Load Balancing in Cloud Computing a New Way and a New Direction in View of Present Day Issues

G.Thejesvi[1], E.Hari Prasad[2]
Research Scholar, Department of Computer Science
Dravidian University-Kuppam, A.P.517426 (India)

ABSTRACT- *Cloud Computing is excessive software program having the potential to exchange the IT software industry and making the software program even more appealing. It has additionally changed the manner IT groups used to buy and design hardware. The elasticity of sources without paying a top class for large scale is extraordinary within the records of IT enterprise. The growth in internet site visitors and extraordinary services are increasing day by day making load balancing a big research subject matter. Cloud computing is a new generation which makes use of virtual machine instead of bodily machine to host, keep and community the distinctive components. Load balancers are used for assigning load to exceptional virtual machines in any such way that none of the nodes gets loaded heavily or gently. The load balancing needs to be executed well due to the fact failure in any person of the node can cause unavailability of records.*

Keywords- *Cloud Computing, SaaS, Paas, Iaas, Load balancing*

INTRODUCTION- Cloud computing get its name as a metaphor for the Internet. Typically, the Internet is represented in community diagrams as a cloud . The time period "cloud" originates from the arena of telecommunications while providers began the use of digital private network (VPN) offerings for data communications. Cloud computing surely manner Internet Computing, normally the net is seen as series of clouds; for that reason the sector cloud computing is defined as using the internet to offer technology enabled services to the human beings and agencies .According to NIST(National Institute of Standards and Technology), cloud computing is a model for enabling convenient, on-call for community access to a shared pool of configurable computing assets i.E. Community servers, storage applications and offerings)

The evolution of cloud computing over the last few years is one of the primary advances in the records of computing. Cloud computing is a current fashion in IT that actions computing and facts far from computer and portable PC's into large records centers.The most important gain of cloud computing is that client do no longer must pay for infrastructures, its installation and required guy strength to deal with such infrastructure and protection . Cloud computing is impartial computing it's miles totally exclusive from grid and application computing. Cloud computing is less expensive than other computing fashions;0 upkeep value is involvedsince the provider issuer is responsible for the supply of offerings and customers are free from upkeep and management issues of useful resource machines. Due to this selection, cloud computing is likewise referred to as software computing or "IT on demand".In contrast to previous paradigms together with clusters and grid computing, cloud computing isn't utility-orientated however carrier-orientated; it offers on-call for virtualized assets as measurable and billable utilities

Cloud computing is a dispensed computing paradigm that focuses on providing a extensive variety of users with allotted get right of entry to to scalable, virtualized hardware and/or software program infrastructure over the net. It entails virtualization, allotted computing, networking, software program and web offerings.The concept of cloud computing has notably changed the field of parallel and disbursed computing systems these days .It has emerged as apopular approach to offer cheap and smooth access to externalized IT resources . Cloud computing deals with virtualization, scalability, interoperability, pleasant of service and the shipping models of the cloud, particularly public, private and hybrid.Through virtualization, cloud computing is capable of cope with with the equal bodily infrastructure a large purchaser base with one of a kind computational desires.The rapid increase in the subject of cloud computing additionally increases severe protection issues. Lack of security is the most effective hurdle in wide adoption of cloud computing.

Software as a Service (SaaS) : SaaS, sometimes referred to as "software on demand". SaaS constitutes a mojor role in all th cloud computing offerings .Software as a Service (SaaS) is the model in which an application is hosted as a service to customers who access it via the Internet. SaaS is software that is owned, delivered and managed remotely by one or more providers and is offered in a pay-as-per-use manner. SaaS focuses on providing users with business specific capabilities such as e-mail or customer management. The typical user of SaaS offering usually has neither knowledge nor control about the underlying infrastructure. One of the example of SaaS provider is Google Apps that provides large suite of web based applications for many business applications including accounting, enterprise resource management (ERP), human resource management (HRM), customer relationship management (CRM) and security device manager (SDM).

Platform as a Service (PaaS) : PaaS is a service model cloud computing. In this model, client creates the software using tools and libraries from the provider. The client controls the applications that run in the environment, but does not control the operating system, hardware and network infrastructure on which they are running. The provider provides the network, servers and storage. One of the example of PaaS is Google App Engine that provides clients to run their applications on Google's infrastructure .PaaS services include application design, development, testing, deployment and hosting. Other services include team collaboration, webservice integration, database integration, security, scalability, storage, state management and versioning.PaaS also supports web development interfaces such as Simple Object Access Protocol (SOAP) and Representational State Transfer (REST), which allows the construction of multiple web services, sometimes called mashups. A downfall to PaaS is a lack of interoperability and portability among providers.

Infrastructure as a Service (IaaS) : IaaS, also known as cloud infrastructure services, delivers computer infrastructure-typically a platform virtualization outsourced service. IaaS model provides a virtual data center within the cloud. IaaS provides servers (physical and virtualized), cloud-based data storage, etc.The client need not purchase the required servers, data center or the network resources. The key advantage is that customers need to pay only for the time duration they use the service. One of the examples of IaaS providers is Amazon Elastic Compute Cloud (EC2). It provides users with a special virtual machine that can be deployed and run on EC2 infrastructure.

Load Balancing : Load Balancing is the one of the maximum crucial elements of the modern digital environment. In the case of cloud computing environments there have been numerous challenges are there in the load balancing techniques like protection, fault tolerance etc. Many researchers had been proposed numerous strategies to improve the weight balancing. Let us describes a survey on load balancing schemes in cloud environments. There were diverse load balancing strategies are used in these papers and their corresponding benefits, negative aspects and performance metrics are studied in element.

Load balancing is a common time period used for dispensing a larger processing load to smaller processing nodes for boosting the overall overall performance of device. In a disbursed gadget surroundings, it's miles the process of distributing load amongst diverse different nodes of dispensed device to improve both useful resource utilization and task response time. An best load balancing set of rules should avoid overloading or under loading of any unique node. But, in case of a cloud computing surroundings the selection of load balancing algorithm isn't smooth as it involves additional constraints like safety, reliability, throughput and so forth. So, the principle aim of a load balancing set of rules in a cloud computing surroundings is to enhance the reaction time of task with the aid of distributing the entire load of device. The algorithm should also make sure that it is not overloading any particular node.

Load balancers can work in two methods: one is cooperative and non-cooperative. In cooperative, the nodes work simultaneously with a purpose to attain the common purpose of optimizing the overall response time. In non-cooperative mode, the obligations run independently that allows you to improve the reaction time of local obligations. Load balancing algorithms, in standard, can be divided into classes: static and dynamic load balancing algorithm. A static load balancing algorithm does no longer take into account the preceding country or conduct of a node while dispensing the load.

On the opposite hand, a dynamic load balancing set of rules exams the preceding country of a node even as dispensing the burden. The dynamic load balancing set of rules is carried out both as a dispensed or non-dispensed. The benefit of using dynamic load balancing is that if any node fails, it's going to now not halt the device; it'll best have an effect on the machine overall performance. In a dynamic load balanced machine, the nodes can interact with each different producing more messages while compared to a non-allotted environment. However, choosing the precise server desires real time communication with the alternative nodes of the community and for this reason, generates greater number of messages within the community. Dynamic load balancer makes use of rules for retaining tune of updated data. Dynamic load balancers have four guidelines.

Metrics for Load Balancing:

1. Throughput: - It is used to calculate the all duties whose execution has been finished. The performance of any device is improved if throughput is excessive.
2. Fault Tolerance: -It means recovery from failure. The load balancing have to be a very good fault tolerant technique.
3. Migration time: -It is the time to migrate the roles or sources from one node to different nodes. It must be minimized as a way to enhance the performance of the gadget.
4. Response Time: - It is the quantity of time this is taken by way of a particular load balancing set of rules to reaction a venture in a machine. This parameter must be minimized for higher overall performance of a device.
5. Scalability: - It is the capability of an algorithm to carry out Load balancing for any finite wide variety of nodes of a machine. This metric have to be stepped forward for a very good gadget.

EXISTING LOAD BALANCING ALGORITHMS IN CLOUD COMPUTING

There are many load balancing algorithms which help to acquire better throughput and enhance the reaction time in cloud surroundings. All the algorithms have their own advantages.

1. Task Scheduling based totally on LB: This set of rules specially consist degree venture scheduling mechanism which might be based on load balancing to fulfill dynamic requirements of users . It obtains high resource usage. This set of rules achieves load balancing by means of first mapping tasks to virtual machines and then all digital machines to host sources .It is enhancing the project response time .It also offer higher useful resource utilization .

2. Opportunistic Load Balancing: OLB is to strive every node maintain busy, therefore does not do not forget the prevailing workload of every pc. OLB assigns every project in free order to give node of useful .The benefit is quite easy and attain load balance however its shortcoming isn't always recollect every expectation execution time of undertaking, consequently the whole completion time (Make span) is very poor.

3. Round Robin: - In this algorithm all the methods are divided among all processors. In this each system is assigned to the processor in a spherical robin order. The work load distributions between processors are same. Different processes have not same job processing time. At many factor of time a few nodes may be closely loaded and others remain idle In web servers in which http requests are of similar nature and distributed similarly then RR algorithm is used . In Round Robin Scheduling the time quantum play a critical role. When time quantum may be very huge then RR Scheduling Algorithm is identical as the FCFS Scheduling. And when time quantum is simply too small then Round Robin Scheduling is known as Processor Sharing Algorithm.

4. Randomized: This set of rules is static in nature. In this set of rules a manner may be treated through a selected node n with a possibility p. When all the tactics are of identical loaded then this algorithm paintings well. Problem arises when hundreds are of various computational complexities. This algorithm isn't always retaining deterministic approach.

5. Min-Min Algorithm: It starts offevolved with a hard and fast of all unassigned obligations .In this minimal of completion time for all obligations is observed. Then after that among these minimal instances the minimal cost is chosen. Then undertaking with minimum time schedule on machine. After that the execution time for all other responsibilities is up to date on that gadget on the other hand the same procedure is accompanied until all the obligations are assigned on the sources. The most important hassle of this set of rules is has a hunger.

6. Max-Min Algorithm: Max-Min algorithm is sort of identical as the min-min set of rules. The fundamental distinction is following: In this algorithm first finding out minimal execution times, then the maximum cost is selected that's the most time amongst all the obligations on any resources. After that maximum time locating, the challenge is assigned on the specific decided on gadget. Then the execution time for all obligations

is up to date on that machine, that is executed by means of adding the execution time of the assigned assignment to the execution instances of different tasks on that machine. Then all assigned assignment is eliminated from the list that performed through the gadget.

7. Honeybee Foraging Behavior: It is a nature inspired Algorithm for self-employer. Honeybee achieves worldwide load balancing through local server moves. The overall performance of the gadget is enhanced with multiplied machine range. The principal hassle is that throughput isn't increased with an increase in device size. When the diverse populace of service kinds is required then this set of rules is best perfect.

8. Active Clustering:- In this algorithm identical type nodes of the device are grouped collectively and that they work together in corporations. It works like as self-aggregation load balancing method where a network is rewired to balance the load of the system. Systems optimize the usage of comparable job assignments by using connecting comparable services. System Performance advanced with stepped forward resources. The throughput is stepped forward through the usage of these kinds of sources effectively.

9. Compare and Balance:-This algorithm is makes use of to reach an equilibrium circumstance and manage unbalanced systems load. In this set of rules on the idea of chance (no. Of digital system strolling at the cutting-edge host and whole cloud device), present day host randomly pick a host and examine their load. If load of present day host is extra than the chosen host, it transfers greater load to that precise node. Then every host of the gadget plays the identical manner. This load balancing set of rules is also designed and carried out to lessen digital machines migration time. Shared storage memory is used to lessen virtual machines migration time.

10. Lock-unfastened multiprocessing solution for LB: It proposed a lock-unfastened multiprocessing load balancing solution that avoids using shared reminiscence in contrast to different multiprocessing load balancing answers which use shared memory and lock to preserve a person consultation. It is accomplished by way of editing kernel. This solution enables in enhancing the overall overall performance of load balancer in a multicore environment via running more than one load-balancing approaches in one load balancer.

11. Ant Colony Optimization: :- Ant algorithms is a multiagent technique to tough combinatorial optimization issues . Example of this approach is journeying salesman trouble (TSP) and the quadratic assignment problem (QAP) . These algorithms were stimulated via the remark of real ant colonies. Ant's behaviour is directed greater to the survival of the colonies .They now not assume for individual.

12. Shortest Response Time First: The concept of this algorithm is simple. In this each process is assigned a concern which is allowed to run. In this identical priority procedures are scheduled in FCFS order. The (SJF) algorithm is a unique case of popular priority Scheduling set of rules. In SJF algorithm is priority is the inverse of the subsequent CPU burst. It approach, if longer the CPU burst then decrease the priority. The SJF policy selects the job with the shortest (expected) processing time first. In this set of rules shorter jobs are accomplished before long jobs. In SJF, it is very vital to understand or estimate the processing time of every activity which is major hassle of SJF.

13.Based Random Sampling: This set of rules is based on the development of the digital graph having connectivity among the all nodes of the system where each node of the graph is corresponding to the node laptop of the cloud device. Edges between nodes are sorts as Incoming aspect and outgoing part that is used to take into account the burden of specific device and additionally allotment the assets of the node. It is very good method to balance the load.

Conclusion:

The load balancing of the modern-day system is one of the best problems. Various techniques and algorithms are used to solve the problem. In this paper we survey numerous present load balancing strategies in exclusive environments. A huge wide variety of parameters and special forms of soft computing strategies may be blanketed inside the destiny for the better usage and needs of the consumer. The various load balancing strategies also are being as compared here.

REFERENCES

[1] A.T. Velte, T.J. Veltey and R. Elsenpeter, Cloud Computing: A Practical Approach (Tata McGraw-Hill Education Private Limited, New Delhi, Edition 2010).

[2] Y. Jadeja and K. Modi, "Cloud Computing-Concepts, Architecture and Challenges", International Conference on Computing,Electronics and Electrical Technologies, 2012, 877-880.

[3] F.B. Shaikh and S. Haider, "Security Threats in Cloud Computing", Internet Technology and Secured Transactions,2011, 214-219.

[4] J. Srinivas, K.V.S.Reddy and A.M. Qyser, "Cloud Computing Basics", International Journal of Advanced Research in Computer and Communication Engineering, 1(5), July 2012.

[5] S. Ray and A.D. Sarkar, "Execution Analysis of Load Balancing Algorithms in Cloud Computing Environment",International Journal on Cloud Computing

Services and Architecture, 2(5), October 2012.
[6] Mladen A. Vouk, "Cloud Computing – Issues, Research and Implementations", Proceedings of the ITI 2008 30th Int. Conf. on Information Technology Interfaces, June 23-26, 2008, Cavtat, Croatia
[7] J. Sahoo, S. Mohapatra and R. lath "Virtualization: A survey on concepts, taxonomy and associated security issues" computer and network technology (ICCNT), IEEE, pp. 222-226. April 2010.
[8] G. Pallis, "Cloud Computing: The New Frontier of Internet Computing", IEEE Journal of Internet Computing, Vol. 14, No. 5, September/October 2010, pages 70-73.
[9] A. Khiyati, M. Zbakh, H. El Bakkali, D. El Kettani "Load Balancing Cloud Computing: State Of Art", IEEE, 2012
[10] Moharana, S.S., Ramesh R.D., and Powar, D., May 2013, "Analysis of Load Balancers in Cloud Computing," International Journal of Computer Science and Engineering, Vol.2, Issue2.
[11] Roy, A., and Dutta, D., April 2013, "Dynamic Load Balancing: Improve Efficiency in Cloud Computing," International Journal of Emerging Research in Management & Technology, Vol. 2. Issue 4.
[12] Khiyaita, A., Zbakh, M., Bakkali, H. El., and Kettani, D.El, 2012, "Load balancing cloud computing: state of art," In National Days of Network Security and Systems (JNS2), IEEE, pages 106–109.
[13] Kansal, N. J., and Chana, I., 2012, "Existing load balancing techniques in cloud computing: A systematic review," Journal of Information Systems & Communication, Vol. 3, Issue 1,
[14] Menasce, D.A., and Ngo, P., "Understanding cloud computing: Experimentation and capacity planning," 2009, In Computer Measurement Group Conference.
[15] Wang, S.C., Yan, K.Q., Liao,W.P., and Wang, S.S., 2010, "Towards a load balancing in a three-level cloud computing network," In Computer Science and Information Technology (ICCSIT) 3rd IEEE International Conference, IEEE, Vol. 1, pages 108– 113.
[16] Braun, T. D., Siegel, H. J., Beck, N., Boloni, L. L., Maheswaran, M., Reuther, A. I., J. P. Robertson, M. D. Theys, B. Yao, D. Hensgen, et al., 2001, "A comparison of eleven static heuristics for mapping a class of independent tasks onto heterogeneous distributed computing systems," Journal of Parallel and Distributed Computing, Vol. 61, Issue 6, pages 810–837.
[17] Kokilavani, T., and Amalarethinam, D., 2011, "Load balanced min-min algorithm for static meta-task scheduling in grid computing," International Journal of Computer Applications, Vol. 20, Issue 2.