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Analysis of Existing Load Balancing Techniques in Cloud Computing

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Abstract: ***Cloud Computing is an evolving computing technology. Main goals of cloud computing is to provide various services to the users like share various type of information and data, calculations, and it gives transparently service over a mountable nodes of network. Cloud computing uses the open environment to store the data and for distributed resources in cloud network. Load balancing is the vital matter in the cloud storage network. Load balancing provide a procedureby which we distribute the dynamic workload across all cloud network nodes equally to escape a condition where various network nodes are greatly loaded while some other node are futile or doing slight work. In cloud system the resources are distributed to all computer nodes fairly and in efficiently manner. If a node has extra workload as comparison of other nodes then we use load balancing techniques or process for transferring the extra load of nodes to others networks node. Some existing scheduling algorithms can preserve load balancing. This paper provides review of various load balancing algorithms in cloud computing.***
Key Words: Cloud computing, load balancing, Round Robin, Randomized, hill climbing stochastic.

I. INTRODUCTION

Now a days the Internet technologies is increasing very fast and is being used largely, with it Cloud Computing come to be a greatest average area of engineering and academic world since it is an evolving new computing skill mechanism. For various services as guarantee of QoS, high scalable rate the Computing Cloud offer a set of networks which facilitated above given services, and provide ordinarily adapted, economical computing organizations on affording to demand of organization or group of organizations, which could be retrieved and used in a humble, informal and common way .

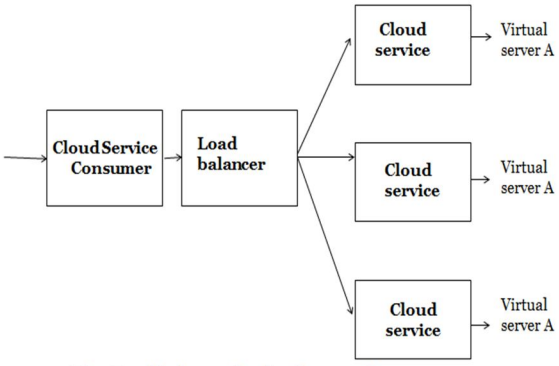

Fig. Load balancer in cloud computing

II. LOAD BALANCING

In cloud computing a CSP (Cloud Service Provider) is used in load balancing for distribution of resources across all the server, datacenters and hard drives used in the network system of cloud the CSP work as ISP. It allots all application requirements across any number of application distributions nodes which is Positioned in different data centers. Load balancing can be generally characterized into numerous techniques. These are: Integrated or decentralized, active or static, and periodic or non-periodic.

In cloud computing environment, some resources are heavily loaded while some other resources are idle or have little work its main reason is random arrival of task and random utilization of CPU service time loaded the random arrival of tasks with random utilization of CPU service time so, in cloud computing load balance and resource control is main key challenging issue. To achieve minimum response time, less energy efficiency, optimal resource utilization and remove overload of a node it provide a procedure to

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allocate workload across multiple computers, or nodes .The main purpose of load balancing is to improve performance by balancing load amongst various resources viz. network links, disk drives and central processing units. Different load balancing algorithms are used to distribute load on to different various systems.

III. METRICS FOR LOAD BALANCING IN CLOUD

Different metrics arise in existing load balancing techniques in cloud computing are discussed below-

A. Scalability

is the factor in which identifies the performance of an algorithm in load balancing for a system with several finite numbers of nodes .This also need to be improved.

B. Resource Utilization

To achieve efficient load balancing the checking of utilization of resources is play most important role.

C. Performance

In cloud system main and important parameter is performance which is used to fined overall efficiency of all network of cloud system**.** This is also enhanced at a reasonable cost, e.g. reduce task response time.

D. Response Time

is the main metrics in which check the total amount of time taken to respond by a particular load balancing algorithm in a distributed computing system. This parameter is better when it should have minimum value.

E. Overhead Associated

when implementing a load-balancing algorithm determines the amount of overhead involved. Overhead is issue its main reason is the movement of task from one node to another and communication between inter-process and inter-processor. It minimized or removes when load balancing method work efficiently in cloud system. Before balance the requests of resources and its utilization it is necessary to identify main aim of load balancing algorithms which used in cloud system to balance the load.

These main aims are

1) Expense tag efficacy: The main and first goal of the algorithm is give the performance at experimental cost

2) Scalability and tractability: The algorithm which used in load balancing must be scalable and flexible according to size of network and system for e.g. if it is implemented in distributed system in this system network size is large so it change n/w to n/w or node to node.

3) Priority: The algorithm must be based on priority Algorithm provides better service so; algorithm selects the high priority jobs first. So Priority of the resources or jobs is most essential part of algorithm used in load balancing.

IV. LOAD BALANCING ALGORITHMS

A. Token Routing

The token routing algorithm is proposed to minimize the cost of a system by using tokens which is move around the system. If cloud system is large scalable then the system agents cannot have the sufficient information of how distributing the work load due to lack of communication bottleneck. So it is not fixed how many workloads are distributed among the agents. This is the main disadvantage of the token routing algorithm to remove this drawback use a heuristic approach in token based load balancing. This algorithm has a good feature it provides the fast and effective routing decision. This algorithm is totally based on agent concept but it does not have any idea of the neighbor's working load and not information of their global state. Where to pass token again make this decision his own knowledge base. This knowledge based decision based on the earlier received tokens information. So any communication overhead is not generated in this methodology.

B. Round Robin

In this procedure, the processes are distributed among all processors used in cloud system. Round robin order is used to assign each process to the processor. The allocation of remote processors does not affect the process allocation order which is maintained

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locally. All processor have equal work load distributions but the job processing times of each processor is different or not equal. So that it is main reason at any point of time some nodes remain idle and other may be heavily loaded. Web servers based applications use this approach because all Http requests are of similar nature and it is distributed equally.

C. Randomized

Nature of Randomized algorithm is static type. As part of the algorithm, every process can be handled by a node n with associated probability of p Remote processor allocation is independent how process allocation order is maintained for each processor in cloud system. When all processor have equal workload this algorithm works. If loads are have different computational complexities then problem arise in this algorithm. Deterministic approach is not maintained by Randomized algorithm. When Round Robin algorithm produces overhead in queue of process then this algorithm works well.

D. Central queuing

Central algorithm based on the principal of dynamic distribution. In this algorithm all process is handled by central manager. Central manager control the activity queue if any activity find out in ready state then central manager answer this request otherwise queue waiting for new activities.

E. Connection mechanism

Dynamic scheduling algorithm contains least connection mechanism on which load balancing algorithm is based. For estimation of load, there is a necessity to count the connections used by each server. This is done by the load balancer. The number of connection increases or decreases depending on either thee connection is dispatched or finished. It becomes very time taking and complex to measure the performance. In this situation, simulation is used.

F. Equally Spread Current Execution

Priority mechanism is used in this. It checks the size first then, distributes the load accordingly. A virtual machine is used which handles the task easily. This machine takes very less time and it throughput is maximized. It uses the concept of spread spectrum technique.

G. Throttled Load Balancing

Concept of virtual machine is used in this technique. A request is made by the client who checks any ideal virtual machine is available or not that can access the load easily and can perform the operations as commanded by the user. The main concept behind this algorithm is that a suitable virtual machine is found out.

H. A Task Scheduling Algorithm Based on Load Balancing

To meet the dynamic requirements, two level task scheduling algorithm is used. The resources are properly utilized. The task response time is improved by mapping tasks to virtual machines the virtual machines further host them. In this, the resources are properly utilized. And the overall performance is improved.

I. Biased Random Sampling

This algorithm investigated a distributed and scalable load balancing approach is found out which uses the concept of random sampling. It balances the load over all nodes across the system. Construction of virtual graph is made. In the virtual graph, the connectivity between each node is assured. All the servers presented in the graph are treated as node. The load balancing scheme used here is fully decentralized load scheme is used in this biased random sampling technique. As the number of nodes increases in the graph, the performance of the throttled load balancing technique is degraded.

J. Min-Min Algorithm

This algorithm works on a set of all unassigned tasks. All tasks are assigned with completion time. The minimum value is found out. According to that minimum value, the tasks are assigned to any resource. Then the task is scheduled accordingly. The execution time is updated every time. The tasks which are executed are removed from the queue. This procedure is followed till all the tasks are assigned to machines. Starvation is the main drawback of this min -min algorithm.

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K. Max-Min Algorithm

It works same except following things. In this minimum value is found out then maximum value is chosen among all the values. The maximum valued task is assigned to corresponding machine. Max-Min is almost same as the min-min algorithm except the following: after finding out minimum execution times, the maximum value is selected which is the maximum time among all the tasks on any resources. Then according to that maximum time, the task is scheduled on the corresponding machine. Then the execution time for all other tasks is updated. The tasks which are executed are removed from the waiting queue.

L. Hill Climbing Algorithm

Hill climbing algorithm used the concept of virtual machine server. First of all create an index table of Virtual Machine servers (VMs) and define the status of the virtual machine. It has two states i) VM BUSY
ii)VM AVAILABLE When a new job arrives in cloud system .At this start time all VMs are in available state. After that a VM id is generate randomly for every process for next allocation generate a query. To get the status of the particular VM allocated to the process and parse the allocation table. Return the VM id and send a request to the VM identifier if any VM is found unallocated using VM id.

M. Genetic Algorith

When a job arrives in cloud system for this process to find inclusive optimum processor genetic algorithm is used for this purpose. In global optimum solution rescheduling of jobs is not considered and job of arrival is considered as in linear nature.

1) *Initial population generation:* Genetic algorithm will be based on static bit string representation of a solution. Therefore, all solutions are encoded into format of binary strings. We have many chromosomes for an initial solution we select randomly from population.
2) *Crossover:* Crossover is used to select the best fitted pair of chromosomes for individual it is the main objective of crossover. The fitness function is used to calculate individual chromosome fitness value. To undertake a random single point crossover value the chromosomes pool is used, which is based upon the crossover point, the one side of crossover exchanged with the other side crossover portion which is lying on site. To produces a new pair of individuals use above process.
3) *Mutation:* Mutation is used for mutation probability which picked from a very small value (0.05). Chromosomes bit is depend upon the mutation\value; those bits are toggled from 1 to 0 or 0 to 1. The mutation output is used to create or generate a new mating pool which is ready for crossover procedure. The Genetic Algorithm repeated this process until either the fittest chromosome (best result) is not found or the conclusion state is exceeded which is also depending upon maximum number of iteration. To encode into binary string a population of processing unit is randomly initialize and encode it.
4) *Honeybee Foraging Behavior:* This algorithm gives some inspiration to the self-organization. By using local server actions the global load balancing is achieve by Honeybee. If the system diversity is increase the system performance is improved. But a problem is arising when the system size is increase the throughput of system is not increased. This algorithm is best suited when the diverse population service is required.

N. Active Clustering

Same nodes are collect in a single group and then these nodes work together. It works like as self-aggregation load balancing technique where a network is rewired to balance the load of the system. Systems optimize using similar job assignments by connecting similar services. When resources quality is improved then automatically performance of system are improved. If resources are used effectively then the throughput of system is also improved.

O. Ant Colony Optimization

To overcome the problem of difficult combinatorial Optimizations a multi-agent approach is used that is called Ant Colony Optimization algorithm. TSP (travelling salesman problem) and QAP (quadratic assignment problem) are based on multi agent process. Ants not think for individual. So Ant's activities is provide a message how to persistence in the colonies.

V. CHALLENGES IN LOAD BALANCING

A. The scientific communities define some scientific challenges which are persisting unsolved mainly load balancing challenges

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are:

1) Automated service provisioning: Cloud computing provide a key feature of elasticity; in which service/resources are allocated or released automatically to the user when it required. How keep the record of resources which is used by same traditional systems which have same performance and use optimal resource how decide which resource is use or release?

2) Virtual Machines Migration: Due to virtualization each and every VM seen as a file or set of files if a when any PM is greatly overloaded and want to unload for this unloading move VM to various physical machines. A problem is arising how we can distribute the load dynamically when moving the virtual machine to physical machines. How avoid blocks in Cloud computing systems?

3) Energy Management: The adoption economy of scale is the main profits in cloud system. For allowing global economy energy saving is a basic point which allows how a reduced providers will be support set of global resources that each process as sits own resources. So each has keeping acceptable performance. How can we use a part of datacenter?

4) Stored data administration: Management of stored data in a n/w or thorough a n/w which increase exponential establishments that provide the source to the individuals which manage own data at various years points. The main challenge in cloud computing is how to manage the management of data storage. So when a process wants to maintain access very fast. How can optimum storage data is distribute in cloud system.

5) Manifestation of small data centers for cloud computing: Small data center are useful than large data center because it have various issue such as more energy consumer and expensive. Small data centers are best it provide best diversity computing with less energy consumes. The main problem occur at large scale in cloud computing with optimal distribution with sufficient response time.

VI. CONCLUSION

Load balancing is a major issue in cloud system. It provides a way how we utilize the resources and how improving the performance of the system. By using efficient scheduling and resource allocation strategies the existing algorithms provide better load balancing. The above mentioned algorithms provide various factors which is also very helpful in enhancement of cloud computing services Those factors are better resource utilization, high performance, scalability, better response time etc. In this paper review on existing load balancing stochastic hill climbing, genetic algorithm and ant colony optimization etc. is used for load distribution in Cloud computing system. The Round Robin, First Come First Serve, Honey Bee Foregoing and Active Clustering approaches are compared by using soft computing techniques. Various parameters are used for to be studied for further enhancement.

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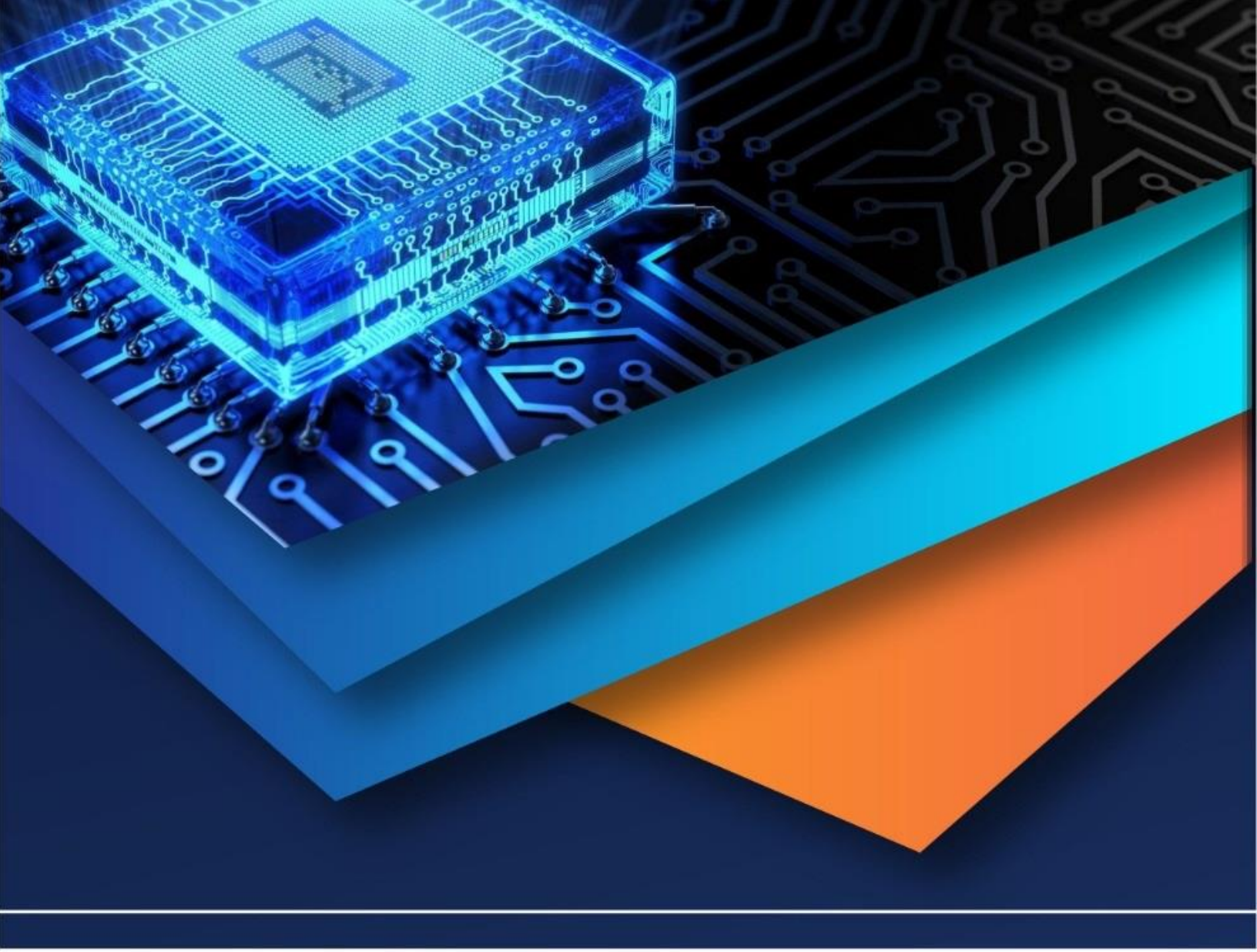

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