"Survey on Load Balancing in Cloud Computing"

Aabha Sahu[1], Dr. Durgesh Kumar Mishra[2]
[1]*M. Tech Scholar*, [2]*Professor*
[12]*Department of Computer Science & Engineering*
SAIT, Indore

Abstract- The goal of load balancing is to distribute workloads and computing resources in a cloud computing environment. Load balancing manages application or workload demands through allocating resources among multiple computers, networks or servers. Load balancing helps to achieve high performance level for potentially lower costs than traditional on-premises load balancing techniques. In addition to workload and traffic distribution, load balancing technology can provide health checks for cloud applications. On internet the companies whose web sites deals with the great traffic uses several approaches. For web serving, one approach is to route each request in turn to a different server host address in a Domain Name System (DNS) table, round robin fashion. Usually, if two servers are used to balance a workload, a third is needed to determine which server to assign the work to. Since load balancing requires multiple servers, it is usually combined with failover and backup services. In some approaches, the servers are distributed over different geographical locations. In simple round robin algorithm time slices are assigned to each process in equal intervals and handling all processes without priority. The findings of this survey is that if the priority of process is also taken into account while executing the process in round robin fashion, it can minimize the drawbacks and limitations of existing scheduling algorithm in cloud computing**.**

Keywords- Cloud Computing; Cloudlets; Cloud Coordinator; Datacenter Broker; Host; Load Balancing; Round Robin; Virtual Machine.

I.   INTRODUCTION

Cloud computing is an emerging technique in which computing resources and storage provides online. These resources can access anytime or anywhere through internet. In cloud computing many issues are covered. Load balancing is one of them. It enables ubiquitous access to shared pools of configurable system resources and services with minimal management effort, over the internet. It also enables organizations to focus on their core business instead of expending resources on computer infrastructure and maintenance. Proponents also claim that cloud computing allows enterprises to get their applications up and faster running time, that enables IT teams to work rapidly. The user can take benefits from all of these technologies, without the need for deeper knowledge. Cloud computing comes throughout focus development of grid computing, virtualization as well as web technologies. Cloud computing is usually the world wide web based computing that presents infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS). IaaS describes that the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. PaaS offer a development environment to application developers. In PaaS, cloud providers deliver a computing platform which includes operating system, database, execution environment and web server. SaaS is a software distribution model in which a third-party provider hosts applications and makes them available to customers over the Internet. The main enabling technology for cloud computing is virtualization. Virtualization software separates a physical computing device into one or more "virtual" devices, each of which can be easily used and managed to perform computing tasks. This article introduces a better load balance model for the cloud, based on the cloud partitioning concept with a switch mechanism to choose different strategies for different situations. The algorithm applies the load balancing strategy to improve the efficiency in the cloud environment. A typical Cloud model applying CloudSim involves after four entities Datacenters, Hosts, Virtual machine in addition application form along with system software. *Datacenter* is set of host. This can be responsible regarding managing virtual models (VMs) (e.g., VM provisioning). It behaves like IaaS provider from finding requests with regard to VMs via brokers. *Datacenter Broker* represents the broker acting on behalf of a user. It modifies a couple of mechanisms: ones mechanism for submitting VM provisioning requests to be able to data centers and mechanism with regard to submitting tasks to VMs.
Host executes actions regarding management of VMs (e.g., creation along with destruction) and update task processing to be able to VMs. A good host possesses the defined policy to provisioning memory, processing elements, and also bandwidth to virtual machines. A good host is associated for you to the data center. The idea can host virtual machines. *VM* represents the software implementation of a machine that executes applications called virtual machine (VM) which functions to be a physical machine. Each virtual machine divides your own resources received by the host among tasks working from it. *Cloudlet* can be viewed as a data center in a box whose goal is to bring the cloud closer. The class is

managed through the scheduling policy that will be implemented Inside Datacenter Broker Class.

II.   LITERATURE REVIEW

Authors proposed Equally Spread Current Execution (ESCE) scheduling algorithm to solve the load distributing problem on various nodes of a distributed system to improve both resource utilization and job response time while also avoiding a situation where some of the nodes are heavily loaded while other nodes are idle or doing very little work.[2]

This research paper concentrated on various VM load balancing algorithm(Throttled Load Balancing Algorithm and Active Monitoring Load Balancing Algorithm) and proposed a new VM load balancing algorithm after modifying Throttled Load Balancing algorithm in virtual machine environment of cloud computing in order to achieve better response time, processing time, and cost.[3]

Authors proposed a concept of cloud computing along with research challenges in load balancing and discuss some of the existing load balancing algorithm and also their challenges. [4, 19]

The highlights of this research paper simulated four different scheduling algorithms along with different variants of Round Robin algorithm for executing the user request in cloud environment. According to the experiment and analysis RR algorithm has the best integrate performance. [5, 10]

This research paper concentrated on dynamically optimized cost based task scheduling which combines cost based task scheduling beneficial to user and dynamically optimized resource allocation strategy beneficial to service provider. They also prove computation ratio and utilization of available resources by grouping the user tasks before resource allocation. [6]

Authors proposed Optimal Cloud Resource Provisioning (OCRP) algorithm which is used to obtain optimal solution. It uses Bender decomposition, stochastic programming model, sample average approximation and deterministic equivalent formulation. OCRP result in reduction of the cost for resource provisioning. [7]

This research paper concentrated on several algorithm which are used to handle the data centre load balancing and VM level load balancing problem. The performance of various loads balancing algorithm analyzed by different cloud simulator like CloudSim and CloudAnalyst. [8]

Authors proposed an algorithm Round Robin (RR) to reschedule the CPUs. Here at first consumer's request submitted into the Service Accepter (SA) and SA search for free VMs. When it finds one it starts to serve the services to those VMs using RR. The work is done for ten servers and the procedure of the process scheduled is not dynamic. [9]

B.Santhosh Kumar and Dr. Latha Parthiban, implemented an algorithm VMLeastFrequentlyUsed to distribute the load among virtual machine created in a data center. The algorithm mainly relies upon Least frequently used mechanism. When a task has to be submitted to a data center for processing choice is made upon the VM which has been assigned tasks least number of times. [11, 16]

Lipika Datta introduced modified Round Robin scheduling for processes with user defined external priorities so that the scheduling algorithm can be used to schedule processes of soft real time systems which reduces the average response time and less number of context switching. [12, 20]

This research paper suggests a new VM load balancing algorithm: "Round Robin VM Load Balancing", which is implemented using round robin approach with previous allocation status of virtual machine to handle service request from the user base. [13]

Rajkumar Somani and Jyotsana Ojha, proposed a hybrid approach for virtual machine level load balancing using concepts of two algorithm for load balancing: Round Robin Algorithm and Throttled Algorithm. The Hybrid approach gave better results in terms of response time, data center request serving time and data center processing time. It is effective in case of same data size per request as well as for different data size per request. [14]

In this research paper authors surveyed various load balancing algorithms in the cloud computing environment. They discussed major issues which must be taken into consideration while designing any load balancing algorithm. A comparison has been done on the basis of different criteria like scalability, network overhead, resource utilization, algorithm complexity, fault tolerance, response time etc. [15]

Ritu Kapur, introduced a new scheduling algorithm Cost Effective Resource Scheduling (CERS) algorithm. This algorithm leads to an efficient utilization of resources; it serves the aim of Green IT and makes a contribution towards a better future. [17]

Authors proposed an approach of Round Robin technique in a circular way and by this method try clarify the load balancing scenario of a cloud server during its execution. It helps to get an effective and fast execution environment of task assigned by the user which helps in to create an effective communication framework between broker and virtual machine to optimize the time and minimize the cost. [18]

III.   PROBLEM DOMAIN

Cloud computing is scalable and efficient. But when the job rate is high, maintained the processing is very complex problem with load balancing and require much attention for researchers. Since the job arrival pattern is not predictable and the capacities of each node in the cloud differ, for load balancing problem, workload control is crucial to improve system performance, maintain and stability. Load balancing schemes depending on the system either static or dynamic. Static schemes do not use the system information and are less complex while dynamic schemes will bring additional costs

for the system but can change as the system status changes. A dynamic scheme is used here for its flexibility.

IV.   EXISTING LOAD BALANCERS

Round Robin Load Balancer:-

It is one of the simplest scheduling techniques that utilize the principle of time slices [13]. Here the time is divided into multiple slices and each node is given a particular time slice or time interval i.e. it utilizes the principle of time scheduling. Each node is given a quantum and its operation. They are provided to the requesting client on the basis of time slice by the service provider.
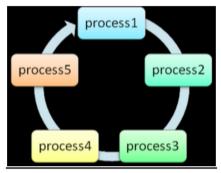

Fig.1: Round Robin Load Balancer

Throttled Load Balancer (TLB):-

This algorithm ensures that pre-defined number of cloudlets is allocated to a single VM at any given time. If there are more request groups are present than the number of available VM's at data centre allocate incoming request in queue basis until the next VM becomes available.
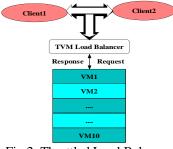

Fig.2: Throttled Load Balancer

Active Monitoring Load Balancer (AMLB):-

The AMLB is a load balancer which maintains information about each virtual machine and the number of request currently allocated to which virtual machine when a new virtual machine arrives. If there are more than one virtual machine, the first identified is selected. AMLB returns the virtual machine identification number to the data center controller. The data center controller sends the request to the virtual machine identified by that identification number. The data centre controller notifies the AMLB to new allocation
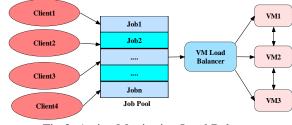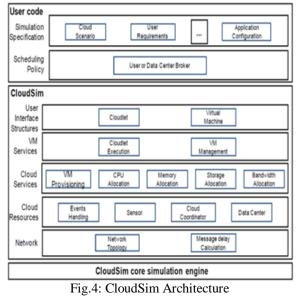
and cloudlets is sent to it.

Fig.3: Active Monitoring Load Balancer

CloudSim:-

Figure 4 shows that the multilayered design of CloudSim software framework and its architectural components[1]. CloudSim is efficient tool which can be used with regard to Cloud modeling. CloudSim provides a generalized and extensible simulation framework that enables seamless modeling and simulation of app performance during current life cycle of a Cloud. CloudSim allows VMs for us to be managed coming from hosts that will inside turn are usually managed by datacenters. Architecture inside four uncomplicated entities is offered by CloudSim. These types of entities offer consumer to set-up the basic cloud computing environment as well as measure your effectiveness involving fill up Balancing algorithms. The responsibility of providing Infrastructure level solutions for the Cloud users is featured by Datacenters entities. They act as a home to help a lot of Host Entities or maybe a lot of instances hosts' entities aggregate to help application form the solitary Datacenter entity. Hosts are usually Physical Servers. Software level Service is provided by the host to the Cloud Users. Hosts have their particular storage and memory. Processing features regarding hosts is usually expressed throughout MIPS (million instructions per second).

Fig.4: CloudSim Architecture

V. CONCLUSION

The main problem faced by current system is Load Balancing. To deal with this problem, various algorithms and techniques have been implemented. We have surveyed many existing load balancing methods in various environments. By Modifying the existing Round Robin algorithm, with prioritize job, it will be seen that performance of cloud computing increases along with maximum resource utilization. Hence we can conclude that modifying Round Robin will give us better results.

VI. REFERENCES

[1]. Dr. Rajkumar Buyya, "CloudSim: a toolkit for modeling and simulation of cloud computing environments and evaluation of resource provisioning algorithm", Wiley Online Library, 24 August 2010, pp. 23- 50.

[2]. Jaspreet Kaur, "Comparison of load balancing algorithm in a Cloud", International Journal of Engineering Research and Applications (IJERA), Vol. 2, No. 3, May- June 2012, pp. 1169-1173, ISSN:2248-9622.

[3]. Prof Meenakshi Sharma1 and Pankaj Sharma, "Performance Evaluation of Adaptive Virtual Machine Load Balancing Algorithm", International Journal of Advanced Computer Science and Applications(IJACSA), Vol 3, No. 2, 2012, pp. 86-88

[4]. Kaur S and Supriya Kinger, "Analysis of Load Balancing Techniques in Cloud Computing", International Journal of Computers & Technology, Vol 4, No. 2, March- April 2013, pp 737- 741, ISSN:2277-3061.

[5]. Subasish Mohapatra, Subhadarshini and K. Smruti Rekha, "Analysis of Different Variants in Round Robin Algorithms for Load Balancing in Cloud Computing", International Journal of Computer Application, Vol 69, No. 22, May 2013, pp. 17-21, ISSN:0975-8887.

[6]. Yogita Chawla and Mansi Bhonsle "Dynamically optimized cost based task scheduling in cloud computing", International Journal of Emerging Trends and technology in Computer Science (IJETTCS), Vol 2, No.3, May-June 2013, ISSN:2278-6856.

[7]. Kunal Mahurkar, Shraddha Katore, Suraj Bhaisade and Pratikawale, "Reducing Cost of Provisioning in Cloud Computing", International Journal of Advance in Computer Science and Cloud Computing, Vol 1, No. 2, Nov- 2013, pp 6-8, ISSN:2321-4058.

[8]. Sonika Matele, Dr, K James and Navneet Singh,, "A Study of Load Balancing Issue Among Multifarious Issues of Cloud Computing Environment", International Journals of Emerging Technology Computational and Applied Science (IJETCAS), Vol 13, No. 142, 2013, pp. 236- 241, ISSN(Print):2279-0047, ISSN(Online):2279-0055.

[9]. Syed Tauhid Zuheri1, Tamanna Shamrin, Rusia Tanbin and Firoj Mahmud, "An Efficient Load Balancing Approach in Cloud Environment by using Round Robin Algorithm", International Journal of Artificial and Mechatronics, Vol 1, No. 5, 2013, pp 96-99, ISSN:2320-5121.

[10]. Pooja Samal and Pranati Mishra, "Analysis of Variants in Round Robin Algorithms for Load Balancing in Cloud Computing", (IJCSIT) International Journals of Computer Science and Information Technologies, Vol 4, No. 3, 2013, pp 416- 419, ISSN: 0975-9646.

[11]. B. Santosh Kumar and Dr. Latha Parthiban, "An Implementation of Load Balancing Policy for Virtual Machines Associated with a Data Centre", International Journal of Computer Science & Engineering Technology (IJCSET), Vol 5 No. 3, March 2014, pp. 253- 261.

[12]. Lipika Datta, "Modified RR Algorithm with Dynamic Time Quantum for Externally Prioritized Tasks", International Journal on Recent and Innovation Trends in Computing and Communication. Vol. 3, Issue 3, March 2014, ISSN:2278-0181

[13]. Nusrat Pasha, Dr. Amit Agarwal and Dr. Ravi Rastogi, "Round Robin Approach for VM load balancing algorithm in Cloud Computing Environment", International Journal of Advances Research in Computer Science and Software Engineering(IJRISE), Vol 4, No. 5, May 2014, ISSN:2277-128X.

[14]. Rajkumar Somani and Jyotsana Ojha "A Hybrid Approach for VM Load Balancing in Cloud using CloudSim", Interntional Journal of Science, Engineering and Technology Research (IJSETR), Vol 3, No. 6, June 2014

[15]. N. S. Raghava and Deepti Singh, "Comparative Study on Load Balancing Techniques in Cloud Computing", Open Journal of Mobile Computing and Cloud Computing, Vol. 1, No. 1, August 2014.

[16]. B Preethi, Professor C. Kamalanathan, Dr. S.M Ramesh, S Shanmathi and P SathiyaBama, "Optimization Of Resources in Cloud Computing Using Effective Load Balancing Algorithms", International Advanced Research Journal in Science, Engineering and Technology Vol. 1, Issue 1, September 2014, ISSN:2393-8021.

[17]. Ritu Kapur "A Cost Effective approach for Resource Scheduling in Cloud Computing" IEEE International Conference on Computer, Communication and Control (IC4), 2015

[18]. Soumen Santra and Dr. Kalyani Mali, "A New Approach to Survey on Load Balancing in VM in Cloud Computing: using CloudSim", IEEE International Conference on Computer, Communication and Control (IC4-2015), 2015.

[19]. Sukrati Jain and Dr. Ashendra K Saxena, "A Survey of Load Balancing Challenges in Cloud Environment", IEEE Conference, Moradabad, November 2016, ISBN:978-1-5090-3543-4.

[20]. Shruti Tiwari, Shriya Prajapati and Nazish Ali Ansari, "Modified Optimal Algorithm for Load Balancing in cloud Computing", International Conference on Computing, Communication and Automation (ICCCA), 2017, ISBN:978-1-5090-6471.