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LOAD BALANCING IN CLOUD COMPUTING

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Abstract- From a decade ago there has been a quick advancement in the utilization of web and its applications. Distributed computing is otherwise called internet based computing where we lease the registering assets over the web. It is a compensation for each utilization show where you pay for the measure of administrations leased. It gives various focal points over the traditional computing. With cloud computing increasing such an enormous energy now days, the workplace culture is notwithstanding changing the same number of individuals now very much wants to telecommute as opposed to going each day to office. There are three primary administrations gave by cloud that are SAAS, IAAS and PAAS. Load balancing is an extremely real issue confronted now days in cloud environment so that the assets are proficiently used. There are many load balancing algorithms accessible that are utilized to balance the load of the customer demands. In this paper we will propose an approach which is a blend of Honeybee Foraging Algorithm, Active clustering algorithm and Ant Colony Optimization.

Index Terms- Honeybee Foraging Algorithm, Active Clustering, ACO, Cloud Computing

I. INTRODUCTION:

1.1 Introduction

Cloud computing is not another thought in specialized world but rather it is a forthcoming innovation. Grid Computing, Utility Computing and dispersed frameworks have direct association with the Cloud Computing. It can be expressed that framework processing goes about as the spine to Cloud Computing. Cloud computing gives virtual assets and administrations with the goal of diminishing expense. Cloud computing is actualized and famous generally because of its properties of giving virtualization and reflection.

As cloud computing is growing fastly and more services and better results are demanded by the clients, so for the cloud, load balancing has become a very interesting and important research area.

The area of Cloud computing is getting more hot, at the same time, a more intensive task waiting to be processed, how to allocate cloud tasks reasonably so that the nodes in the cloud computing environment can have a balanced load become more critical, this task allocation strategy is called load balancing.

Load balancing has a significant influence on the performance in cloud computing as load balancing aims to enhance resource consumption, get the most out of throughput, reduce response time, and avoid overload of any single resource. Better load balancing makes cloud computing more efficient and improves user satisfaction. Therefore, "it is the process of confirming the evenly distribution of work load on the pool of system node or processor so that the running task is accomplished without any disturbance". The objectives of load balancing are to maintain the stability of the system, improves the performance, build the system which is fault tolerance and provide future variation in the system such as security updates, releasing up customers time and resources for further tasks as well. Cloud load balancing is a type of load balancing that is executed in cloud computing which can be completed individually as well as on grouped basis. There are various algorithms designed for balancing the load among different tasks. After completing the literature survey, it can be conclude that most of the load balancing algorithms suggested so far are complex. In Round robin scheduling algorithm method, it considers only current load on each virtual machine. This is static method of load balancing, static load balancing method offer simplest simulation and checking of environment but failed to model heterogeneous nature of cloud. The other algorithm known as throttled is completely based on virtual machine. In this algorithm, "client first ask the load balancer to check the correct virtual machine which access that load simply and execute the operations which is given by the user or client". Escel algorithm says that load balancer is necessary for monitoring of jobs which are requested for execution. The responsibility of load balancer is to queue up these jobs and assign them to different virtual machines. The balancer regularly looks over the queue for fresh jobs and then allots those jobs to the list of free virtual server. The list of tasks that are allotted to virtual servers are also maintain by the balancer, which supports them to recognize that which virtual machines are free and required to be allotted with fresh jobs. The name suggests about this algorithm that "it work on equally spreading the execution load on different virtual machine". According to our research outcome of this algorithm in terms of response time and data center request servicing time is very low in comparison of other two algorithms.

Therefore with these issues in mind our paper presents an optimized load balancing system for cloud using Honeybee Foraging Algorithm, Active clustering algorithm and Ant Colony Optimization. Using these methods, system will be less complex and time will be reduce for client request as well as for data centre request servicing time.

1.2 Honeybee Foraging Algorithm

The main idea behind the Honeybee Foraging algorithm is derived from the behavior of honeybees. There are two kinds of honeybees: finders and reapers. The finder honeybees first goes outside of the honey comb and find the honey sources. After finding the source, they return to the honey comb and do a waggle dance indicating the quality and quantity of honey available. Then, reapers go outside and reap the honey from those sources. After collecting, they return to beehive and does a waggle dance. This dance indicates how much food is left. This algorithm requires that each node to maintain a separate queue. This computation of profit on each node causes additional overhead but priority based balancing focuses on reducing the amount of time a task has to wait on a queue of the VM. Thus, it reduces the response of time of VMs. The disadvantage of this algorithm is that, it does not

show any significant improvement in throughput, which is due to the additional queue and the computation overhead. In above flowchart The tasks are to be send to the under loaded machine and like foraging bee the next tasks are also sent to that virtual machine till the machine gets overloaded as flower patches exploitation is done by scout bees. If we continue with honeybee foraging algorithm it becomes overloaded that's why we will use active clustering algorithm with this.

1.3 Active Clustering

Active Clustering is a clustering based algorithm which introduces the concept of clustering in cloud computing. The performance of an algorithm can be enhanced by making a cluster of nodes. Each cluster can be assumed as a group. The principle behind active clustering is to group similar nodes together and then work on these groups.

The process of creating a cluster revolves around the concept of match maker node. In this process, first node selects a neighbor node called the matchmaker node which is of a different type. This matchmaker node makes connection with its neighbor which is of same type as the initial node. Finally the matchmaker node gets detached. This process is followed iteratively. The performance of the system is enhanced with high availability of resources, thereby increasing the Throughput. This increase in throughput is due to the efficient utilization of resources.

1.4 ACO

A heuristic algorithm based on ant colony optimization has been proposed to initiate the service load distribution under cloud computing architecture. The pheromone update mechanism has been proved as a efficient and effective tool to balance the load. This modification supports to minimize the make span of the cloud computing based services and portability of servicing the request also has been converged using the ant colony optimization technique

ACO used in our proposed method for:

1. To develop an effective load balancing algorithm using

2. To balance the entire system load while trying to maximize and minimize the different parameters

1. Efficient to finding the overloaded node in minimum time

2. To balance the node with efficiency and maximum utilization of resources

II. RELATED WORK:

K Pathak, G Vahinde [01], Cloud computing is a recent advancement where in IT infrastructure and applications are provided as 'services' to end-users. Cloud computing is the delivery of computing services over the internet. It is always required to share work load among the various nodes of the distributed system to improve the resource utilization and for better performance of the system. So there may be load on VM's, for balancing the load we have two ways, one is allocation of resources and second is scheduling the task. In this paper we are comparing two well-known non-linear algorithm for load balancing in cloud environment for effective utilization of the system and proper servicing the client's request. We conducted our experiments on CloudSim simulator taking makespan as parameter for comparing the results of the different algorithm.

Anoop Yadav [02], Cloud computing, now a days is becoming the most demanding and evolving technology all over the world as cloud computing emphases on increasing the effectiveness of the shared resources as well as cloud resources are generally not only shared by numerous users but as dynamically re-allocated per demand. The use of network services are increased by cloud computing which is an internet based computer technology. The main difficulty associated to cloud computing

is the load balancing. The load can be characterized as a memory, CPU storage capacity, a network or delay load. It is always required to segments work load among the dissimilar nodes of the distributed system to advance the resource consumption and for enhanced performance of the system. This can support to evade the condition where nodes in the network are heavily loaded or under loaded. Cloud load balancing helps to enhance the overall cloud performance. This paper emphasize on a new hybrid approach and its comparison with various existing load balancing algorithms such as round robin, throttled, escel, and pso on the basis of overall response time, execution time as well as on the data centre request servicing time.

Yongfei Zhu, Di Zhao [03], In the area of cloud computing load balancing, the Particle Swarm Optimization (PSO) algorithm is neoteric and now praised highly, but recently a more neoteric algorithm which deploys the classifier into load balancing is presented. Besides, an algorithm called red-black tree which is aiming at improving the efficiency of resource dispatching is also praised. But the 3 algorithms all have different disadvantages which cannot be ignored. For example, the dispatch efficiency of PSO algorithm is not satisfying; although classifier and red-black tree algorithm improve the efficiency of dispatching tasks, the performance in load balancing is not that good, as a result the improved PSO algorithm is presented. Some researchers are designed to get the advantages of new algorithm. First of all, the time complexity and performance for each algorithm in theory are computed; and then actual data which are generated in experiments are given to demonstrate the performance. And from the experiment result, it can be found that for the speed of algorithm itself PSO is the lowest, and the improved PSO solve this problem in some degree; improved PSO algorithm has the best performance in task solving and PSO is the second one, the red-black and Naive Bayes algorithm are much slower; PSO and improved PSO algorithm perform well in load balancing, while the other two algorithms do not do well.

Geetha Megharaj, Dr. Mohan K.G [04], Load Balancing is the one of the most significant parts in distributed environments. As Cloud Computing is one of the best platform that gives storage of data in very minimal cost and accessible for all time over the internet, load balancing for the cloud computing has turned into a very interesting and important study area. Load balancing supports to get a high user satisfaction and usage of resource ratio by guaranteeing a proficient and reasonable allocation of each computing resource. There are numerous difficulties in the load balancing techniques such as security, fault tolerance etc. in cloud computing environments. Many researchers have been proposed several techniques to enhance the load balancing. This paper portrays an overview on load balancing schemes in cloud environments. We explore the diverse types of algorithms that is proposed by many researchers to solve the problem of load balancing in cloud computing.

Ren Gao and Juebo Wu [05], How to distribute and coordinate tasks in cloud computing is a challenging issue, in order to get optimal resource utilization and avoid overload. In this paper, we present a novel approach on load balancing via ant colony optimization (ACO), for balancing the workload in a cloud computing platform dynamically. Two strategies, forward-backward ant mechanism and max-min rules, are introduced to quickly find out the candidate nodes for load balancing. We formulate pheromone initialization and pheromone update according to physical resources under the cloud computing environment, including pheromone evaporation, incentive, and punishment rules, etc. Combined with task execution prediction, we define the moving probability of ants in two ways, that is, whether the forward ant meets the backward ant, or not, in the neighbor node, with the aim of accelerating searching processes. Simulations illustrate that the proposed strategy can not only provide dynamic load balancing for cloud computing with less searching time, but can also get high network performance under medium and heavily loaded contexts.

Anju Baby [06], Cloud computing is an entirely internet-based approach where all the applications and files are hosted on a cloud which consists of thousands of computers interlinked together in a complex manner. The HBB load balancing model is not assign task to proper virtual machine and also it does not consider the Quality of Service. In order to overcome the drawback of honeybee algorithm another algorithm called PSO algorithm is used. In PSO algorithm task will be assigned to the virtual machine in best fit manner. i.e task will check all the virtual machine and assigns the task to proper virtual machine which will have least memory wastage as we have taken that as the QoS In this project comprehensive multi-objective model for optimized task scheduling to minimize task completion time and task response time. However, the objective functions in this model are in conflict with one another. The simulation results show that the proposed method has the ability to find optimal trade-off solutions for task scheduling problems that represent the best possible compromises among the conflicting objectives.

Elina Pacini, Cristian Mateos, and Carlos García Garino [07], Parameter Sweep Experiments (PSEs) allow scientists to perform simulations by running the same code with different input data, which results in many CPU-intensive jobs and thus computing environments such as Clouds must be used. Our goal is to study private Clouds to execute scientific experiments coming from multiple users, i.e., our work focuses on the Infrastructure as a Service (IaaS) model where custom Virtual Machines (VM) are launched in appropriate hosts available in a Cloud. Then, correctly scheduling Cloud hosts is very important and it is necessary to develop efficient scheduling strategies to appropriately allocate VMs to physical resources. Here, scheduling is however challenging due to its inherent NP-completeness. We describe and evaluate a Cloud scheduler based on Particle Swarm Optimization (PSO). The main performance metrics to study are the number of Cloud users that the scheduler is able to successfully serve, and the total number of created VMs, in online (non-batch) scheduling scenarios. Besides, the number of intra-Cloud network messages sent are evaluated. Simulated experiments performed using CloudSim and a job data from real scientific problems show that our scheduler succeeds in balancing the studied metrics compared to schedulers based on Random assignment and Genetic Algorithms.

Fahimeh Ramezani · Jie Lu, Farookh Khadeer Hussain [08], Live virtual machine (VM) migration is a technique for achieving system load balancing in a cloud environment by transferring an active VM from one physical host to another. This technique has been proposed to reduce the downtime for migrating overloaded VMs, but it is still time- and cost-consuming, and a large amount of memory is involved in the migration process. To overcome these drawbacks, we propose a Task based System Load Balancing method using Particle Swarm Optimization (TBSLB-PSO) that achieves system load balancing by only transferring extra tasks from an overloaded VM instead of migrating the entire overloaded VM. We also design an optimization model to migrate these extra tasks to the new host VMs by applying Particle Swarm Optimization (PSO). To evaluate the proposed method, we extend the cloud simulator (Cloudsim) package and use PSO as its task scheduling model. The simulation results show that the proposed TBSLB-PSO method significantly reduces the time taken for the load balancing process compared to traditional load balancing approaches. Furthermore, in our proposed approach the overloaded VMs will not be paused during the migration process, and there is no need to use the VM pre-copy process. Therefore, the TBSLB-PSO method will eliminate VM downtime and the risk of losing the last activity performed by a customer, and will increase the Quality of Service experienced by cloud customers.

III. PROPOSED METHODOLOGY:

We proposed a method for load rebalancing on cloud based on Honeybee Foraging Algorithm and Active clustering algorithm. By using honeybee foraging algorithm we will improve in average execution time and reduction in waiting time of tasks. Active clustering used for increase in throughput by utilization of resources. We will integrate ant colony optimization has been proposed to initiate the service load distribution under cloud computing architecture. The pheromone update mechanism has been proved as a efficient and effective tool to balance the load. This modification supports to minimize the make span of the cloud computing based services and portability of servicing the request also has been converged using the ant colony optimization technique.

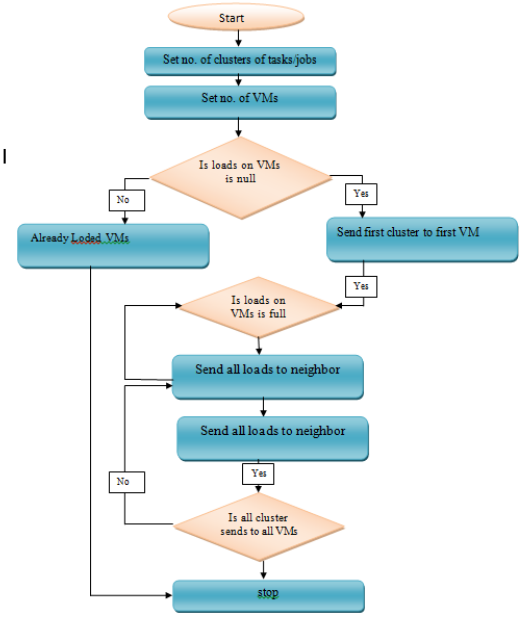

Fig: Proposed Methodology

IV. Result Analysis / Implementation:

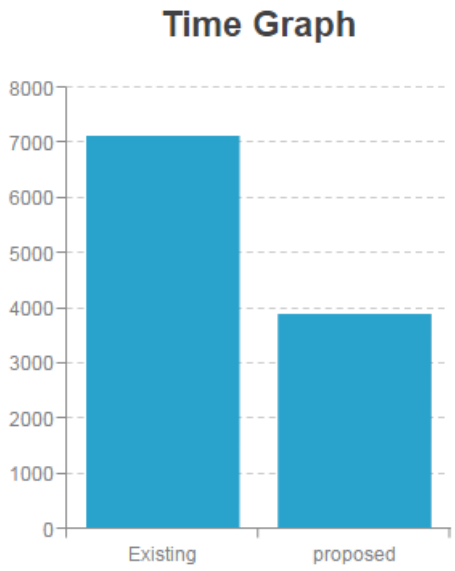

Fig – Comparison Graph between Proposed and Existing methodology

V. CONCLUSION:

Cloud computing has generally been embraced by the business, however there are many subsisting issue like Server Consolidation, Load Balancing, Energy Management, Virtual Machine Migration, and so on. Central to these issue is the issue of load balancing, that is required to distribute to access dynamic local workload equitably to every one of the hubs in the entire cloud to accomplish a high used satisfaction and asset usage apportion. It withal discovers that each computing asset is conveyed effectively and decently. Subsisting load balancing strategies that have been contemplated primarily focus on decreasing overhead, convenience replication time and improving execution, and so forth., however none of the methods has considered the execution time of any undertaking at the runtime. In this manner there is an objective to grow such load balancing method that can enhance the execution of cloud computing alongside most extreme asset usage.

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