Load Balancing On Cloud Data Centres

Dr. Hemant S. Mahalle	**Prof. Parag R. Kaveri**	**Dr.Vinay Chavan**
Department of Computer Science,	*Department of Computer Science,*	*Department of Computer Science*
P. N. College, Pusad (M.S) S.G.B.	*H.V.P.M D.C.P.E, Amravati (M.S)*	*S.K. Porwal Kamptee Nagpur (M.S)*
India	*India*	*India*

Abstract— Clouds are high configured infrastructure delivers platform, software as service, which helps customers to make subscription for their requirements under the pay as you go model. Cloud computing is spreading globally, due to its easy and simple service oriented model. The numbers of users accessing the cloud are rising day by day. Generally cloud is based on data centres which are powerful to handle large number of users. The reliability of clouds depends on the way it handles the loads, to overcome such problem clouds must be featured with the load balancing mechanism. Load balancing in cloud computing will help clouds to increase their capability, capacity which results in powerful and reliability clouds. This paper is a brief discussion on testing load balancing on proposed cloud model.

Keywords—Load Balancing, cloud sim, cloud analyst.

I. INTRODUCTION

The performances of computational system depend on several concepts, one of which is load balancing. The load balancing mechanism is totally dependent on the amount of work allotted to the system for a specific time period. This is the time where system has to manage and work according to the priority basics. The interaction with factors and some load balancing algorithm which can be applicable for such factors are studied in the current paper. There are several load balancing algorithms for the improvement and optimization of cloud performances. The nature of the algorithm can be dynamic or static, although some algorithms are simple but under some conditions they work more effectively.

Cloud computing is a service oriented architecture [1], which is provided via internet. The only objective of the service provider is to provide maximum resources output and this can be achieved by implementing load balancing algorithm which helps in gaining this objective. The paper proposed an algorithm which is experimented on a virtual machine environment. The paper is a comparative study of such several algorithms.

II. LOAD BALANCING

Cloud computing is one of the fastest implementing technology in the decade. Many companies are trying to implement and introduce clouds, due to its simple and flexible architecture. These result in the increasing number of users reaching cloud. Although clouds are bifurcated in public private and hybrid models but still problem of reliability may arise in these clouds [2],[3].

Cloud computing has been adopted by organization which includes, social networking websites, online application design by Google app managers and by Google doc which are some of the important implementation and a step ahead in cloud computing. Some clouds are also designed for online software testing. This all suggests that cloud computing will change the way we interact with the resources via Internet.

Cloud models used virtualization technology; this technology helps in slicing a single data centre or high power server to act as multiple machines. It depends on the hardware configuration of the data centre or server in how may virtual machine they can be divided. To implement virtualization additional software is also required. This software is the system software an operating system, can be from windows for example windows server 2008 or Hyper-V or for an open source environment like Linux

Load balancing is the pre requirements for increasing the cloud performance and for completely utilizing the resources. Load balancing is centralized or decentralized. Load Balancing algorithms are used for implementing. Several load balancing algorithm are introduced like round robin algorithm a mining improvement in the performance. The only differences with this algorithm are in their complicity. The effect of the algorithm depends on the architectural designs of the clouds [4]. Today cloud computing is a set of several data centres which are sliced into virtual servers and located at different geographical location for providing services to clients. The objective of paper is to suggest load balancing for such virtual servers for higher performance rate.

The existing system does have these polices of load balancing , but still the efficiency of these algorithms are studded and presented to find the best suited algorithm for load balancing of virtual servers. The paper includes the three fundamental algorithms for load balancing round robin, equally spread current execution load and Throttled. These algorithms are used for load balancing in cloud environment [5]. Load balancing works in the manner to decide which virtual machine is in steady state while which virtual machine will go on hold. Load balancing helps in reducing the

bandwidth usage which results in decreasing the cost of machine and maximizing the services offered by the service providers.

III. LOAD BALANCING ALGORITHMS

The paper describes about three load balancing algorithms which are Round robin algorithm, equally spread current execution load and Throttled Load balancing.

- **Round Robin**: Round robin use the time slicing mechanism. The name of the algorithm suggests that it works in the round manner where each node is allotted with a time slice and has to wait for their turn. The time is divided and interval is allotted to each node. Each node is allotted with a time slice in which they have to perform their task. The complicity of this algorithm is less compared to the other two algorithms. An open source simulation performed the algorithm software know as cloud analyst, this algorithm is the default algorithm used in the simulation. This algorithm simply allots the job in round robin fashion which doesn't consider the load on different machines.

- **Equally spread current execution load**: This algorithm requires a load balancer which monitors the jobs which are asked for execution. The task of load balancer is to queue up the jobs and hand over them to different virtual machines. The balancer looks over the queue frequently for new jobs and then allots them to the list of free virtual server. The balance also maintains the list of task allotted to virtual servers, which helps them to identify that which virtual machines are free and need to be allotted with new jobs. The experimental work for this algorithm is performed using the cloud analyst simulation. The name suggests about this algorithm that it work on equally spreading the execution load on different virtual machine.

- **Throttled Load balancing**: The Throttled algorithm work by finding the appropriate virtual machine for assigning a particular job. The job manager is having a list of all virtual machines, using this indexed list, it allot the desire job to the appropriate machine. If the job is well suited for a particular machine than that job is, assign to the appropriate machine. If no virtual machines are available to accept jobs then the job manager waits for the client request and takes the job in queue for fast processing.

This algorithm is being experimentally performed using the cloud analyst simulation which helps in testing the outputs with respects to the virtual machine. The following figure shows the diagrammatical representation of the algorithm used for load balancing in cloud computing environment [6], [7]. The figure also shows the three algorithms which are studded in this paper using the cloud analyst simulation tool , this tool is based on cloud sim , the cloud sim provides a GUI inter face which helps to perform the experimental work.
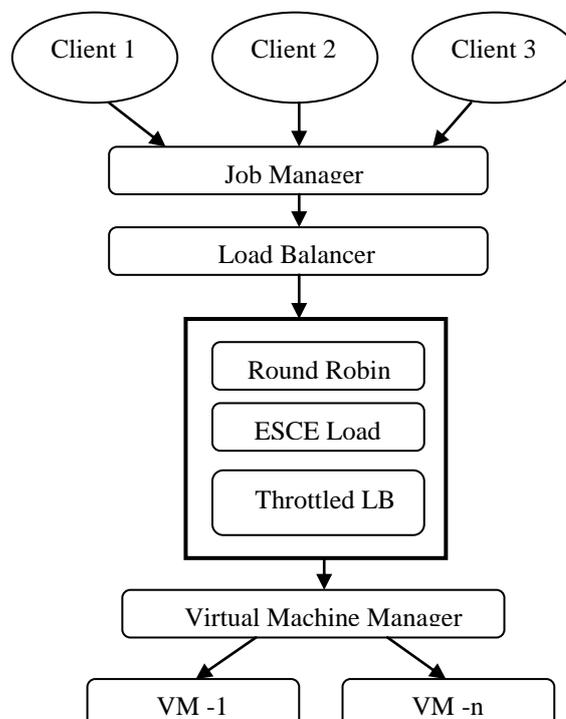
Fig. 1 Load balancing Algorithms Execution

The cloud sim allow studying various constraints by changing the parameters. The cloud sim is based on java programming language. The above diagram is about different algorithms used for load balancing. The performances of these algorithms are showed in the experimental work.

IV. EXPERIMENTAL WORK

The experimental work is performed using simulation software named as cloud analyst. The simulation is based on the cloud sim simulator; cloud sim is based on java and consist of a GUI interface which helps in easy configuration of attributes required for experiment.

The diagram shows the environment for cloud analyst simulation tool. The simulation comes with three important menus, configure simulation, define Internet characteristics and run simulation [8], [9].This menu is for configuring the experiment and setting up the load balancing algorithms. Simulation tool is having options to switch algorithm according to the requirement.
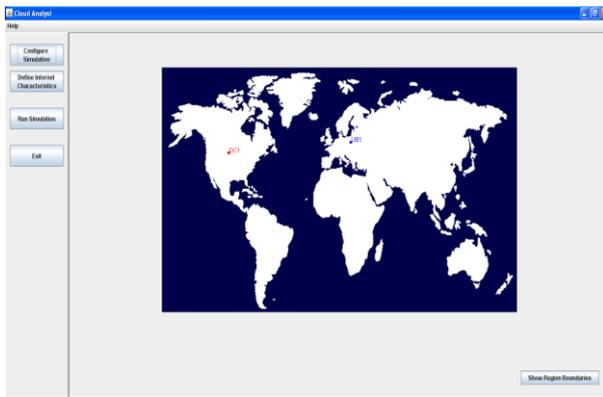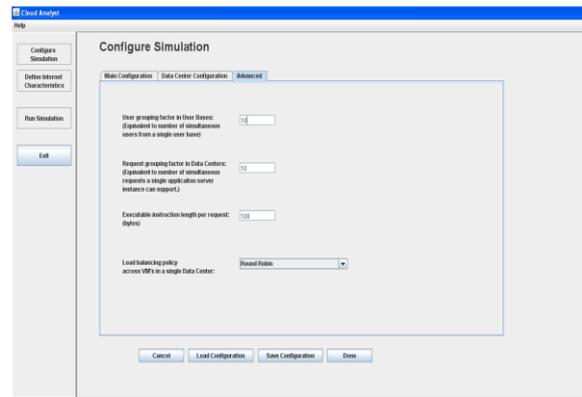

Fig. 2 Cloud Analyst Interface

Fig. 3 Cloud Analyst Configuration Windows

TABLE I
COST ESTIMATION AND AVERAGE REQUESTING TIME TABLE

Parameters	Load Balancing Algorithm on Cloud Analyst		
	Round Robin	ESCE	Throttled
Data Centres	2	2	2
UB	5	5	5
H/W Unit	2	2	2
V.M	20	20	20
Avg (ms)	0.28	0.28	0.28
Min (ms)	0.02	0.02	0.02
Max (ms)	0.64	0.64	0.64
Total $ (Cost)	1.83	1.83	1.82

V. RESULTS

After performing experiment on the simulation we get the desire outputs for the entire three algorithms. The configuration assigned in terms of cost, data transfer is also shown in Table .1. The costs are assigned in the dollar currency. Different user based (UB) will communicate with the data centres to generate output. The average, minimum and maximum requesting time is also calculated using simulation. The data transfer cost after Appling the algorithm is also calculated and tabulated in Table 1.

VI. CONCLUSIONS

The performances of three algorithms are studied in the paper. The request time for the three policies applied (Round Robin, Equally spread current execution load, Throttled Load balancing) are same which means there is no effect on data centers request time after changing the algorithms. The cost analysis showed for each algorithm is calculated in the experimental work. The cost calculated for virtual machine usage per hour is same for two algorithms Round Robin, Equally spread current execution load but Throttled Load balancing algorithm reduce the cost of usage, so Throttled Load balancing algorithm works more efficiently in terms of cost for load balancing on cloud data centers.

REFERENCES

[1] Wei-Tek Tsai*, Xin Sun, Janaka Balasooriya "Service-Oriented Cloud Computing Architecture" Computer society 2010.

[2] Zenon Chaczko, Venkatesh Mahadevan, Shahrzad Aslanzadeh and Christopher Mcdermid," Availability and Load Balancing in Cloud Computing" IPCSIT vol.14 (2011).

[3] Anthony T. Velte ,Toby J. Velte, Robert Elsenpeter, " Cloud Computing: A Practical Approach ", The McGraw-Hill Companies(2010), [Book]

[4] Zenon Chaczko, Venkatesh Mahadevan , Shahrzad Aslanzadeh and Christopher Mcdermid," Availability and Load Balancing in Cloud Computing" , IACSIT 2011.

[5] Ratan Mishra and Anant Jaiswal "Ant colony Optimization: A Solution of Load balancing in Cloud", IJWesT, 2012

[6] Jasmin James, Dr. Bhupendra Verma "Efficient VM load balancing algorithm for a cloud computing environment" IJCSE, 2012

[7] Brain Underdahl, Margaret Lewis and Tim mueting "Cloud computing clusters for dummies" Wiley Publication (2010), [Book]

[8] Judith Hurwitz, Robin Bloor, and Marcia Kaufman, "Cloud computing for dummies" Wiley Publication (2010), [Book]

[9] Bhathiya Wickremasinghe1, Rodrigo N. Calheiros, and Rajkumar Buyya "CloudAnalyst: A CloudSim-based Visual Modeller for Analysing Cloud Computing Environments and Applications", 2009.

[10] Yang Xu, Lei Wu, Liying Guo, Zheng Chen , Lai Yang, Zhongzhi Shi "An Intelligent Load Balancing Algorithm Towards Efficient Cloud Computing"2011

[11] http://www.cloudbus.org/cloudsim