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A Survey on Load Balancing Strategies in Cloud Computing

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Abstract-

"Cloud computing" is a general term used to describe a new class of network based computing that takes place over the Internet, which involves distributed computing, software, web services, virtualization, and networking. A cloud consists of various components such as clients, datacenter and distributed servers. There are several issues in cloud computing such as fault tolerance, scalability, flexibility, high availability, reduced overhead for users, reduced cost of ownership, on demand services etc. But the main issue is load balancing. Load may be in the form of CPU load, memory capacity, delay or network load. Load balancing divides the whole amount of work between two or more computers so that more work gets done in the same amount of time and all users get served faster. Load balancing assure that all the processor in the system or every node in the network does exactly the same amount of work at any instant of time.

Keywords***:*** Cloud computing, Types of cloud, Load Balancing, load balancing environment, Load Balancing Algorithm.

I. INTRODUCTION

In cloud computing large number of computers are connected through internet. A cloud computing system which does not used load balancing has number of drawbacks there is Uneven distribution of workload which results in server overloading and system may crash, Due to this performance is degrades and efficiency reduces. Cloud computing allows consumers and businesses to use application without installation and access their personal files at any computer with internet access.

Cloud computing is model of network computing where application can run on connected server rather than local computing devices such as tablet or PC.Cloud computing is mechanism of distributed computing that focuses on wide range of users with distributed access to virtualized hardware and software infrastructure over the internet.

1.1Types of Cloud

1.1.1Public Cloud**:**In public cloud customer has no visibility and control access where computing infrastructure is hosted. The computing infrastructure is shared among any organization. It is available for public.

Ex: Google, Amazon AWS, and Microsoft.

*1.1.2*Private cloud: Computing infrastructure operated only for single organization, it can be manage internally or by third party. Private clouds are more costly and more secure than public cloud. Physical resources on server are finite.

1.1.3Hybrid Cloud:Hybrid cloud combines various type of cloud such as private, public and community. Where those clouds maintain their unique identity but are bound together as a unit.

Cloud computing thus involving distributed technologies to satisfy a variety of applications and user needs. Sharing resources, software, information via internet are the main functions of cloud computing with an objective to reduced capital and operational cost, better performance in terms of response time and data processing time, maintain the system stability and to accommodate future modification in the system .So there are various technical challenges that needs to be addressed likeVirtual machine migration, grouping of server, fault tolerance, high availability and scalability but central issue is the load balancing.

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II. Load Balancing:

It is the mechanism of distributing the load among 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. It also ensures that all the processor in the system or every node in the network does approximately the equal amount of work at any instant of time. Load Balancing is done with the help of load balancers; in load balancing load on systems is equally distributed between individual nodes of a system. So that with load balancing amount of work to be done is equal on every node. Cloud load balancers manages the online workload between multiple servers. Important things to be consider while developing such algorithm are: estimation of load, comparison of load, stability of different system, performance of system, interaction between the nodes, nature of a work to be transferred etc. This load considered can be in terms of CPU load, amount of memory used, delay or network load. Load balancing algorithm can be static or dynamic.

2.1Static load balancing algorithm*:*

Static load balancing algorithm [1] can consider the current state of the system static algorithms are mostly suitable for homogeneous and stable environments and can produce better results.

2.2Dynamic load balancing algorithm:

Dynamic algorithm [1] does not consider the previous state or behavior of the system that is, it depends on the present behavior of the system. The major advantage of dynamic load balancing algorithm is that if someone node fails, it will not stop the system it will only affect the performance of the system. The task of load balancing is shared among distributed nodes, in a distributed system dynamic load balancing can be done in two different ways distributed and non-distributed.

2.2.1Distributed dynamic load balancing algorithm: dynamic load balancing algorithm is executed by all nodes present in the system and the taskof scheduling is shared among them.[1]

2.2.2Non-Distributed Load Balancing Algorithm:

In the non-distributed or undistributed, the nodes workPersonal in order to instate a common goal.Non-distributeddynamic load balancing algorithms are aheadClassified into two: centralized and semi-centralized.[1]

2.2.2.1Semi-distributed Dynamic Load Balancing:

In semi-distributed dynamic load balancing, the nodes of the system are divisions into clusters, where the load balancing in each cluster is of centralized form. [1] A central node is elected in every cluster by appropriate election technique which takes care of load balancing within that cluster. Therefore, the load balancing of all system is done via the central nodes of each cluster.

2.2.2.2Centralized Dynamic Load Balancing

In centralized dynamic load balancing, the algorithm isonly executed by a single node in the whole system i.e. Central node. This node is perfectly responsible for loadbalancing of the whole system and rest of the nodesinteracts only with the central node.

III. Related Work

In this section we see a few existing algorithm.

3.1Round Robin**:**

RR is the simplest algorithm [2] that uses the concept of time quantum or slices in this algorithm. The time is divided into multiple slices and each node is given a particular time quantum or time interval and every node has to perform their task within the given time period. RR is suitable for static environment It is static in nature, completion time is the parameter of RR. But the survey indicates that it has longer average waiting time, higher turnaround time and low throughput. Most of time processor remains ideal is the main drawback.

3.2Honey Bee:

It is a decentralized and nature-inspired algorithm. Its whole concept is based on idea of honey bee, how they search their food and then inform others for the same waggle dance. The strength of this dance gives the idea about amount of food present. The same idea is used for load balancing. As virtual machine is overloaded user request is forwarded to next less loaded virtual machine. Itachieves global load balancing via local server actions. [3]The HBB is

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dynamic in nature and used in distributed environment. In HBB advert is build which stores the status of each node and when job has to be assign to the node then it is done using that advert. Parameters considered for HBB are throughput, job completion time and overhead. Resource utilization can be maximized with the help of HBB. It can provide low overhead. The HBB load balancing model does not assign task to proper virtual machin and it does not consider the quality of service,due to that the throuput of system will not be increase with increase in system size. So to overcome the drawback of honey-bee PSO algorithm is used.

3.3PSO Algorithm:

Practicalswarm optimaization algorithm allocates task to virtual machin in best-fit manners ie staus of each VM is checked before assigning task to the VM,Wich have least memory westage.It is dynamic in nature and used for distributed enviroment.[3]. The method easily suffers from the partial optimism, which causes the less regulation of its speed and the direction. It has higher throughput: More sophisticated finite element formulations.

3.4ESCE:

Equally Spread Current Execution handel procees with their priorities.It distibutes the load randomly by checking the size and then transfer the load to VM which is lightly loaded and take less time and also gives maximum throuput.[4] The data Centre assigns the request to the VM identified by their id. It maintains index table which keeps the track of incoming requests. When VM completes the assigned task, a requestis communicated to data Centre which is further notified by the load balancer. There is an additional computation overhead to scan the queue again and again. It is dynamic in nature and has centralized environment.[5]]communication exist between the load balancer and Data center,which results into updation of index table. Due to that the delay in response and causes overhead.It is suitable for dynamic and centralized enviroment only.

3.5 Ant-Colony:

This algorithm is derived from the behaviour of Ant,how they can collect information and leave the liquid in the path to inform others about the path of food.Ant serches the overloaded nodes and then traverse it and then go back to fill the under loaded nodes,so that load can be balance.ant colony algorithm is used to find the optimal resource resource allocation for each task in dynamic cloud system.it works on minimization of task complion time.Fault tolerance,resource utilizaton and good scalability are the performance parameter consider while developing the Ant-colony algo.It is dynamic in nature.Network overhead,full replication of data and and complex network are the drawbacks of Ant-colony.

3.6Throtteled Load Balancing Algorithm:

In this algorithm client first requesting load balancer to check the right virtual machine which access that load easily and perform operations which is given by client or user.This algorithm is completely based on virtual machine and host. In this algorithm client first requests the load balancer to find the suitable virtual machine to perform the required operation.[4]Various performance parameters for throtteled are communication cost,network delay,load movement factor.It is dynamic in nature and it has high load movement factor.

IV. CONCLUSION:

This paper is based on Load Balancing strategies and their performance parameters such as throughput, response time, waiting time etc.While studying above load balancing algorithms it is foundthat Equally Spread Current Execution and Throttled algorithm will gives better throughput and latency. ESCE and Throttled are dynamic in nature and will work better for centralized environment and will give effective load balancing.

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