ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Special Issue 7, October 2015

Enhanced Proximity-Based Routing Policy for Service Brokering in Cloud Environment

Santhosh B[1], Aravind Prabhu [2],Usman[3],Dr Manjaiah D.H[4]

Asst. Professor, Dept. of MCA, AIMIT, St. Aloysius College (Autonomous), Mangalore, Karnataka, India

Dept. of M.Sc (ST) , AIMIT, St. Aloysius College (Autonomous), Mangalore, Karnataka, India

Professor, Dept. of MCA, AIMIT, St. Aloysius College (Autonomous), Mangalore, Karnataka, India

ABSTRACT: Cloud computing is an area that is rapidly gaining popularity in both academia and industry. Cloud-Analyst is useful tool to model and analyze cloud computing environment and applications before actual deployment of cloud products. Service broker controls the traffic routing between user bases and data centers based on different service broker policies. Service proximity based routing policy selects closest data center to route the user request. If there are more than one data centers within the same region, it is selected randomly without considering workload, cost, processing time or other parameters. Randomly selected data center is prone to give unsatisfactory results. In this paper we propose an enhanced proximity-based routing policy that select cost effective data center.

I. INTRODUCTION

Cloud computing now is known as a provider of dynamic, scalable on demand, virtualized resources over the internet. It also makes it possible to access applications and associated data from anywhere. Companies are able to rent resources from cloud for storage and other computational purposes so that their infrastructure cost can be reduced significantly. They can also make use of software's, platforms and infrastructures as a services , based on pay-as-you-go model.

1.1 Task scheduling in cloud

The Task scheduling problem belongs to the class of problem known as Np-Hard problem . There is no algorithm exists which gives optimal solution within the polynomial time.The solutions based on the exhaustive search are impractical because of overheads involved in generating the schedulers.

The scheduling algorithms should provide benefits to both, the cloud user as well as to the service provider. Scheduling algorithms can be designed in such a way that they satisfies the QoS (Quality of Service) constraints imposed by cloud users. Scheduling algorithms can also be designed to perform load balancing among virtual machines which results into improvement of resource utilization at service provider's end.

1.2 Cloud application service broker

A service broker decides which data center should provide the service to the requests coming from each user base. And thus, service broker controls the traffic routing between User Bases and Data Centers. Service brokers are implemented with different routing policy.

1.3 Resource Location based scheduling in cloud computing

Resource Selection is one of the important phase in scheduling. Selection of the resource based on the location is in the laws of many countries. It provide security to the data. In the Australian Government Information Security Manual (ISM)[8], The Australian Signals Directorate (ASD) strongly *encourages* agencies to choose either a locally owned vendor or a foreign owned vendor that is located in Australia and stores, processes and manages sensitive data only within Australian borders. Like Australia many of the countries ,the security of the data is the main concern. One of the solution is in the SLA specify location where the requests should be processed.

II. SERVICE PROXIMITY BASED ROUTING

In this case the proximity is the quickest path to the data center from a user base based on network latency. The service broker will route user traffic to the closest data center in terms of transmission latency.

Algorithm
1. ServiceProximityServiceBroker maintains an index table of all Data Centers indexed by their region.
2. When the Internet receives a message from a ser base it queries the ServiceProximityServiceBroker for the destination DataCenterController.
3. The ServiceProximityServiceBroker retrieves the region of the sender of the request and queries for the region proximity list for that region from the InternetCharacteristics.
This list orders the remaining regions in the order of lowest network latency first when calculated from the given region.
4. The ServiceProximityServiceBroker picks the first data center located at the earliest/highest region in the proximity list. If more than one data center is located in a region, one is selected randomly.

III. PROPOSED ENHANCED PROXIMITY-BASED ROUTING ALORITHM

.
Here we are proposing the new algorithm based on Service Proximity based routing. Here location of the resource and cost per processing ie cost per Vm$/Hr is considered. In the proposed algorithm Location of the resource based on SLA is considered and when there is more than one datacenters are available it selects the data center with the lowest cost based on cost per Vm$/Hr and also it manages the load between the datacenters. When there are more than one datacenters with the same cost per Vm$/Hr is found it selects one of the datacenter randomly.

Algorithm
1. ServiceProximityServiceBroker maintains an index table of all Data Centers indexed by their region.
2. When the Internet receives a message from a user base it queries the ServiceProximity ServiceBroker for the destination DataCenterController.
3. The ServiceProximityServiceBroker retrieves the region of the sender of the request and queries for the region proximity list for that region from the InternetCharacteristics.This list orders the remaining regions in the order of lowest network latency first when calculated from the given region.
4. The ServiceProximityServiceBroker picks the first data center located at the earliest/highest region in the proximity list and satisfied by SLA. If more than one data center is located in a region, select the datacenter from the region where Vm$/Hr is minimum. When there are multiple datacenters with the same Vm$/Hr is present , select the datacenter randomly.

IV. SIMULATION EXPERIMENT

The paper uses simulation to test and verify the efficiency and correctness of the job scheduling algorithm presented in this paper.

4.1 Simulation results and analysis
The proposed algorithm is simulated in a simulation toolkit CloudAnalyst[1]

4.1.1 Cloud Analyst
To support the infrastructure and application-level requirements such as modelling of on demand virtualization arising from Cloud computing paradigm, enabled resource simulators are required. Few simulators like CloudSim [1] and CloudAnalyst [2] are available. CloudAnalyst has been used in our paper as a simulation tool. A snapshot of the GUI of CloudAnalyst simulation toolkit is shown in figure 1(a) and its architecture is shown figure 1(b).

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Special Issue 7, October 2015

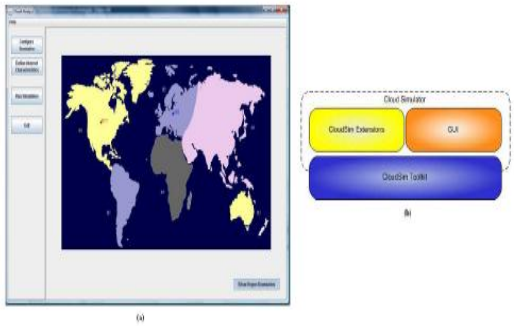

Fig 1: Cloud Analyst (a) GUI of Cloud Analyst

(b) Architecture of Cloud Analyst build on CloudSim

CloudAnalyst developed on CloudSim is a GUI based simulation tool. CloudSim facilitates modelling, simulation and other experimentation on cloud programmatically. CloudAnalyst uses the functionalities of CloudSim with GUI based simulation. It allows setting of parameters for setting a simulation environment to study any research problem of cloud. Based on the parameters the tool computes, the simulation result also shows them in graphical form. A hypothetical configuration has been generated using CloudAnalyst. Where, the world is divided into 6 ''Regions" that coincide with the 6 main continents in theWorld. Six "User bases" modeling a group of users representing the six major continents of the world is considered. A single time zone has been considered for the all the user bases and it is assumed that there are varied number of online registered users during peak hours, out of which only one twentieth is online during the off-peak hours.

4.2. SIMULATION SETUP

Here we have considered two simulation scenarios with different user bases, datacenters and userbase-datacenter locations

4.3 Simulation scenario1

In this scenario User Base and data center configurations are as given in Table 1 and Table 2 and it is assumed that UB1 user requests can be executed in any datacenter except in Region 1. In the Proximity-Based Routing algorithm always selects closest data center and most of the cases data center within the user base.

S.No	User Base	Region	Online users during peak hrs.	Online users during off-peak
1	UB1	1	1000	100

Table 1 : Configuration of User Bases

Name	Region	Arch	OS	VMM	Cost per VM $/Hr	Memory Cost $/s	Storage Cost $/s	Data Transfer Cost 4/Gb
DC1	1	x86	Linux	Xen	2	0.05	0.1	0.1
DC2	1	x86	Linux	Xen	1	0.05	0.1	0.1
DC3	2	x86	Linux	Xen	1	0.05	0.1	0.1
DC4	2	x86	Linux	Xen	1	0.05	0.1	0.1
DC5	4	x86	Linux	Xen	1	0.05	0.1	0.1

Table 2 : Configuration of Data Centers:

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Special Issue 7, October 2015

4.3.1 Analysis of Results

Fig (2) shows the results of data center loading . Here UB1 region is 1 and the SLA requirement is request can be executed in any region other than region1. Results shows that UB1 requests are processed in data centers DC3 and DC4 . It satisfies SLA requirement . The data centers DC3 and DC4 are in region 2 and cost per VM$/Hr is same , the Fig (2) is also shows that load is equally distributed between the data centers.

The assignment of the user bases to the data centers also depicted the final simulation results as shown in Fig (3)

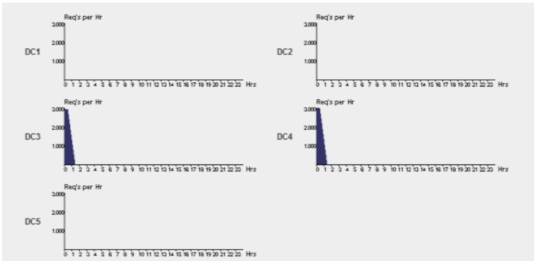

Fig 2: Data Center Loading

Fig 3: Simulation Results

4.4 Simulation scenario2

In this scenario User Base and data center configurations as given in Table 3 and Table 4 and It is assumed that UB1 user requests can be executed in any datacenter except in region 1 and region 3. UB2 user requests can be executed in any datacenter except in region 2 and 4 and UB3 can be executed in any datacenter.

S.No	User Base	Region	Online users during peak hrs.	Online users during off-peak
1	UB1	1	1000	100
2	UB2	2	1000	100
3	UB3	3	1000	100

Table 3 : Configuration of User Bases

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Special Issue 7, October 2015

Name	Region	Arch	OS	VMM	Cost per VM $/Hr	Memory Cost $/s	Storage Cost 4/s	Data Transfer Cost 4/Gb
DC 1	1	x86	Linux	Xen	2	0.05	0.1	0.1
DC 2	1	x86	Linux	Xen	1	0.05	0.1	0.1
DC 3	2	x86	Linux	Xen	1	0.05	0.1	0.1
DC 4	2	x86	Linux	Xen	1	0.05	0.1	0.1
DC 5	4	x86	Linux	Xen	1	0.05	0.1	0.1

Table 4 : Configuration of Data Centers:

4.4.1 Analysis of Results

Fig (4) shows the results of datacenter loading .Here UB1,UB2,UB3 user bases are in the region 1,2 and 3 respectively. The SLA requirement for UB1 is request can be executed in any region other than 1 and 3, UB2 request can be executed in any region other than 2 and 4 and there is no restriction of data centers for userbase UB3. The results in Fig (4) and Fig (5) shows that the UB1 region is 1 and closest are datacenters are DC1 and DC2 , requests are executed in region 3 by the datacenters DC3 and DC4 and satisfies the given SLA. The SLA requirement for UB2 is request can be executed in any region other than 2 and 4.The results in Fig (4) and Fig (5) shows that though UB2 region is 2 and closest are data centers are DC3 and DC4 , requests are executed in region 1 by the datacenter DC1 and DC2 . Here cost of VM$/Hr of data center of DC1 is more than DC2. Therefore majority of the requests are executed in DC2. Since there is no restrictions on the user base UB3 , results shows that it was executed in the closest data centers DC3 and DC4. Here the cost of VM$/Hr of data centers are same and the fig (4) shows that the load is equally distributed between the datacenters. The assignment of the user bases to the datacenter's also depicted the final simulation results as shown in Fig (5)

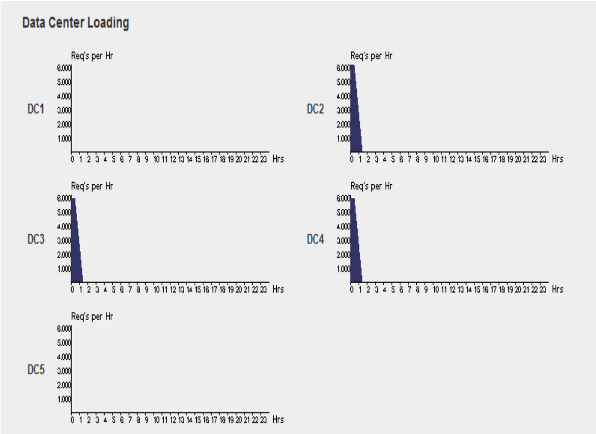

Fig 4 : Data Center Loading

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Special Issue 7, October 2015

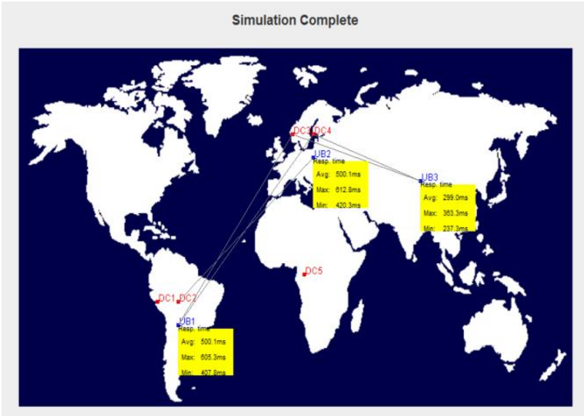

Fig 5: Simulation Results

V. CONCLUSIONS

The selection of the resources based on the location is the requirement in the laws of the many countries. This paper proposes new modified Proximity-Based Routing algorithm, where location of the resource and cost of VMs, ie cost per VM$/Hr considered. Here resources are selected based on the location specified in the user base SLA. Here, if the closest data center is the quickest datacenter it selects the closest datacenter else it selects either closest or quickest datacenter based on the cost of executing the task.

ACKNOWLEDGMENT

The authors would like to thank the dedicated research group in the area of Cloud & Grid Computing , wireless networks at the Dept of MCA,AIMIT,St Aloysius College, Mangalore for many stimulating discussions for further improvement and future aspects of the Paper. Lastly but not least the author would like to thank everyone, including the anonymous reviewers.

REFERENCES

[1].N.Calheiros,R.Ranjan,A.Beloglazov,C.Rose,R.Buyya,"Cloudsim:A toolkit for modeling and simulation of cloud computing environments and evaluation of resource provisioning algorithms",in *Software:Practice and xperience(SPE)*,Vol:41,No:1,ISSN:0038-0644,Wiley Press,USA,pp:23-50,2011.

[2] B. Wickremasinghe, R.N. Calheiros and R. Buyya, "Cloudanalyst: A cloudsim-based visual modeller for analysing cloud computing environ- ments and applications", in Proc. of *Proceedings of the 24th International Conference on Advanced Information Networking and Applications (AINA 2010)*, Perth, Australia, pp.446-452, 2010.

[3] Chieu T.C., Mohindra A., Karve A.A., Segal A., "Dynamic Scaling of Web Applications in a Virtualized Cloud Computing Environment ," in IEEE International Conference on e-Business Engineering, Dec. 2009, pp. 281-286.

[4] Naidila Sadashiv, S. M Dilip Kumar, "Cluster, Grid and Cloud Computing: A Detailed Comparison," The 6th International Conference on Computer Science & Education (ICCSE 2011) August 3-5, 2011. SuperStar Virgo, Singapore, pp. 477- 482.

[5] Vincent C. Emeakaroha, Ivona Brandic, Michael Maurer, Ivan Breskovic, "SLA-Aware Application Deployment and Resource Allocation in Clouds", 35th IEEE Annual Computer Software and Application Conference Workshops, 2011, pp. 298-303.

[6] V. C. Emeakaroha, I. Brandic, M. Maurer, and S. Dustdar, "Low level metrics to high level SLAs - LoM2HiS framework: Bridging the gap between monitored metrics and SLA parameters in cloud environments," In High Performance Computing and Simulation Conference, pages 48 – 55, Caen, France, 2010.

[7] M. Maurer, I. Brandic, V. C. Emeakaroha, and S. Dustdar, "Towards knowledge management in self-adaptable clouds," In 4th International Workshop of Software Engineering for Adaptive Service-Oriented Systems (SEASS'10) , Miami, Florida, USA, 2010.

[8]http://www.asd.gov.au/publications/csocprotect/Cloud_Computing_Security_Considerations.pdf

[9] R. Van den Bossche, K. Vanmechelen, J. Broeckhove, Cost-optimal scheduling in hybrid iaas clouds for deadline constrained workloads, in: IEEE 3rd International Conference on Cloud Computing CLOUD, pp. 228–235.

[10] R. Buyya, C. Yeo, S. Venugopal, J. Broberg, I. Brandic, Cloud computing and emerging IT platforms: vision, hype, and reality for delivering computing as the 5th utility, Future Generation Computer Systems 25 (2009) 599–616.

[11]Martin Randles, David Lamb, A. Taleb-Bendiab, "A Comparative Study into Distributed Load Balancing Algorithms for Cloud Computing", 2010 IEEE 24th International Conference on Advanced Information Networking and Applications Workshops, pp. 551-556.

[12] Soumya Ray and Ajanta De Sarkar, "EXECUTION ANALYSIS OF LOAD BALANCING ALGORITHMS IN CLOUD COMPUTING ENVIRONMENT", International Journal on Cloud Computing: Services and Architecture (IJCCSA), Vol.2, No.5, October 2012