A Survey on Load Balancing in Cloud Computing Using Optimization Technique

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Abstract—**The main goal of this work is to create a system that uses the improved Ant Colony and Artificial Bee Colony (AB) algorithm to provide load balancing for the cloud computing technology. This algorithm is a combination of Ant colony algorithm and Artificial Bee colony algorithm. It will improve the existing AB algorithm. There are certain limitations in the existing algorithm. This algorithm will overcome those limitations and provide good optimal solution for effective load balancing.**

Keywords—**Ant Colony Algorithm; Artificial Bee Colony Algorithm; Load Balancing.**

I. INTRODUCTION

Cloud computing is one of the fastest growing technology in the world. It is the advanced technology which required large sized infrastructures. In recently with the help of new inventions cloud computing is used for many purposes. But the intention of using the cloud is to store the resources such as hardware and software resources instead of storing it in the local machines. Due to these reasons this technology is used in many organizations.

1.1 Basic forms of cloud

Cloud is broadly divided into three forms.

1.1.1 Private cloud

It is one of the infrastructures provided by the cloud technology. It requires separate infrastructure that is designed specifically for an organization. The data stored is dedicated only for clients or employees in that organization or institution. These data are shared only among the employees. Due to this reason there are more security vulnerabilities. This is solved with the help of data centers, compared to other two is has more security issues.

1.1.2 Public cloud

A Public cloud is an infrastructure developed an owned by the third party cloud service providers. The user or customers can use this on the basis of certain amount. Here the data center is shared for the multiple users. If it is not shared it is called as private cloud. Confidentiality is one of the major concerns in this cloud. The cloud service providers are increasing day by day.

1.1.3 Hybrid cloud

As the name hybrid states that it is a combinations of two clouds. It is created by combining the private cloud and the public cloud. This type of cloud has the ability to change to private or public based on the requirement in the size. This process is called as cloud bursting. Due to these reasons it also faces both security and confidentiality issues.

1.2 Service models of cloud

The cloud computing provides three different services as per the NIST (National Institute of Standards and Technology).

1.2.1 Infrastructure as a service (IaaS)

It is a kind of infrastructure provides the virtual resources to the users. These virtual devices are provide to the users with the tools to operate. It provides high performances than others.

1.2.2 Platform as a service (PaaS)

It provides computing platform as a service. This cloud computing platform consists of operating system, database and webserver. In this service the user don't manage the operating systems they have control over only the deployed applications.

1.2.3 Software as a service (SaaS)

This service provides the application software and the databases. Here the user cannot access over the other functions. It is completely based on the user needs.

1.3 Load Balancing

The load balancing is segregation of work between different resources of the system. The resources include computers, clusters, network lines etc. The objective of the load balancing is to increase the throughput time and reduce the response time. It requires specialized software and hardware such as Domain Name System (DNS) and multilayer switch etc. Load balancing archives more throughput because other systems uses a single node for certain process but load balancing uses multiple nodes to achieve the result with minimum response time.

II. RELEATED WORKS

Kun Li [1] proposed that the following load balancing concept is based on the ant colony algorithm and the first come first serve basis. The aim of this work is to minimize the work span.

Kumar Nishant [2] proposed load balancing in cloud using ACO algorithm. Before providing final solution, it computes result set for every individual nodes. It is cost efficient as they update the single result continuously rather than own result set. It provides optimal distribution of nodes and act as a barrier to the dead nodes. In this algorithm Regional load balancing node acts as head node which is permanent. If the head node does not function properly then the node

can be replaced by neighbor nodes so that nodes are traversed in direction network of cloud computing service providers .Ants are originated from the head node which finds location of overload and under loaded servers and updates pheromone table. The main advantage of this algorithm is that it provides optimal solution for both under loaded and overloaded nodes.

Haozheng Ren [3] proposed load balancing algorithm in cloud computing. It uses Ant Colony and BEE algorithm to balance the loads and improve throughput. It uses two modules load detection and load scheduling .In load detection load information are calculated using load calculator and information is updated to the database using load updater. The proposed algorithm can be implemented in different environments. The advantages of this algorithm are Reduction in time of user requests, maximum throughput, high scalability, reduction in overloaded of servers.

Jing Yao [4] proposed strategy of balancing load using artificial load balancing algorithm. The algorithm improvise existing artificial load balancing algorithm by replacing requests and increases steadiness of load and scalable which increases throughput. It satisfies conditions required for load balancing which reduce time. Required for sharing information between nodes and it can be run in different environments. Improved algorithm can be implemented in heavy loaded server as it process more number of request at a time. The proposed algorithm provides average throughput when the number of nodes increases. But this algorithm provides stable nodes. When compare to the existing algorithms.

Sheeja Y S [5] proposed the cost effective balancing of node using honey bee behavior in cloud. It provides balancing of nodes by assigning task from overloaded server to under loaded Server or load which is idle. For single overloaded server it uses honey bee algorithm but for multi over loaded server it uses strategy of Pareto dominance which is cost effective. Assigning of loads are based on cost of virtual machine and deployment time of tasks but not based on the priority of tasks. Based on the Pareto dominance relation optimal nodes are selected by comparing cost of virtual machines to other virtual machines and run time between the virtual machines. The minimization function is calculated based on the cost and the virtual machine which has minimum value of minimization function then the node is selected. The advantages of the algorithm are cost efficient and balances independent nodes.

Ekta Gupta [6] proposed a technique for load balancing using ACO algorithm in cloud data center. The proposed algorithm identifies under loaded and overloaded server and implements operations of load balancing between identified servers of data center. It uses redistribution policy in which to calculate the number of requests. It handles large number of requests in data center with maximum utilization of resources. The main advantage of this algorithm it ensures reliability, maximum utilization of resources, handles large number of requests and reduces response time for serving multiple requests at a time.

Wei-Tao Wen [7] proposed strategy of load balance in cloud based on Ant Colony Optimization algorithm. It provides optimal method to balance loads and optimize use of resources. It checks utilization of resources and then it launches migration. During monitor stage it check both past and present states of migration to avoid overloaded of server. This algorithm uses positive traversing strategy and negative strategy .In positive strategy it traverse through physical machines in which pheromone value is high. In negative strategy it traverse less intuitively through physical machines in which pheromone value is high. Priority is based on the average load. As the average load increases priority given to the load also increases. The drawback is that it requires high cost for live migration of the resources.

K R Remesh Babu [8] proposed load balancing of task in cloud using bee colony algorithm. It provides distribution of loads by migrating from overloaded to under loaded nodes .If nodes are overloaded they are removed and emigrated to under loaded nodes based on the scavenging behavior of honey bee in which balance the nodes. Overloaded nodes act as honey bees and under loaded act as food. It provides significant solution in Quality of Service. This algorithm uses various approaches such as finding load, load balance decision, Virtual Machine grouping and transfer of tasks. Standard Deviation is calculated from load and if its value is higher than threshold then only Load balance is occurred. Task transfer preformed only when demand meets supply. The main advantage of this algorithm is that it makes span, risk of imbalance and increasing of migrations.

S.Yakhchi, [9] proposed a method using load balancing method in cloud computing environment. It provides a solution for the enormous power reduction. In this algorithm they provided an effective way named ICA-MMT to manage power consumption of the data centers. It overcomes the previous drawbacks of LR-MMT, Bee-MMT.

B.Gothi1 [10] proposed an efficient approach for load balancing Using dynamic Ant Colony and Artificial Bee Colony (AB) algorithm in Cloud Computing in which are assigned based on the pheromone table. Optimal loads are Balanced based on the fitness function and threshold values. AB Algorithm equally distributes load on all nodes and finds imbalanced node on distance based and updates pheromone table. The proposed algorithm provides balance from overloaded to under loaded and effective load balancing.

III.   CONCLUSION

This work provides the best optimal solution thereby it simultaneously decreases the load in this developed system. This is done by improving the existing AB algorithm. It drastically reduces the load of the other systems thereby providing a better flow of work for the systems.

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