

Previous Allocation Based Active Monitoring Algorithm for Load Balancing in Cloud Computing

Harsha M B¹, Dr. Sarojadevi H²

P.G Scholar, Dept. of Computer Science and Engineering, NMAMIT, Udupi, Karnataka, India¹

Professor and Head, Dept. of Computer Science and Engineering, NMAMIT, Udupi, Karnataka, India²

ABSTRACT: Balancing load is very important in cloud computing environment. Now a days, cloud computing is very popular and rapid growing technology. Clients from all over the world request for various cloud computing services. In present situation the load balancing algorithms are built to allocate the user requests to cloud resources (Data centre) in very efficient and intelligent way, so that over/under utilization of resource will not occur in cloud environment. In this paper, we proposed Modified Active Monitoring load balancing algorithm which allocates the user requests to all virtual machine in efficient manner. Simulation of this algorithm is done in Cloud Analyst simulator and we compare the results with existing Active Monitoring algorithm. Proposed algorithm distributes the load to all virtual machine without over/under utilization.

KEYWORDS: Cloud computing, Load balancing, Resource utilization, Virtual machine, Cloud Analyst.

I. INTRODUCTION

Cloud computing is emerging and innovative technology adopted in both industry and academia to store and retrieve the data file and we can access the software and computing resource over a network. Cloud technology is getting popular and large numbers of users are accessing the cloud services. Balancing load is major task of cloud service provider with minimum response time and better satisfaction of service level agreement of users. Many algorithms like Round Robin, Random Distribution and Throttled are used to distribute the load to virtual machine running in data centre with minimum response time and better throughput. But constraints such as over/under utilization of virtual machine and communication delay are not addressed clearly. Generally load balancing algorithms can be classified into static and dynamic algorithms. Static load balancing algorithms do not depend on the state and behaviour of system while allocating the user request. These algorithms are mostly suitable for homogeneous and stable environment but in dynamic environment they produce a poor response time. Dynamic Algorithms depends on the state and behaviour of the system, while allocating the user request they are more flexible and take different types of system attributes.

Cloud system consists of several servers, virtual machine, storage etc., which are interconnecting efficiently in network. Nowadays, cloud computing fully depends on virtualization technique and thus enables the server to run several applications. In this paper, we present the Modified Active Monitoring load balancer to overcome the over/under utilization problem in Active Monitoring load balancer.

II. RELATED WORK

In this section, we briefly discuss the basic load balancing algorithms in cloud computing. The main focus of load balancing algorithms in cloud environment is to distribute the incoming requests to all available virtual machines with minimum response time. Load balancing is normally defined as a process to distribute the workload on cluster of virtual machines in data centre links to achieve optimal resource utilization for maximum throughput and minimum

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Special Issue 9, May 2016

response time. There are many load balancing algorithms proposed by researchers to balance the load in cloud, of which three load balancing algorithms are as follows.

A. Round Robin Algorithm:

Round robin algorithm is static in nature, it allocate the user requests to virtual machine in rotation manner. When first request arrives, it selects virtual machine randomly then next requests are allocated in rotation manner. Drawback of this algorithm is that, it does not consider the state or size of the server while allocating the user requests.

B. Active Monitoring Load Balancer:

Active load balancing algorithm is dynamic in nature. It has index table to store the information of number of user requests currently running in each virtual machine. When next request arrives, it finds the least loaded virtual machine from the index table. Drawback of this algorithm is that, virtual machines are over and underutilized while balancing the load.

C. Throttled Load Balancer:

Throttled load balancing algorithm is also dynamic in nature, in which at a time one virtual machine executes only one user request. The Load balancer maintains index table to store the state (Available or Busy) of each virtual machine. When a request arrives load balancer parses the index table and finds the available state virtual machine for allocation. If all virtual machine are busy it returns -1 and then requests are stored in waiting queue. Drawback of this algorithm is that it checks table from first index every time to allocate. Because of this virtual machines are over/under utilized.

III. PROPOSED MODIFIED ACTIVE MONITORING ALGORITHM

In proposed work we are considering Active Monitoring load balancer to propose a Modified Active Monitoring load balancer. This algorithm focuses on finding the least loaded virtual machine (VM) and how user requests are assigned intelligently to it, so that optimum utilization of virtual machine is done. Algorithm of Modified Active Monitoring load balancer is given below. It checks the least loaded virtual machine to allocate the user request also considering previous allocation. If the least loaded VM is previously used, it goes for next least loaded VM for user request.

Algorithm: Modified Active Monitoring Load Balancer

Input: Number of incoming requests $A_1, A_2 \dots \dots \dots A_n$, Available virtual machines $B_1, B_2, \dots \dots \dots B_m$

Output: All incoming requests $A_1, A_2 \dots \dots \dots A_n$ are allocated least loaded virtual machine status among the available $B_1, B_2, \dots \dots \dots B_m$

1: Initially all the virtual machines have 0 request allocations.

2: Modified Active Monitoring maintained the index table of virtual machines which has number of requests currently allocated to each virtual machine.

3: When requests arrive at the data centre, it passes to the load balancer.

4: Load balancer parses the index table and finds the least loaded virtual machine for allocation.

Case I: if found

a. Check whether the chosen least loaded virtual machine is used immediately in the last iteration.

If YES

Go to step 4 to find next least virtual machine

If NO

Least loaded virtual machine is chosen

5: Modified Active Monitoring load balancer returns the virtual machine id to the data centre.

6: Request is assigned to the virtual machine. Data centre notifies the Modified Active Monitoring load balancer about the allocation.

7: Modified Active Monitoring load balancer updates the requests hold by each virtual machine.

Figure 1 shows the flow diagram of Modified Active Load Balancer Algorithm.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Special Issue 9, May 2016

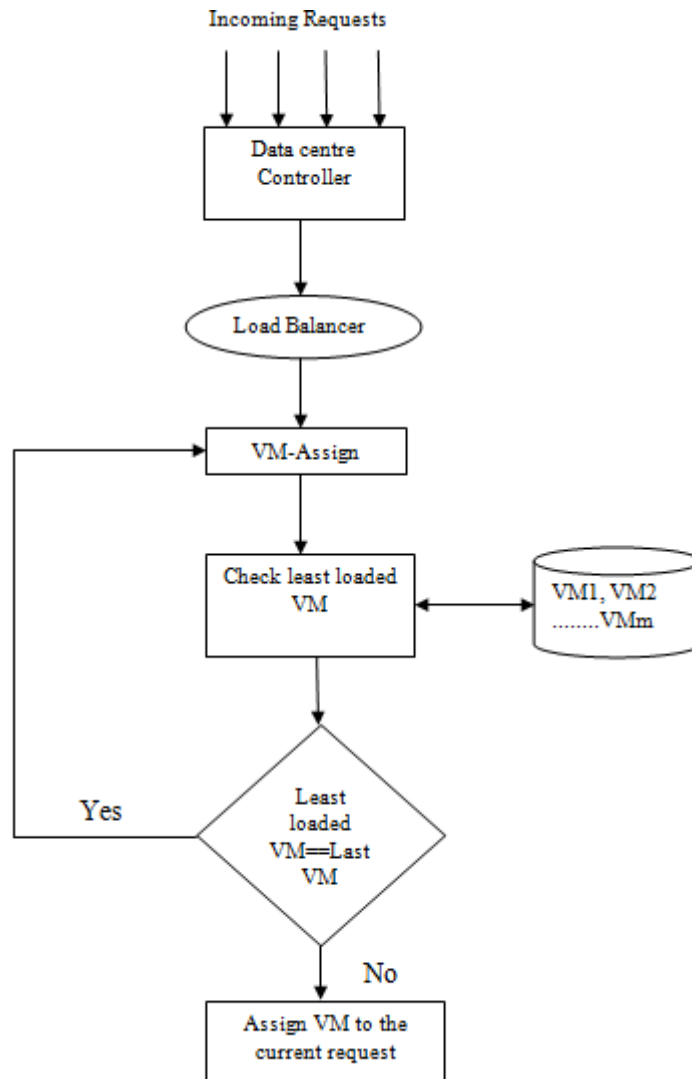


Figure1: Flow of proposed Modified Active Monitoring Algorithm

There is “n” number of user who sends requests to data centre. Data centre controller sends “n” user request to “m” virtual machine which are running on it. Modified Active Monitoring load balancer maintained index table to store the number of requests that are currently executing in each virtual machine, When request comes it checks the least loaded virtual machine, if the least loaded virtual machine is previously allocated then the algorithm choose the next least loaded virtual machine for user request, so we achieve the efficient utilization of all virtual machine.

IV. EXPERIMENTAL SETUP

Simulation of proposed algorithm is carried out in Cloud Analyst Simulator. Cloud Analyst is a simulation framework enables to user modelling and simulates a large scale cloud infrastructure environment, Cloud Analyst is built on the top of CloudSim tool kit by extending CloudSim feature and new graphical user interface. Architecture of Cloud Analyst is shown in Figure 2.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Special Issue 9, May 2016

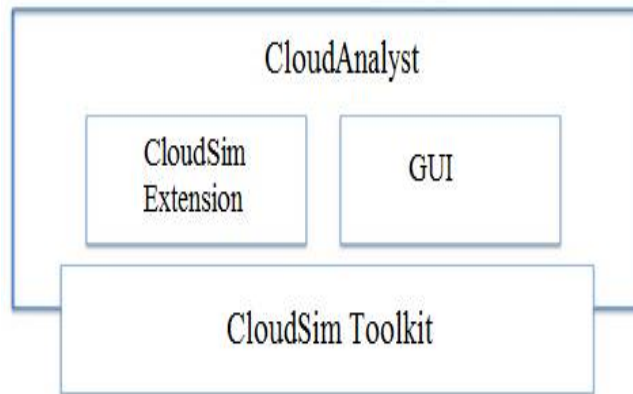


Figure 2: Architecture of Cloud Analyst simulator

Snapshot graphical user interface of Cloud Analyst simulator is shown in Figure 3. It enables the user to create and configure the data centre & user base (Traffic generator) in all the regions easy and quickly. Simulator generates the output in the form of graph and tables enable the modeller easy analysis of performance parameter.

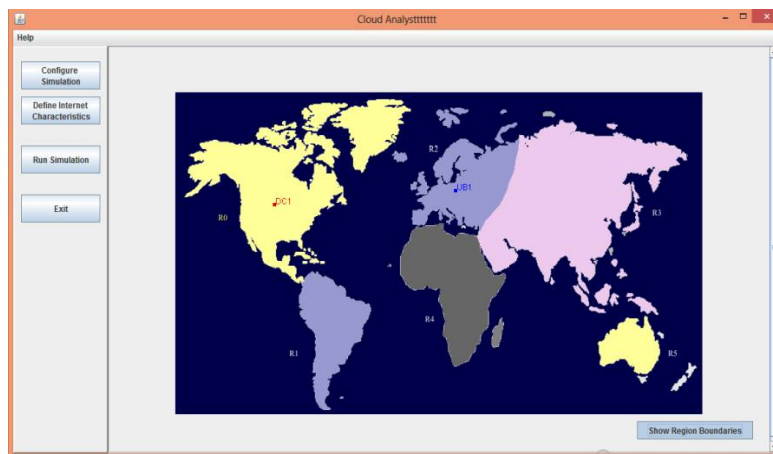


Figure 3: Snapshot of simulator

Simulation configuration of user base and data centre is given in Figure 4 and 5. User base configuration consists of generation of traffic at given time and Application router algorithm for routing the traffic to different region. Data centre configuration consists of hardware specification like storage, processor, bandwidth etc.

From the results obtained, we observe that the response time of both Active Monitoring and Modified Active Monitoring load balancer are same. But our proposed algorithm makes best utilization of resources compared to Active Modified load balancer.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Special Issue 9, May 2016

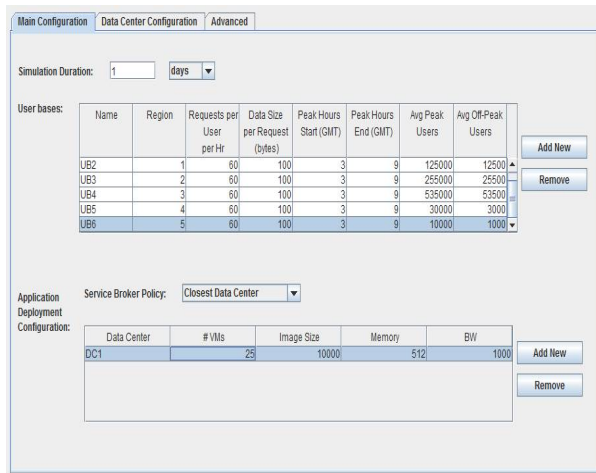


Figure 4: User base configuration.

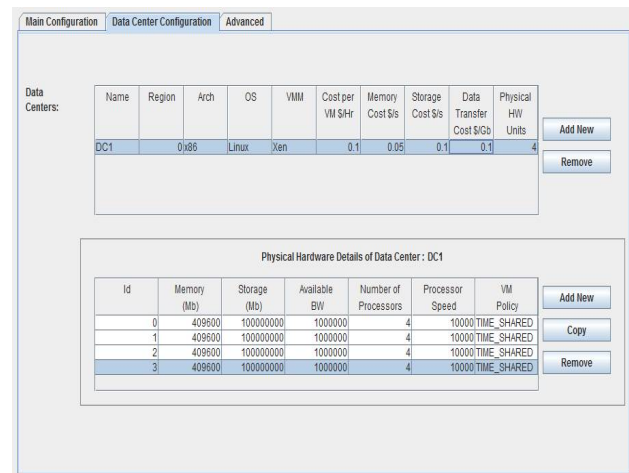


Figure 5: Datacenter configuration

V. RESULTS AND ANALYSIS

We analysed the result based on the efficient utilization of virtual machines. The proposed Modified Active Monitoring algorithm does not allow the virtual machines which are allocated in the previous request. It finds next least loaded virtual machine for allocation. So we can utilize all virtual machines without over/under utilization. We simulated experiment using 5, 25 and 50 virtual machines respectively.

Table 2: Virtual machine usage with 5 VMs

Sl. No	Active Load Balancer	Modified Active Load Balancer
VM0	1174	258
VM1	78	252
VM2	11	253
VM3	4	251
VM4	2	254

Virtual machine utilization of Active Monitoring and Modified Active Monitoring are shown in Table 1 and 2. We can see that Modified Active Monitoring algorithm distributes the load efficiently to all available virtual machines compared to Active Monitoring load balancer. In Active monitoring load balancer VM0 is over utilized and VM4 is underutilized. But in the proposed algorithm all virtual machines are efficiently utilized.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Special Issue 9, May 2016

Table 3: Virtual machine usage with 25 VMs

SI. No	Active Load Balancer	Modified Active Load Balancer
VM0	25881	4951
VM1	20093	5150
VM2	15127	5167
VM3	11804	5144
VM4	9918	4929
VM5	8985	5185
VM6	7035	5183
VM7	5691	5175
VM8	4735	4861
VM9	4124	5166
VM10	3327	5215
VM11	2587	5220
VM12	2156	5002
VM13	1862	5225
VM14	1494	5252
VM15	1234	5254
VM16	1025	5308
VM17	846	5095
VM18	800	5339
VM19	643	5408
VM20	574	5476
VM21	476	5325
VM22	515	5659
VM23	427	5863
VM24	365	6072

VI. CONCLUSION

Good load balancing algorithm distributes the load to all virtual machines with minimum response time, maximum throughput and efficient utilization of all virtual machines. In this paper, we proposed the Modified Active Monitoring load balancer which manages the load by considering all virtual machine requests for allocation and previous allocation. In Active Monitoring load balancer, virtual machines are extremely over/under utilised. To overcome the drawback, we modified Active Monitoring load balancer. Modified Active Monitoring Load Balancer distributes the load across the virtual machine efficiently. VM0 and VM4 are over and underutilized in Active Monitoring whereas in proposed algorithm all virtual machines are efficiently and evenly utilized. As a future work, we can further improve the proposed algorithm by considering more dynamic situation of the incoming request.

REFERENCES

- [1] Klaithem Al Nuaimi, Nader Mohamed, Mariam Al Nuaimi and Jameela Al-Jaroodi, "A Survey of Load Balancing in Cloud Computing: Challenges and Algorithms", in Second Symposium on Network Cloud Computing and Applications, pp 137-142, Dec. 2012.
- [2] Reena Panwar, Bhawna mallick, "A Comparative of Load Balancing Algorithm In Cloud Computing" International Journal of Computer Application , vol.117, no. 24, May 2015.
- [3] Darji, Vinay, Jayna Shah, and Rutvik Mehta. "Dynamic Load Balancing For Cloud Computing Using Heuristic Data and Load on Server" IOSR Journal of Computer Engineering, vol. 16, no. 4, pp 59-69, Aug. 2014
- [4] Zhen Xiao, Weijia Song and Qi Chen, "Dynamic Resource Allocation Using Virtual Machines for Cloud Computing Environment" IEEE transactions on parallel and distributed systems, vol. 24, no. 6, june 2013.
- [5] Hemant S. Mahalle, Parag R. Kaveri and Vinay Chavan, "Load Balancing On Cloud Data Centres" in International Journal of

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Special Issue 9, May 2016

- Advanced Research in Computer Science and Software Engineering, vol. 3, no. 1, January 2013.
- [6] Brototi Mondal, Kousik Dasgupta and Paramartha Dutta, "Load balancing in cloud computing using stochastic hill climbing-a soft computing Approach" in *Procedia Technology*, vol. 4, pp783 - 789, ELSEVIER C3IT-2012.
- [7] Rajkumar Buyya, Rodrigo N. Calheiros, Rajiv Ranja, Anton Beloglazov, A. F. De Rose, "CloudSim: a toolkit for modeling and simulation of cloud computing environments and evaluation of resource provisioning algorithms", 2010.
- [8] B. Wickremasinghe, R.N.Calheiros,R.Buyya, "Cloudbanalyst: A cloudsim-based visual modeller for analysing cloud computing in:Proceedings" of the 24th International Conference on Advanced Information Networking and Applications (AINA 2010), Perth, Australia" 2010.
- [9] Mr.Manan D. Shah, "Allocation Of Virtual Machines In Cloud Computing Using Load Balancing Algorithm" in *International Journal of Computer Science and Information Technology & Security*, vol. 3, no.1, February 2013.
- [10] Ms.Nitika, Ms.Shaveta, Mr. Gaurav Raj, "Comparative Analysis of Load Balancing Algorithms in Cloud Computing" in *International Journal of Advanced Research in Computer Engineering & Technology*, vol. 1, no, 3, May 2012.