

Review on Load Balancing Using Virtual Machine in Cloud Computing

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Abstract— Cloud computing is emerging technology of this era. It is a new standard for large scale distributed computing. Cloud computing provides shared pool of resources to the end users. To provide fast service and better management of resources it needs prior load balancing technique which share load of tasks among multiple virtual machines. Because of this user will get better services with fast response. In this present situation the load balancing algorithms should be very efficient in allocating the request and also ensuring the usage of the resources in an intelligent way so that underutilization of the resources will not occur in the cloud environment. This paper provide brief introduction of the load balancing techniques which is using virtual machine. In this paper we are providing advantages and disadvantages of recent techniques used for load balancing.

Keywords— Cloud computing; load balancing; Resource utilization; Virtual Machine; Task Scheduling

I. INTRODUCTION

Cloud Computing can be defined on the basis of many aspects like processing, storage resources, the service-oriented interface and the exploitation of virtualization techniques etc. Cloud computing is defined as a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. Cloud Computing provide internet services with elasticity; improve performance and scalable data storage to a many number of users^[1].

In cloud computing, there are many tasks requires to be executed by the available resources to achieve best performance, minimal total time for completion, shortest response time, utilization of resources etc^[8] Because of these different intentions and high performance of computing environment, we need to design, develop and propose a load balancing algorithm to outperform appropriate allocation map virtual machine. The total completion time of task knows as make span may minimize by improving the load balancing algorithm.

II. LOAD BALANCING

Load balancing is a technique used to distribute the incoming traffic among available servers so that the requests can be handled and the response can be given, at a faster rate.

The load can be memory capacity, CPU load, delay or network load.

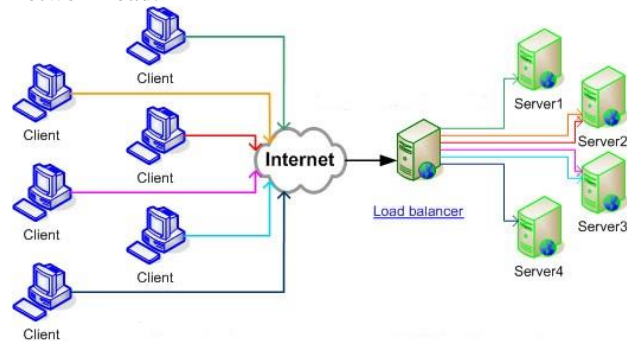


Fig.1 Load Balancing ^[15]

Load balancing is the method of distributing the load between various nodes of a distributed system to get better both resource utilization and job response time while also staying away from a situation where some of the nodes are heavily loaded while other nodes are idle or doing very little work. Load balancing makes sure that all the processor in the system or every node in the network does more or less the equal amount of work at any moment of time ^[3].

A. Load Balancing Types

1) Static Load Balancing Algorithm:

Static load balancing algorithm requires knowledge about the application and resource of system. It does not depend on the current state of the system. The System is needed by using prior knowledge. The advantages of static methods are simplicity in implementation and low communication overheads.

2) Dynamic Load balancing:

Dynamic load balancing it depends on current state of the system. No Prior knowledge is needed. A dynamic load balancing algorithm does not consider the previous state of the system. So, it improves overall system performance.

B. Qualitative Metrics

Different qualitative parameters or metrics that are considered vital for load balancing in cloud computing are discussed as follows ^[4]:

- 1) Nature: Determines the behavior of load balancing algorithms for example, static or dynamic, preplanned or no planning and so on.
- 2) Throughput: The total number of tasks that have completed execution is called throughput. A high throughput is required for better performance of the system.
- 3) Fault tolerant: It is the ability of the algorithm to perform correctly and uniformly even in conditions of failure at any arbitrary node in the system.
- 4) Response time: It is the smallest amount of time, a distributed system executing a specific load balancing algorithm takes to respond.
- 5) Process Migration: It determines when a processor should transfer a process? Meaning whether to execute it locally or remotely.
- 6) Resource Utilization: It is the degree to which the resources of the system are utilized. A good load balancing algorithm provides maximum resource utilization.

III. RELATED WORK

Round Robin Algorithm

The Round Robin algorithm works on random selection of the virtual machines. The datacenter controller assigns the requests to a list of VMs on a rotating basis^[3]. The major issue in this allocation is this that it does not consider the advanced load balancing requirements such as processing times for each individual requests and if the VM is not free then incoming job should wait in the queue.

Throttle Algorithm

Throttled algorithm is completely based on virtual machine. It maintain a record of the state of each virtual machine (busy/ideal), if a request arrive concerning the allocation of virtual machine, throttled load balancer send the ID of ideal virtual machine to the data center controller and data center controller allocates the ideal virtual machine^[4].

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^[5].

Active Monitoring Algorithm

Active monitoring load balancer algorithm which maintains information about each VMs and the number of requests currently allocated to which VM. When a request to allocate a

new VM arrives, it identifies the least loaded VM. If there are more than one, the first identified is selected. Active VM Load Balancer returns the VM id to the Data Center Controller the data Center Controller sends the request to the VM identified by that id. Data Center Controller notifies the Active VM Load Balancer of the new allocation.

VM-Assign Algorithm

VM-Assign Load Balancing Algorithm allocates the incoming requests to the all available virtual machines in an efficient manner. It checks for least loaded VM. Then if next request comes then it checks from VM table, if the VM is available and it is not used in the previous assignment then, it is assigned to that VM.

Randomized Algorithm

Randomized algorithm uses random numbers based on a statistic distribution to choose slave processors. For particular special purpose applications Randomized algorithm gives the best result compared to all available load balancing algorithms^[6]. This algorithm works well in case of processes are of equal loaded. It does not maintain deterministic approach. It works well when Round Robin algorithm generates overhead for process queue.

Central Manager Algorithm

In this during each iteration, central processor will choose a slave processor for assignment of a job. The central processor is having knowledge of all slaves' load and choosing of node is performed based on this information^[7]. The chosen node will always have the least node in the system. The exchange of the load information will create very much inter process communication which will result in poor performance of the system by generating bottleneck at central processor.

Threshold Algorithm

In Threshold algorithm when a new process is generated it will be assigned directly to the machine where it is created. For selection of first processor for any process no remote messages are exchanged and the decision is taken locally. Each processor maintains a copy of the system's load. There are three levels to describe the load of a processor: under loaded, normally loaded and overloaded^[9].

IV. COMPARATIVE ANALYSIS

The main issue with round robin algorithm is it does not consider processing times for each individual requests and if the VM is not free then incoming job should wait in the queue. Throttled algorithm doesn't produce Better response time and efficient utilization of resource. In equally spread current execution load the improvement in response time and the processing time and no virtual machines are underutilized. Due to this it reduce in the virtual machine cost and the data transfer cost. Active Monitoring Load Balancing algorithm in that it does not produce better make span some other parameter like bandwidth, memory can be used to obtain the utilization. VM-Assign load balancing algorithm is use last

iteration in that additionally also check minimum execution time of virtual machine. Randomized Algorithm does not maintain deterministic approach. It works well when Round Robin algorithm generates overhead for process queue. Central Manager Algorithm depend on the center processor so it has difficult to manage center unit.

CONCLUSION

Each method is having its own advantages and disadvantages. So any method that is used with proper application will provide better result. For balancing load user priority, task length is used. But achieve better make span and improve the efficiency for balancing the load other parameter will be consider like minimum completion time, cost, deadline.

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