAnalyst tool

Following are the steps of user request routing[6].

1. UserBase generates InternetCloudlet using application id and name of UserBase itself. This InternetCloudlet is sent to Internet.
2. After receiving message tagged as a REQUEST, Internet consults Service Broker.
3. The Service Broker maintains the list of DataCenterController, indexed by region and selects the best DataCenterController based on the service brokerage policy. The message of selected data center will be sent to InternetCloudlet.
4. The request received at DataCenterController may again sub divided in single InternetCloudlet and send to VMLoadBalancer.
5. VMLoadBalancer balance the load of request by assigning them to available VMs based on following algorithms. And response is send back to UserBase based on application id and User name specified in InternetCloudlet.

III. EXISTING SERVICE BROKER POLICIES

In Cloud environment Data centers provide services to users. In case of many Data centers available, service broker policies are used to select best data center such that it is beneficial to users and service providers both. Different service broker policies are as follows[6].

1. Service Proximity Based Routing

This routing policy follows 'closest data center' strategy as per figure 4. After getting the user request, Internet queries to service proximity service broker. The service broker asks for the region proximity list to the internet characteristics. The region proximity list is an ordered list based on the latency. Based on this information region will be selected with lowest latency and Data center of that region will be selected. If there are multiple data centers within the region, it will be selected randomly.

2. Performance optimized routing

In this routing policy, service broker actively monitors the performance of Data center and directs the traffic to the data center with best response time.

3. Dynamically reconfiguring router

This policy has an extra responsibility of scaling the application deployment based on the current load. For that it will increase or decrease the number of virtual machines.

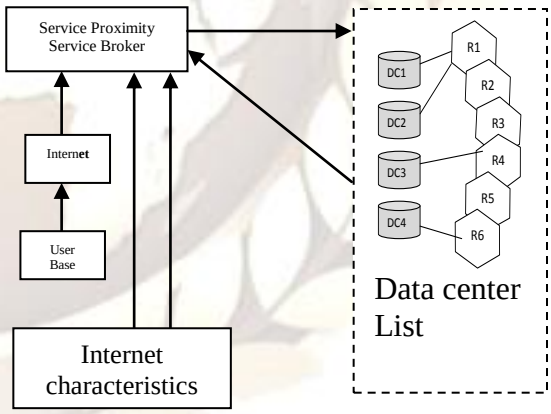

Figure 4. Service proximity based routing

IV. PROPOSED WORK

Proposed service broker policy selects the data center based on number of users running on it. If no data centers are available in same region of user base, service proximity based policy will select the data center from nearest region. If more than one data centers from different region are with same network latency, service proximity based policy selects the first data center. It will not consider other parameters. Proposed service broker policy will sort the data center based on number of users and if network

latency is same for more than one data center. Pseudo code for proposed policy is as per below.

1. Get the Region of the UserBase whose request is arrived.
2. Get the datacenter index of selected region
3. regionalist → regionalDataCenterIndex.get (region)
4. if regionalList is not NULL then
    a. listSize ← size (regionalList)
    b. if listSize is 1 then
        i. dcName ← regionalList.get(0)
    c. else
        i. for all p in dcVMCostList do
            1. if (dcVmCostList.get(smallest)>dcVmCostList.get (p)) then
            2. Smallest← p
            3. end if
        ii. end for
        iii. dcName ←regionalList.get (smallest)
    d. end if
    e. if dcName
5. end if
6. return dcName
7. if dcName is not null then
    a. if Data center is not in same region
        i. sort the region list based on number of users
        ii. return dcName of the region with least users
    b. else
        i. return dcName

V. EXECUTION AND RESULTS

Following configuration(table 1, 2, 3) is taken for the results of service proximity based policy and proposed policy.

User Base	Region	Request per user /Hour	Data Size per requests (Bytes)	Peak Hours (GMT)	Avg Peak Users	Off Peak Users
UB1	0	60	100	11 to 2	150000	15000
UB2	3	60	100	12 to 3	150000	15000
UB3	3	60	100	12 to 3	150000	15000
UB4	4	60	100	12 to 3	150000	15000

Table 1. User Base configuration

DC Name	Region
DC1	3
DC2	4

Table 2 Data center

Region	0	3	4
0	50	250	250
3	250	25	500
4	250	500	25

Table 3 Transmission delay in milliseconds.

When above configuration is selected to run service proximity based policy, User base of region 0 selects data center 1, located in region 3. Data center 1 and 2 both have same network latency from region 0. As data center 1 comes first in proximity list, user base selects data center 1 with service proximity based routing.

Data center 2 has less number of users and less load compare to data center 1. So it may give better response time to user base of region 0. Proposed service broker policy selects the data center with less number of users when network latency is same for all data centers.

Table 4 shows the results of response time for service proximity policy and proposed service broker policy.

Service Proximity Policy	Data center request servicing time (ms)	Data Transfer cost ($)	Overall Response time (ms)
Service Proximity Based	7.41	547.91	224.12
Proposed Service Proximity	5.17	343.48	178.30

Table 4 Results

VI. DISCUSSION

Results of table 4 shows that proposed service broker policy gives better performance than existing service proximity based policy. Data center request servicing time, data transfer cost and overall response time are improved in proposed service broker policy.

VII. CONCLUSION AND FUTURE WORK

Finally we concluded that proposed service broker policy eliminates the 'sequential' selection of inter region data center selection. Proposed policy gives improvement in overall performance.

In future, more optimized service broker policy can be developed using non-lineal

mathematical model, traveling salesman problem or swam intelligence.

REFERENCES

[1] Buyya, Rajkumar, et al. Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility. Melbourn, Australia, n.d

[2] ACM, AIS and IEEE-CS. "The joint task force for Computing Curricula 2005." Overview. 2005.

[3] Huth, Alexa and James Cebula. "The Basics of Cloud Computing.." n.d.

[4] Membrey, Peter, Eelco Plugge and David Hows. Practical Load balancing. New Delhi: Apress, 2012

[5] P. T. Endo, G. E. Goncalves, J. Kelner, D. Sadok,"A Survey on Open-source Cloud Computing Solutions", 1Universidade Federal de Pernambuco – UFPE, Caixa Postal 7851 – 50732-970 – Recife – PE.

[6] Wickremasinghe, Bhathiya. "CloudAnalyst: A CloudSim-based Tool for Modelling and Analysis of Large Scale Cloud Computing Environments." Project Report. 2009.