International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2163
Issue 02, Volume 6 (February 2019) www.ijirae.com

ANALYSIS ON LOAD BALANCING ALGORITHMS IMPLEMENTATION ON CLOUD COMPUTING ENVIRONMENT

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Manuscript History
Number: **IJIRAE/RS/Vol.06/Issue02/FBAE10081**
Received: 02, February 2019
Final Correction: 09, February 2019
Final Accepted: 14, February 2019
Published: **February 2019**
Citation: Dina & Fatima (2019). Analysis on Load Balancing Algorithms Implementation on Cloud Computing Environment. IJIRAE::International Journal of Innovative Research in Advanced Engineering, Volume VI, 32-36.
doi://10.26562/IJIRAE.2019.FBAE10081
Editor: Dr.A.Arul L.S, Chief Editor, IJIRAE, AM Publications, India

Abstract- Cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive. The cloud is just a metaphor for the Internet. The elements involved in cloud computing are clients, datacenter and distributed server. One of the main problems in cloud computing is load balancing. Balancing the load means to distribute the workload among several nodes evenly so that no single node will be overloaded. Load can be of any type that is it can be CPU load, memory capacity or network load. In this paper we presented an architecture of load balancing and algorithm which will further improve the load balancing problem by minimizing the response time. In this paper, we have proposed the enhanced version of existing regulated load balancing approach for cloud computing by comping the Randomization and greedy load balancing algorithm. To check the performance of proposed approach, we have used the cloud analyst simulator (CloudAnalyst). Through simulation analysis, it has been found that proposed improved version of regulated load balancing approach has shown better performance in terms of cost, response time and data processing time.

Keywords: Cloud computing; Load Balancing; Data Center; Virtual Machines; Cloud Analyst;

I. INTRODUCTION

Cloud Computing can be considered as a platform for development, maintenance and accessing applications by user by paying for the resources which are only used for certain time. To serve for huge number of requests from different types of users located at different parts of the world on pay-per-usage bases, the process of virtualization has been followed in cloud computing environment. There are so many service providers who are responsible for maintaining the application on cloud environment. The most predominant cloud service providers are Google, Amazon, Microsoft and many others. In order to serve the huge traffic to world these service providers maintain data centers all over the world where the data is stored in bulk and requests are processed [4]. Depending on the number of requests to be processed by a data center, no. of virtual machines is created where on a single CPU different operating systems and their configurations can be run. It gives the illusion to the users that, there are numbers of CPUs are involved for processing the requests. This whole process can be considered as virtualization and it is monitored by the software called as hypervisor. The hypervisor is mainly responsible in creating and maintaining the virtual machines. The requests from all the users are considered as individual request and each of the virtual machines is assigned a request and effort is made to keep them busy for longer time.

This is considered to be load balancing policy which makes an effort to maximize the throughput of virtual machines. Job Scheduling is a process of allocating jobs onto available resources in time. It is also defined as the process of finding an efficient mapping of tasks to the suitable resources so that the execution can be completed with the satisfaction of some objective functions. In short, more efficient is the scheduling algorithm, better is the Quality of Service delivered. Every Scheduling problem has three important elements [3]. They are:

Machine Configuration: A single machine with a single or multiple processors or a cluster of machines with a single or multiple processors in each machine etc.

Optimization Criterion: It defines the objective(s) of the scheduling algorithm e.g. reducing make span, minimizing response time, minimizing resource cost etc. The main intention for developing this tool is to simulate the traffic generated by most visited applications such as face book, Gmail and analyze the response times at each data center. The simulation process is divided into regions denoted by Ri where 'i' indicates the region number and number of requests generated in each region can be considered as a User Base denoted by UBi where 'i' indicates the user base number. The data centers are denoted by DCi where 'i' indicates the corresponding data center number. The following figure gives a better understanding of how the regions are divided for simulation and the table1 summarizes the regions. Elaborates each and every detail of the tool[9].

II. LOAD BALACING

Load balancing is defining as the distribution of resources, simultaneous working of the schedulers, efficiency enhancement, and minimization of response time via a suitable matching of job to the available resource. Simultaneous working of the schedulers involves the distribution of load in equal manner among the processors. To restore the balance dynamic load balancing also known as load sharing or load migration is employed [4]. It is done by distributing the entire load to the individual processors of the complete structure for obtaining efficient resource mapping and concurrently removing the possibility of overloading or under loading of the nodes in the network. It is done to achieve for better ratio of user realization and resource utilization, thereby enhancing the throughput of the complete system. If done in proper manner the load management can limit the consumption of the available. It also helps in executing failures, making the system scalable, and over-burdening, minimizing response time etc.

III. RELATED WORK

Load balancing is used to distributing the load across multiple nodes for enhancing the overall performance of a system. The current load balancing algorithms in cloud computing environment is not highly efficient. Load balancing is very complex task today, because the users request arrival on server is not possible i.e., we cannot predict it. Each Vms [1] [4] has different specifications. So it is difficult to schedule the job and balance the nodes. Recently, many research work done on load balancing. Load balancing mainly classified into two categories, static load balancing and dynamic load balancing algorithms. Static load balancing algorithms mainly defined in the design or implementation of the system. Dynamic load balancing algorithm considered only current state of the system during load balancing. The existing algorithms are following: In paper [5] have described a conventional round robin approach for balancing the load. A group of available VMs gets the tasks on the random basis and the process of task allocation continues in circular (round) motion. When a task is mapped to the VM then it goes to the last position in the VM list. The discussed approach doesn't have any idea of size of the incoming tasks so suffers with the disadvantage of some overloaded nodes. Besides this, the benefit of this algorithm is that inter-process communication is not required. In paper [10] have presented a Weighted Round Robin approach for balancing the load in cloud environment. The described scheme is a combination of weight assigning and round robin approach. The capacity of the VM to accommodate the tasks helps in assigning weight to the VM and after selecting the VM conventional round robin approach is executed. In paper [8] have discussed basic Throttled load balancing approach for cloud environments in which it was considered that VM has the capacity to handle single task only and the incoming tasks are assigned to the idle Vm's which are selected randomly if more VMs are found to be idle. in paper [10] have presented a technique to balance the load among the overloaded and under-loaded nodes by simply shifting the jobs from overloaded node to under-loaded node in case any virtual machine is found overloaded. To accomplish this task, the technique tracks the data of VM id, task id and no of active tasks allocated to the VM.

IV. PROBLEM IDENTIFICATION

Cloud computing is a term, which involves virtualization, distributed computing, networking and software and web services". As we talk about a cloud it consists many parameters like shoppers, datacenter & distributed system. Cloud comprises of fault tolerance, convenience, and quantifiability, litheness, compact overhead for users, compact value of possession etc. [2]. Load balancing is therefore may be defined as the method of allocate the load among different nodes of a Data Center to enhance each resource employment and process latency whereas additionally avoiding a state of affairs wherever a number of nodes are highly loaded whereas alternative nodes are idle or doing little or no work, and some of the physical machines and virtual machines are having maximum imbalance level of Cloud data centers [5].

V. SOLUTION DOMAIN

We proposed new hybrid load balancing algorithm, which is combination of randomizing and greedy load balancing algorithm. Our aim is to improve the response time for the user (UserBase) and processing time of data center. Our proposed Hybrid Algorithm by effective reallocation the tasks, it had deployment at the VmLoadBalancer in Datacenter Controller, to distribute load among nodes (VM) are idle or doing little or no work. to improve overall system response time.

Proposed Algorithm:

new request Output: The VM id that selected to assign the load. 0.Initialize, Cl(0..i-1) ← 0 At start all VM's have zero allocation., K← 50, vmid ←-1 ,i← 0,currCount ← 0, minCount ← Max_Value, Temp ← -1;

1. Parses VM_List() to LoadBalancer:
2. For i← 0 to k //Select VM randomly
3. Temp ← random(VmStatesList())
4. VMid ← Temp
5. If vmid Exist in Cl(VMid) then
6. currCount ← ClTable(VMid), else
7. currCount ← 0
8. VMids() ← (VMid, currCount).
9. End for
10. Temp ← -1
11. currCount ← 0
12. For i ← 0 to k
13. TempVMid ← i
14. currCount ← VMids(TempVMid)
15. If currCount <minCount then
16. minCount= currCount
17. Vmid ← TempVMid
18. End if
19. End for
20. Cl(VMid) ← Cl(VMid+1)
21. return vmId;

The load balancer spreads the load on to completely different nodes, and hence, it's referred to as unfold spectrum technique. The load balancer maintains a queue of the roles that require using and are presently mistreatment the services of the virtual machine. The balancer then unendingly scans this queue and therefore the list of virtual machines. We implemented hybrid algorithm, on Eclipse using advance java, and cloud Simulation CloudAnalyst. we configure many parameters like number of datacenters, number of cloudlets, VM configuration, bandwidth and MIPS. We implemented three algorithm of load balancing are:

- Throttled.
- Equally Spread Current Execution.
- Round Robin.
- Hybrid Algorithm.

V. RESULT SET

Cloud load balancing is developed in this research with help Java (JDK1.8) and Eclipse IDE8.02 on window operating system 10. In Result Analysis Compare proposed system with existing system in term of Average Response time and CPU Factor.

First step: This is the first page of our project, which is shown in figure1.

Figure 1: Cloud Analyst Simulator front page First Step

Second Step: Adding Hybrid Algorithm in CloudAnalyst.

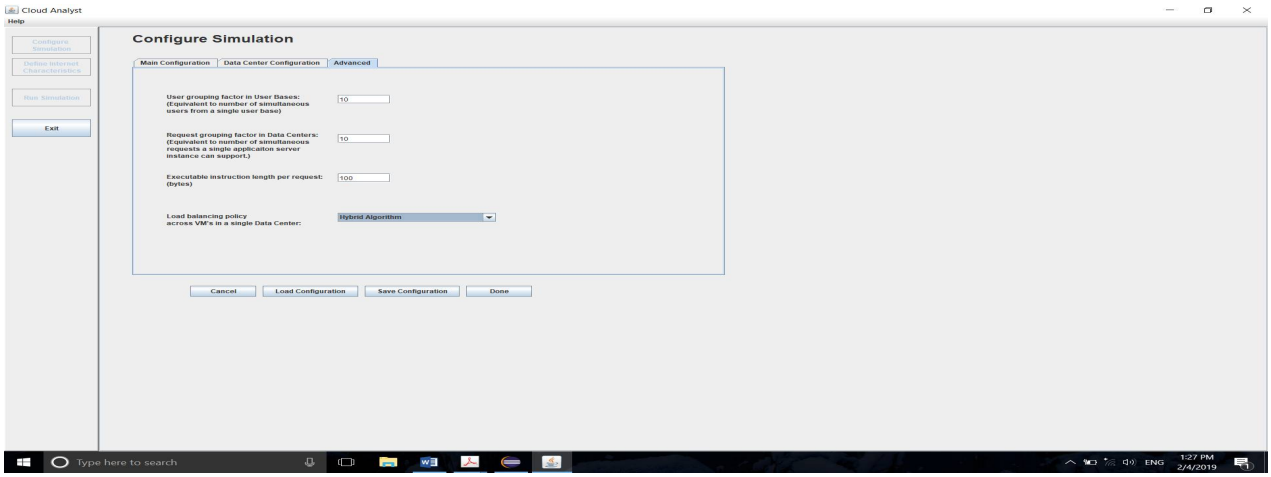

Figure 2: Adding Hybrid Algorithm in CloudAnalyst.

Third Step: Configure Two Datacenter and Implement VMs.

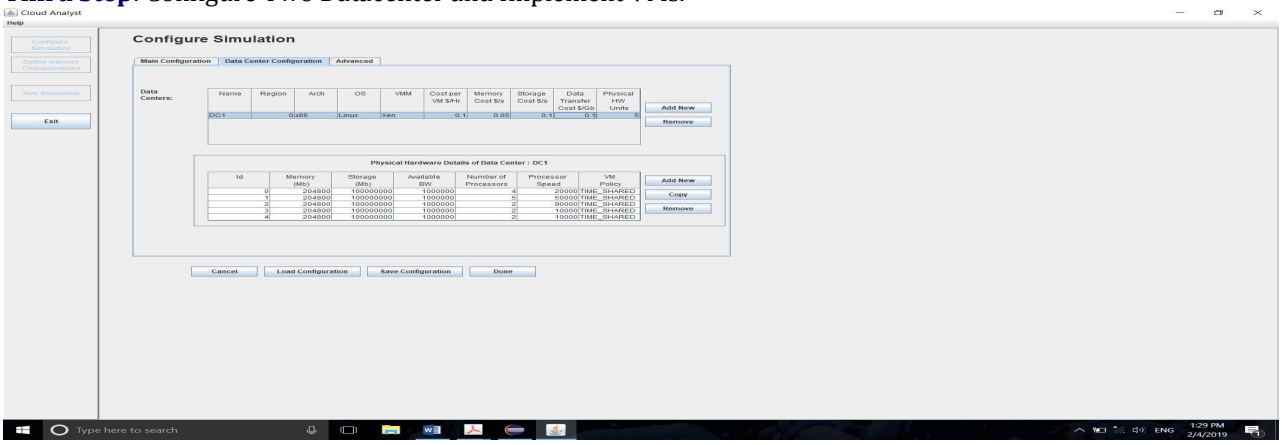

Figure 3 Configure Datacenter and Implement VMs.

Fourth Step: run simulation for all Algorithm

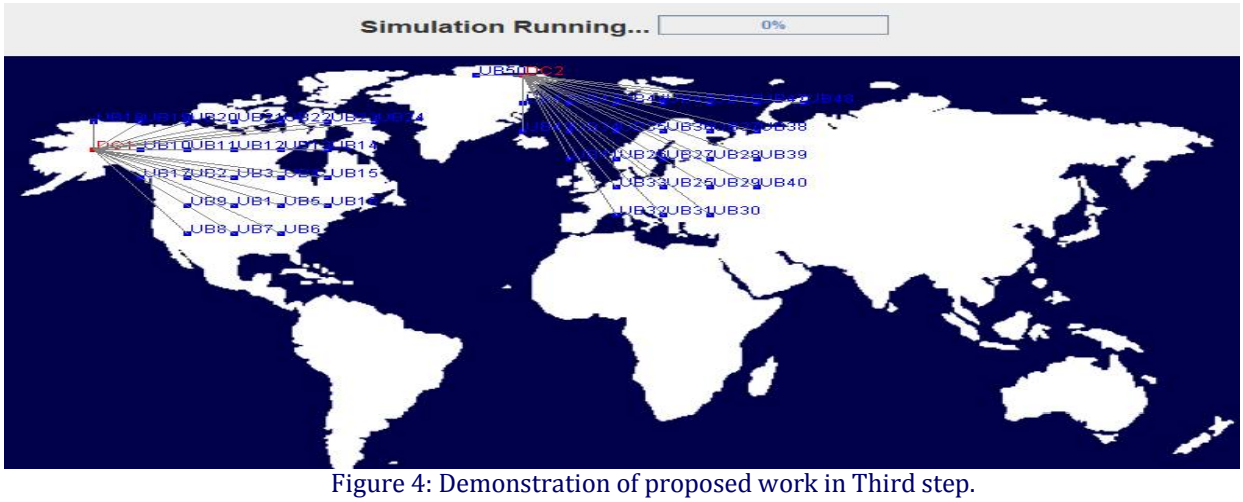

Figure 4: Demonstration of proposed work in Third step.

Table 1: shows average, Minimum, and Maximum time for each Load Balancing algorithm used in this paper.

	Hybrid Algorithm	Round Robin	Throttled	ESCE
DC RT (Avg)	51.51	52.82	51.59	52.36
DC RT(Min)	34.37	34.93	34.39	34.75
DC RT(Max)	138.34	166.70	162.99	175.29

Fifth Step: we repeat all step above for all other load balancing algorithm and round robin, ESCE, Throttled)
Fifth Step: compare the results with other in term of Average time

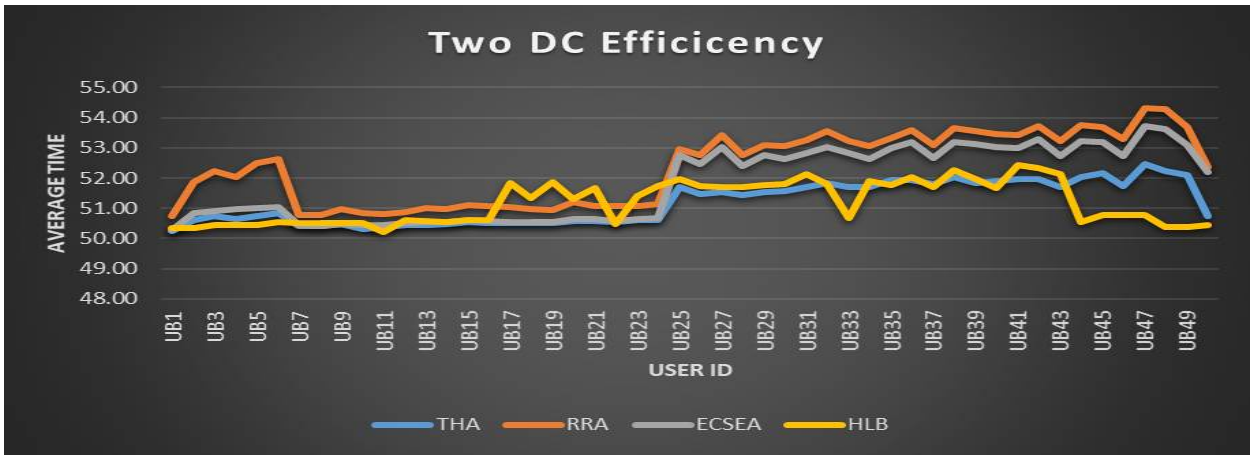

Figure 5 Two Data Center Efficiency on Different Region (US-UK)

VI. CONCLUSION AND FUTURE WORK

Load balancing considered as one of the most challenges in cloud computing, it is the major factor to improve the performance of the cloud computing. In This paper proved the Load balancing helps to distributing the total load to the individual available VM to enhance resource utilization and response time. It also considered a situation where some of the nodes are heavily loaded while other nodes are idle or doing very little work. Here, implemented the new algorithms and compared the performance with the existing load balancing algorithm using the simulator CloudAnalyst. The performance was compared based on Response time computing with respect to stability, resource utilization, dynamicity. In Future either we discussed only on improving the performance on one data center, but there are still other approaches that can be applied to balance the load in clouds computing environment, improved algorithm or combination of algorithms will improve performance of cloud load balancing. In Future also compare load-balancing algorithms on other parameters.

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