Load Balancing in Cloud Computing using Dynamic Load Management Algorithm

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ABSTRACT:
In the recent scenario, Cloud Computing has become a catchword in the Information Technology and is a next phase in the development of internet ,it provides a vast amount of storage services and computing to the users via internet. In cloud virtual environments Load Balancing plays a crucial role. As Cloud Computing is increasing rapidly there are many users all over the world are important for optimal results, so Load Balancing become an essential research area. This paper is a detailed discussion on the existing Load balancing methods and it also compares with various parameters. This paper result is based on Existing Round robin and throttled scheduling.

Keywords: Cloud Computing; Virtual environment Load Balancing, internet.

I. INTRODUCTION:

Cloud computing is the highly developed technology in the IT industry. According to various definitions for cloud computing. Cloud computing means accessing data and storing and programs over the Internet instead of your computer's hard disk. Cloud computing provides services through internet. Cloud Computing has become one of the famous technology acquire by both industry academy. Extensible and efficient way to store and retrieve files.

The main problem is to schedule the incoming request in a way so with minimum response time, efficient resource utilization and also not be underutilized. Cloud computing is based on the internet computing. It delivers all services through the internet dynamically when user demands, such as resources, network, storage, software, hardware and operating system, These services are classified into these types: a)Infrastructure as a Service (IaaS),b)Platform as a Service (PaaS) and c)Software as a Service (SaaS). Cloud computing domain as divided into three types such as Hybrid, Public and Private cloud. Cloud computing framework is shown in Figure. 1 depicts that was four deployment models and three service models which is follows.

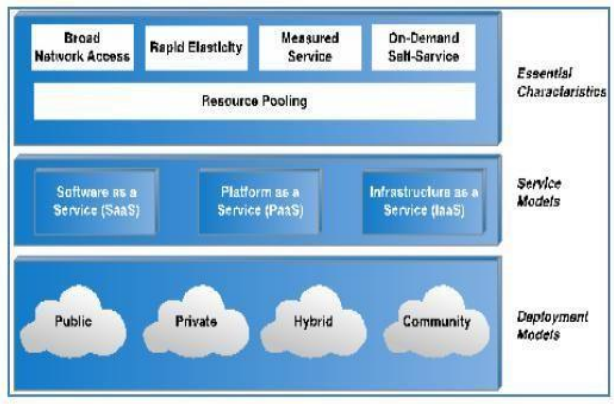


Figure.1. Cloud Computing Framework.

A. Infrastructure as a Service (IaaS)

Infrastructure as a Service (IaaS) is providing virtualized computing resources through the internet. It offers hardware as a service such as Network equipment, Physical virtual machines, CPU cycles and other resources.

B. Software as a Service (SaaS)

Software as a service SaaS is the software distribution model hear third party provider host application and that will available to the customer over the internet. The customer uses software as a pay-per use basis. It is described as “on-demand software”.

C. Platform as a Service (PaaS)

In PaaS models, Cloud service providers deliver the computing platform such are operating system support, web server and programming language execution. Examples are Force.com, Microsoft Azure.

Public Cloud:

A public cloud is the type of computing in which a service provider makes resources available to the public versus the internet. Resources vary by provider, but may include applications, storage capabilities.

Private cloud:

The private cloud is defined as computing services offered either over the Internet or private internal network that only to select users alternative of the general public**.**

Hybrid cloud:

Hybrid cloud is the both public and private cloud

II. LOAD BALANCING IN CLOUD COMPUTING

Load balancing is a technique that gives high resource time and effective resource usage by adopting the total load among the various cloud nodes, side by side that solves the problem of underutilization and overutilization of virtual machines. Load balancing solves problem of overloading. Load balancing is the pre requirements for maximizing the cloud performance and use the resources efficiently. In use of clouds has been bettered by a resource allocation method having preempted able task execution. Adaptive resource allocation algorithm is presented for cloud system with preempt able tasks but this approach does not solve the problem for response time and effective cost usage. In, M. Moradi, M.A. Dezfuli, M.H.Safavi, has proposed a New Time Optimizing Probabilistic Load Balancing Algorithm. This algorithm is proposed to provide load balancing and decrease the response time and main purpose of choose the resources based on better past status and least completion time. Load balancing has two major tasks, one is the resource allocation and other is scheduling in distributed environment. Efficient facilities of resources and scheduling of resources as well as tasks will

- Resources are available
- Resources are efficiently used by condition of low / high load.
- Reduction in cost of using

Load balancing increases throughput to maximum level and minimum response time.

The load balancing is an efficient and demanding concept of cloud computing and it helps in utilizing the resources optimally, Therefore minimizing the loss of resources. Thus load needs to be shared over the nodes in a cloud-based architecture, so that each resource does the equal amount of work at any point of time that is achieved by a load balancer. The load balancer determines the many request allocation to different servers. The load balancer uses many scheduling algorithms which server should take the request.

III. CLASSIFICATION OF LOAD ALGORITHM

In cloud computing, different load balancing algorithm have been proposed such as Honeybee-based load balancing technique, Random Sampling, Active Load Balancer Active Monitoring Load Balancer, WCAP, JIQ, CLBVM. The main purpose is to achieve high throughput and minimum response time. Generally load balancing algorithm is of two types: Static load balancing algorithm Dynamic load balancing algorithm.

A. Static Load Balancing Algorithm

The load does not depend on the current state of the system, but it requires knowledge about the application and resources of the system. Static load balancing is a load balancing algorithms that distributes the workload based strictly on a fixed set of rules such as input workload. There are four different types of Static load balancing techniques: Round Robin algorithm, Central Manager Algorithm, Threshold algorithm and randomized algorithm.

B. Dynamic Load Balancing Algorithm

Dynamic algorithm is more flexible than the static algorithm and they don't rely on prior knowledge, but depends on the current state of the system. In a distributed system, dynamic load balancing has two different ways: distributed and non-distributed. In the distributed one, this algorithm is executed by all nodes present in the system and the task of load balancing is shared between these servers. The interaction among nodes to achieve load balancing can take two forms: cooperative and non-cooperative. In the first one, the nodes work side-by-side to achieve a common objective which means is to improve the overall response time, etc. In the second form, each node works independently toward a goal local to it. Here we will discuss two algorithms:

Round Robin Algorithm:

It is one of the simplest scheduling algorithms that utilize the principle of time slices. Here time is divided into multiple slices and each node is given a particular time interval. Each node is given a quantum and in this given quantum node has to perform its operations. If the user request completes within time quantum then user should not wait otherwise user have to wait for its next slot. It means that this algorithm selects the load randomly, while in some case some server is heavily loaded or someone is lightly loaded.

Throttled Load Balancing Algorithm:

This algorithm is totally based on the allocation of request to virtual machine. Here client will first request the load balancer to check the right virtual machine which access that load easily and performs the operations request by client or user. In this algorithm the load balancer maintains an index table of virtual machines as well as their states (Available or Busy). Therefore the client first requests the load balancer to find a suitable Virtual Machine to perform the required operations. These dynamic algorithms are being experimentally performed using the cloud analyst tool which gives the output with respect to virtual machine.

IV. RESULT & ANALYSIS

Now we will analyze the two load balancing policies by setting the configurations of components of the cloud analyst Algorithm tool [6].The parameters have been set for the application deploying, configuring user base [8], In Figs. 2 to 5 we have shown the Data center configuration and load balancing policy [9]. As shown in the Fig.2, the six regions have been defined for locations of various user bases in the world. We consider the four data centers to serve the requests of users. The First data center is located in region 0, second one is in region 1, third one is in region 2 and fourth one is in region 4 and fifth one is in region 5. There are total 25 VMs in each of DCl to DC5. As shown in Fig.5[8], you can select a load balancing policy; first VM-Assign algorithm is selected. Time for simulation is about 24hrs. Cloud analyst tool permits the users to repeatedly executing the simulation when change of the parameters time to time. Few of user Base configurations are shown below.

Fig.2 user based configuration

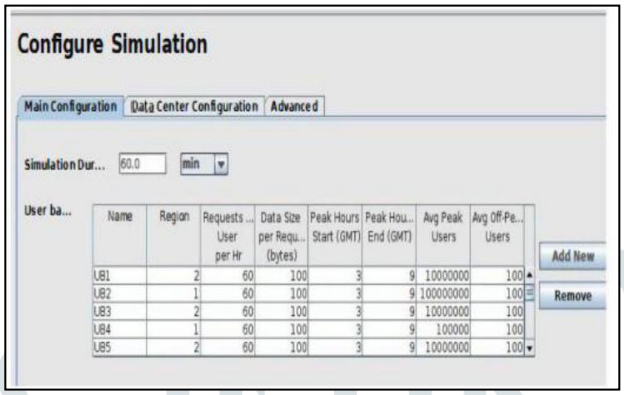


Fig.3.application deployment configuration

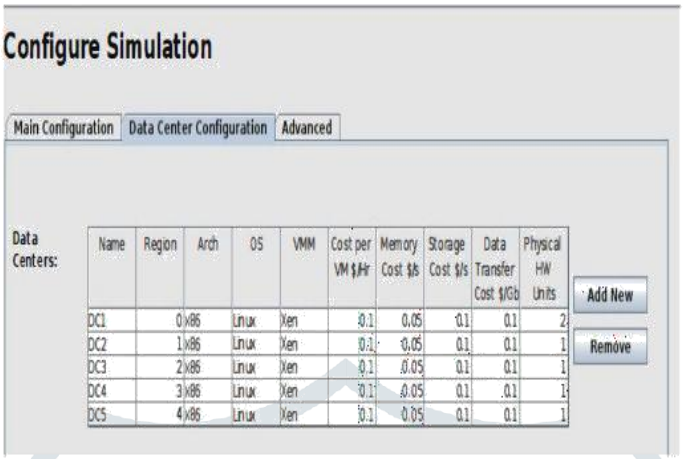


Fig.4. Data Center Configuration

Fig.5.load balancing policy

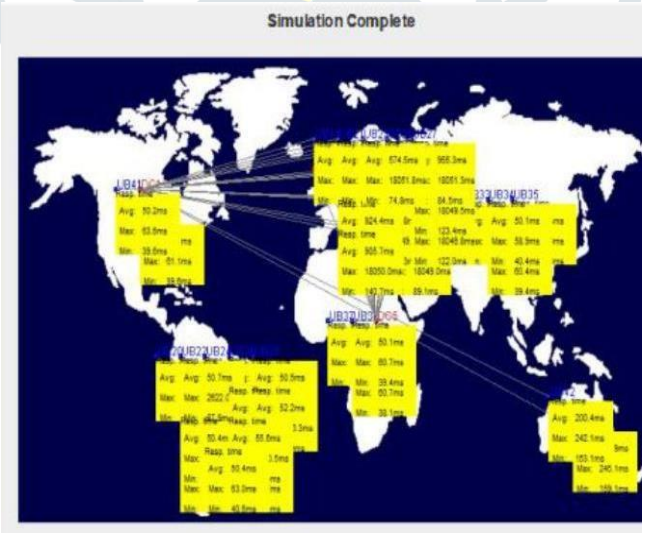


Fig.5.output screen of the cloud

The execution simulation results have been shown by cloud analyst has shown in Fig.6. The above defined configuration [8] has been set for individual load balancing policy one after the other and finally the result has been calculated for metrics, i.e. request processing time[10], response time and total cost required in achieving the task.

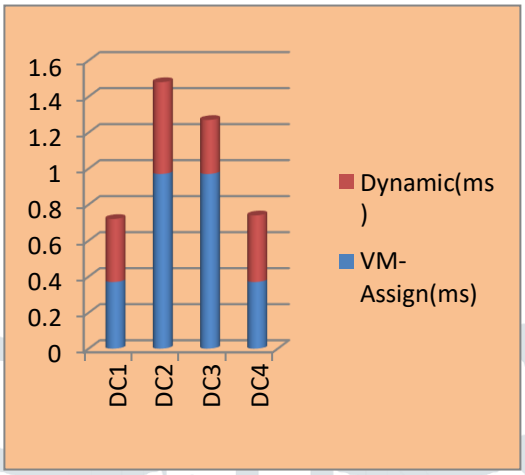


Fig.6.data center per milli second

A. Response Time by Region

Here the response time of the entire user base in various regions has been analyzed by the Cloud Analyst tool by selecting loading policy that are shown as in Table I.

Table I: Response Time by Region

User Base	VM-Assign(ms)	Dynamic(ms)
UB1	800.38	545.49
UB2	50.34	50.00
UB3	849.93	506.21
UB4	50.32	50.18
UB5	918.64	526.78

B. Datacenter Servicing Times

Data center [8] Request Servicing Time has analyzed by the cloud analyst by the selection of loading policy one by one are given in the Table II.

Table II: Data Center Request Servicing Time

Data Center	VM-Assign(ms)	Dynamic(ms)
DC1	.37	.35
DC2	.97	.51
DC3	.97	.30
DC4	.37	.37

C. Cost

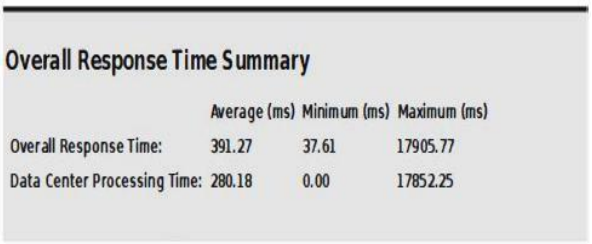
In Table III the cost for particular load balancing policies analyzed by the tool cloud analyst are given as:

Table III: Date Transfer Cost

Data Center	VM-Assign(S)	Dynamic(S)
DC1	.50	.40
DC2	.10	.10
DC3	.10	.10
DC4	.50	.50
DC5	.50	.49

D. Overall Response Time

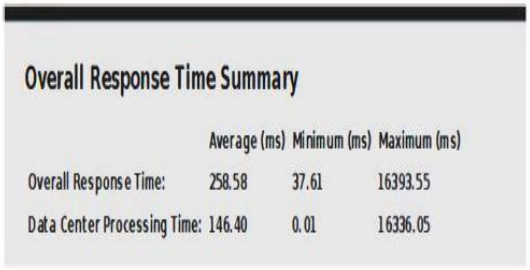
The overall responding time for each algorithms estimated by the simulation of cloud analyst as shown in Fig 8 and Fig 9.



Overall Response Time Summary

	Average (ms)	Minimum (ms)	Maximum (ms)
Overall Response Time:	391.27	37.61	17905.77
Data Center Processing Time:	280.18	0.00	17852.25

Fig.8. Overall Response Time Summery of VM-Assign Algorithm.



Overall Response Time Summary

	Average (ms)	Minimum (ms)	Maximum (ms)
Overall Response Time:	258.58	37.61	16393.55
Data Center Processing Time:	146.40	0.01	16336.05

Fig.9. Overall Response Time Summery of Dynamic Load Management Algorithm.

V. CONCLUSION:

Load balancing is for efficient utilization of resources. The main purpose of load balancing is to achieve higher client satisfaction, maximize resource utilization and increase performance of the cloud system, thereby reduce in the energy consumption and carbon emission rate. Nowadays Cost and Time are key, demanding for every IT engineer to develop products that can enlarge the performance of business in the cloud. The performances of two algorithms Round Robin and Throttled have been discussed in this paper. The requested time for both the techniques applied are same which means there is no effect in request time of data centers after changing the algorithms. The cost analysis for each algorithm is calculated with the help of experiments as shown in the figure. The cost calculated for virtual machine usage per hour is not same for two algorithms, Here Throttled Load balancing algorithm reduce the cost of usage, therefore Throttled Load balancing technique is more efficient in terms of cost for load balancing on cloud data centers.

VI. REFERENCES

[1] Ahamed, B. B., & Hariharan, S. (2012). Implementation of Network Level Security Process through Stepping Stones by Watermarking Methodology. International Journal of Future Generation Communication and Networking, 5(4), 123-130..

[3] Ahamed, B. B., & Ramkumar, T. (2015). Deduce User Search Progression with Feedback Session. Advances in Systems Science and Applications, 15(4), 366-383.

[4] Radojevic, B & Zagar.M, 20 I I .Analysis of issues with load balancing algorithms in cloud environment. In Proc. of 34th International Convention on MLPRO, IEEE.

[5] W. Bhathiya, 2009. Cloud Analyst a Cloud Sim-based tool for modeling and analysis of large scale cloud computing environments. MEDC Project, Computing and Distributed Systems Laboratory, University of Melbourne, Australia, pp. 1-44, June 2009.

[6] Rydhm Beri, Veerawali Behal, 2015. Cloud Computing: A Survey on Cloud Computing. International Journal of Computer Applications. Vol I ll-No 16.

[7] Hamid Shoja, Hossein Nahid, Reza Azizi.2014 A Comparative Survey On Load Balancing Algorithms In Cloud Computing. 51h ICCNT, IEEE-33044.

[8] Hung-Chang Hsiao, Hsueh-Yi Chung, Haiying Shen, and Yu Chang Chao, "Load Rebalancing for Distributed File Systems in Clouds" IEEE transactions on parallel and distributed systems, vo1.24, no. 5, may 2013.

[9] Devisrinandhini, M., Pradeep, G., & Yuvaraj, D.(2018).Exploring Aspect-Based Sentiment Analysis – A Survey. International Journal of Pure and Applied Mathematics, V118,No.22,PP 1085-1090.

[10] Load Balancing computing [EB/OL], http://en. wikipedia.org.

[11] R. R. Buyya, R. Ranjan, Inter cloud: Utility-oriented federation of cloud computing environments for scaling of application services, in: ICA3PP 2010, Part I, LNCS 6081, 2010,pp13-31.

[12] T-Y., W-T. Lee, Y-S.Lin, Y-S.Lin, H-L.Chan and J-S. Huang, "Dynamic load balancing mechanism based on cloud storage" in proc.Computing, Communications and Applications Conference (ComComAp), IEEE, pp:102-106, January 2012.

[13] Steffin Abraham , Tana LuciyaJoji , Sivaram M, D.Yuvaraj, “Enhancing Vehicle Safety With Drowsiness Detection Andcollision Avoidance” International Journal of Pure and Applied Mathematics, Volume 118 No. 22 2018, 921-927. https://acadpubl.eu/hub/2018-118-22/articles/22b/39.pdf.