# Survey Paper on Load Balancing Algorithms

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**Abstract: Users are accessing the web services continuously and awaiting prompt response of the web servers. Load balancing is the emerging technology which enables the clusters to evenly distribute the incoming traffic such as request for services among the number of services for better experience of services. Traditionally, load balancing provides efficient use of CPU, resources, services, etc.**
**Cloud computing is trending as a new technology for administration, controlling, and accessing great number of distributed computing services over the network. Load balancing is the biggest challenge among the distributed systems. Proper load balancing help in solving server down problem, configuring scalability, reducing resource allocation and avoiding jams etc. This paper describes a survey on load balancing algorithms in cloud computing their related advantages, disadvantages and execution standards are discussed in detail.**

*Index Terms:* **Cluster, Cloud computing, Load balancing, Nodes, and Services**

## I. Introduction

This Load balancing is the process of allocation and reallocation of the load among the available resources with the purpose of high output of availability of service .Load balancing is used to distribute workload among the available clusters evenly. It efficiently distributes the incoming traffic. This traffic might be in the form of request for the services. Load balancing results in high availability of services, scalability of throughput, high response time, high performance and minimizing the cost. Load balancing is customer service-oriented algorithm or process. As the count of request for the same service on the same server/cluster increases then with the help of load balancing the load on the server is redirected to the other servers. Load balancing are specially used in the cloud computing services. In the cloud computing the service is named as Load Balancing as a Service (LBaas).There are two types of Load Balancing:
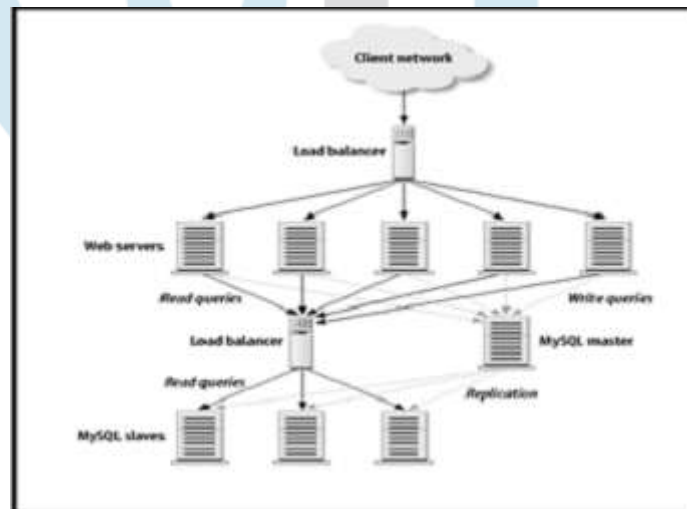


**Fig 1: Overview of load balancing**

● **Static Load Balancing:**

Static load balancing is the method of redirecting workload with the existing information of the system. It doesn't focuses on the current data rather than the existing or available data. However, static load balancing algorithms have a disadvantage that the jobs are allocated to the processor or machines only after it is created and that jobs cannot be moved during its running to any other machine for load balancing.

● **Dynamic Load Balancing:**

In Dynamic load balancing it examines the modifications or changes made in the system at run time according to that it redirects the work. These algorithms are complex but have better tolerance and have better overall performance.

**II.**       **Architecture of Load Balancing**
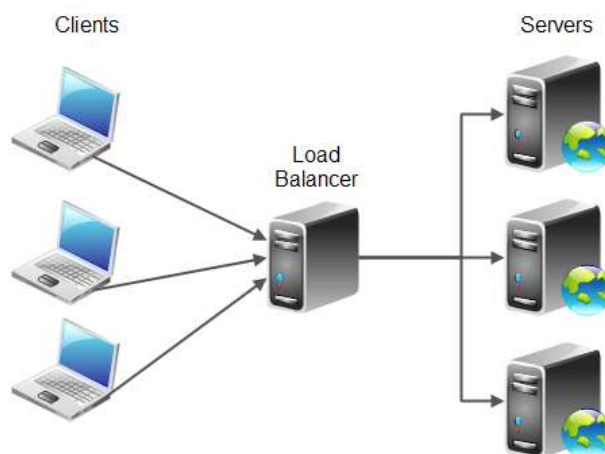


**Fig 2: Architecture of load balancing**

●       **Cloud computing**

Cloud computing is a modern technology in the computer field to provide services to clients at any time. In cloud resources are distributed all over world for faster servicing to the client. In case of cloud computing load is consider as different resources allocated to the clients. Task of allocation is server as services through the instance of resources. Cloud computing services are provided on the lease bases. Clients will only pay for what they use. Cloud computing basically provides three types of services such as Infrastructure as a service (IaaS), Platform as a service (PaaS), Software as a service (SaaS).
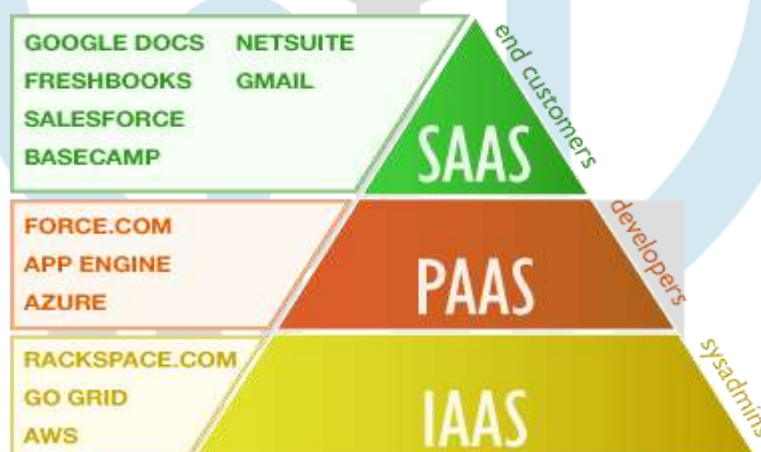


**Fig 3: Cloud Computing Services**

●       SaaS (Software-as-a-Service)

SaaS or software as a service is a software disbursement model in which applications are hosted by a merchandiser or dealer and made available to end user over a network (internet). Through internet this service is available to end user at everywhere in the world.

●       PaaS (Platform as a Service)

Platform as a service, is referred as PaaS, it provides a platform and context to allow developers to create applications and services. This service is hosted in the cloud and accessed by the end user through internet.

●       IaaS (Infrastructure as a Service)

IaaS (Infrastructure as a Service) is one of the basic service model of cloud computing along with the PaaS (Platform as a Service). It provides access to computing resources in a virtualized environment "the cloud" on internet.  It provides computing architecture like virtual server , network connections, bandwidth, load balancers and IP addresses. The number of hardware resource is extracted from different servers and networks.  This provides garrulity and trust ability to IaaS.

## III.        Load Balancing in the cloud computing

Load balancing in cloud is the algorithm with the help of which it uniformly distributes the load among the active nodes. It provides the better use of resources, availability of server, better satisfaction of customer. In the cloud computing the requests are considered as the amount of resources like CPUs.
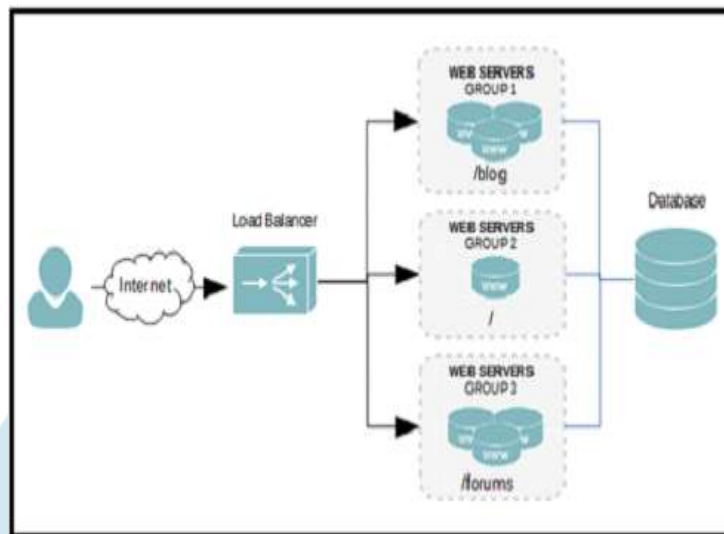


**Fig 4: Load Balancing In cloud computing**

## IV.        Benefits of Load Balancing

● **Scalability:**

Load Balancing provides the facility of scalability which lead to change in the size. It provides scalability in term of cluster.

● **Redundancy:**

It provides the same server or the replica of the server which guarantee the same output as that of the original server.

● **Flexibility:**

Flexibility is provided in term of the administrative authentication. It provides the administration of the server anytime whenever the service is needed it is not dependent upon the uptime of the website.

● **Security:**

The security is provided by assigning single IP to the server which reduces the chance break points or checkpoints in the case of active as well as passive attacks.

## V.        Methodology

● **Round-Robin Algorithm [1]**

It is basically the compile time load balancing algorithm. It uses the round robin method for assigning task. Initially it selects any node inconstantly and the assigns jobs to remaining nodes in round robin fashion. Tasks are assigning in circular manner rather than the priority basis. But issue with this algorithm is that it provides discontinuity. This limitation is solved in the weighted round-robin algorithm .In the weighted round-robin algorithm some particular weight is allocated to the node .If there is same allocation of weight, each node receive some jams. This algorithm is not taken because prior guess of execution time is not possible.

● **Opportunistic Load Balancing Algorithm [1]**

This algorithm acts fast with the insufficient tasks in arbitrary order to the presently available node. Each  task is assigned to the node irregularly. It provides load balance records without good results. The task will process in slow in order because it does not count the present execution time of the node.

● **Min-Min Load Balancing Algorithm [1]**

This is static load balancing algorithm so the definite related to the tasks is friendly in advance. In this type of algorithm the cloud manager review with the jobs having minimum execution time by assigning them to the processors conventionally to the ability of plenary the job in explained completion time at the starting stage.

● **Honey Bee Foraging [2]**

Honey Bee Foraging algorithm is originated from the behaviour of honey bees for searching and gaining food. To check for variation in demand of services, servers are combined under virtual servers, having its own virtual service queues. Each server serving a request from its pool calculates a benefit or prize on basis of CPU application, which is related to the standard that the bees show in their wave dance and advertise on the advert board. Each of the servers takes the role of either a cheat or a spy.

● **Active Clustering [2]**

Active Clustering algorithm works on the theory of collecting the same nodes and work simultaneously on the free groups. A set of processes is continuously executed by every node present on the network. At the beginning, any node can become founder and selects another node from its neighbours to be the intermediate node satisfying the criteria of being a different type than the former one. The matchmaker node then forms a relation between adjacent of it which are similar to the pioneer. The mediator node then yanks the relation between itself and the initiator.

● **Ant-Colony Optimization Based Load Balancing Algorithm**

Aim of this algorithm is to find best and feasible route from the food and the colony of ants depending on their basic characteristics. This technique sets efficient distribution of task load between the nodes. When request is allocated the ant starts action towards the root of food from the source node. Regional Load Balancing Node (RLBN) is selected in Cloud Computing Service Provider (CCSP) as a source node. Ants preserves cat log the every node they visits ant maintain their data for future decision making .Ant saves the track during their movement for other ants to select next node The ardency of track can change on the bases of specific characteristics like spacing of food, quality of food etc. When the tasks are completed the track is modernized. Each ant forms their personal result format and it is later on built into a complete solution set. The ant again and again checks a single result set rather than updating their result. By the ant track trials, the solution set is continuously updated.

## VI. Comparison of Load Balancing Algorithm

Round Robin algorithm refers to the statics allocation of services. The key feature of this algorithm is it treats the entire server equally. And hence, it is the disadvantage that no process is known already.

To overcome the disadvantage of the Round-Robin algorithm opportunistic load balancing algorithm came into exists. It basically depends on the system framework which does not allow any node to be in idle state. But it also has disadvantage like it node still remain busy even if the execution time has been finished which leads to waste of time as well as space.

Min-min load balancing algorithm came into exists which overcomes the disadvantage of opportunistic load balancing algorithm. Nodes those are in busy or waiting queue are identified in this algorithm. Whenever the small number of requests is there it gives the better performance. But this algorithm has disadvantage that it leads to the starvation i.e., running time of any process which takes maximum time it need to wait for longer period.

The disadvantage of starvation is overcome by the algorithm Honeybee Foraging Load Balancing Algorithm. It supports the dynamic allocation. As the name suggest its follows the behaviour of honeybees' and their method of collecting honey. Its advantage is that it reduces the response and waiting time of virtual machines .But the disadvantage of this algorithm is that it decreases in throughput whenever the number of resources increases.

Active clustering is also the run-time algorithm of load balancing. It combines the node together. Primarily it works according to the array which stores the similar type of elements. Similarly active clustering groups the similar nodes together. But this algorithm gives low performance whenever the pool of resources increases.

The best algorithm till now is the Ant-Colony Optimization Based Load Balancing Algorithm, Based on actions of ants and seeking an optimal path in collecting their food. This has the advantage like; Distributes the workload among nodes in efficient and optimal job scheduling is achieved.

## VII. Conclusion

Load balancing is a large concept and plays a vital and important role in server managements. We have examined and compared different load balancing algorithms, other load balancing algorithms can also be utilized. Balancing the network load uniformly is one of the valid jobs in cloud computing. The ant colony optimization works better and divide the workload in an effective order when compared to other algorithms.

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