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A Proposed Load Balancing Algorithm for Maximizing Response Time for Cloud Computing Environment using Fusion Algorithm

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Abstract: ***Load balancing is defined as the process that helps to split the traffic load among the different servers in complex systems that are routing hundreds and thousands of data packets that too in seconds. This is important to handle a large amount of data faster and efficiently. There is a need of many techniques to done load balancing effectively. The existing load balancing algorithm needs improved load algorithm for improved performance. This work is done with the aim to develop efficient and effective load balancing algorithms for cloud computing and fusion algorithms are proposed for the better understanding of load balancing for the different size clouds. The partial swam optimization with genetic algorithm method is used to estimate the Efficient Fusion Algorithm. It will also include its comparison with ESCE, the round robin and Throttled scheduling to estimate processing time and response time. These all things are responsible for the effective cost for the whole process to do.***
Keywords: Load Balancing; Cloud Computing, response time.

I. INTRODUCTION

Cloud computing is the process that is not only limited to large businesses but it is extended to the small business as well. The delivery model that includes “on-demand” and utility computing” helping users to manage computer resources according to their requirement. In the future, it will serve users with its stupendous or mammoth potential. For cloud computing, it is only depended on the single key named “virtualization” to run multiple operating systems as well as applications at the same time with the same hardware. There are various services that people are seeking from cloud computing around the globe with the help of easily accessible cloud knowledge centers. All these IT related services include frame services, platform services, and various software services. These services are based on the concept of “pay per use” and it solely means that consumers need to pay for the services that they are consuming. The essential plan of inexperienced computing and cloud computing resembles too and Service request planning is the required way to realize efficient computing. Standard job planning method is not the best within the cloud computing environments to provide planning. According to the straight forward classification job planning method, there are two major categories that include “Batch mode heuristic planning algorithms (BMHA)” and “on-line mode heuristic algorithms”. In BMHA, after discovering its place within the system all jobs will be picked up as a collection. It will be run in a fixed and short interval of time. There are some key samples for it that include: first served planning algorithm (FCFS), Min–Min algorithm, spherical Robin planning algorithmic program (RR), initial response, and Max-Min algorithm. To use “online mode heuristic planning” algorithm, there is a need for rearranging tasks after reaching it inside the system. In cloud computing system the speed of processor should vary quickly for a heterogeneous system. The “online mode heuristic”, planning algorithms is useful and effective for cloud computing atmosphere. The rest paper is structured in different parts that include Section II, Section III, Section IV, Section V and conclusion. The whole paper is throwing light on the challenges and future perceptions that are associated with the load balancing and cloud computing.

II. CHALLENGES IN CLOUD COMPUTING

The cloud environment has two parties that work with different interests. There is no sharing of their work properties as well as their work conditions in which they are performing their task. There are many challenges that cloud computing is facing and need to be corrected for better performance. It is also claimed that the cloud services are not cost effective and facing several challenges. The cloud computing is the process of allocating a load to the individual nodes but still there are problems that are leaving some nodes underutilized and other overloaded. For the efficient and better response of the task it needs to the best load distribution. To mount the algorithm that can avoid such challenges should be considered things that include load, comparison of stability of the different system, system performance, and communication between the nodes. To consider load it will include CPU load, amount of memory utilize, Network loads.

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1) *Cloud Computing-Round-Robin Algorithm:* It uses the round-robin method for the allocation of the work and it is the static load balancing algorithm. It will choose the first node at unsystematic and then the task will be assigned in a round robin manner. Allocation of tasks to the processor will occur in round order. There is the uneven distribution of the task in this method and this is the reason this algorithm is not considered an appropriate method for cloud computing. In this, some nodes will get overloaded and others will not get any load. This is not helping in load distributing appropriately.
2) *Unprincipled Load Balancing Algorithm:* This static load balancing algorithm doesn't consider the current workload of the VM. But this keeps every node active and also it allocate the task to every node randomly. It will also not execute the current execution time of the node and this is the reason the process will move slowly. In this algorithm, all the tasks having the least implementation will be handled initially as compared to the tasks having maximum implementation time. All the jobs with the maximum implementation time have to wait more and this needs to be solved.

III. LITERATURE SURVEY

For the purpose of achieving maximum utilization of resources to fulfill the user's requirement there are many domains that discussed about thetask scheduling in cloud computing. So there are some terms that can influence tasks scheduling process that include QoS, cost, consumption of energy, waiting for time, and deadline.

Narale, S. A et al[1] this focused that load balancing is to reduce response time, optimize resource optimization, reduction in data and virtual machine cost, maximum throughput and no overloading of workload. [2]. In this research paper, there is a hybrid cloud that is the integration of private and public cloud. This research paper study leads toward a hybrid cloud approach with reduced cost of data center processing, virtual machine cost, and data center processing cost. This is considering users of the same region and different regions of the data center. Same region users are considered as the private whereas different region users will be considered as public cloud.

Rjoub, G., et al[2] this research paper covers the task scheduling that is important for the improved efficiency and to minimize the execution time. It is considered one of the best technologies in cloud computing. It is an important algorithm for the overall performance of cloud systems. It will also decide how to distribute the resources to meet the user's requirements while providing cloud services.

Aslanzadeh, S., et al[3] this paper cover the Endocime algorithm that is based on human's hormone system. The proposed algorithm will help to achieve the load balancing with the help of self-organization between overloaded VMs. This technique explains the communications between VMs. Here the overloaded VMs will transfer their load to underutilized VM with help of the approach named Particle Swarm Optimization (PSO). S., A. T., et al[4] In this paper, resource allocation of virtual machines and user requests are focused the most. The main issues that are covered in this include heterogeneity, reliability, high communication delay etc. To perform all the jobs efficiently and effectively we present PSO algorithm for virtual machines. The Round Robin and Throttled algorithms are the existed algorithms we used to compute and compare the response time. This helped for serving the incoming jobs. Ben Alla, et al[5] A new Dynamic Dispatch Queues Algorithm (DDQA) and Particle Swarm Optimization (PSO) algorithm are proposed here to schedule the task in cloud computing. It will give the full consideration of the cloud computing environment with dynamic characteristics. According to this, it will help to load balancing; giving the best performance, and also it will lead to improved resource utilization.

Priyatharsini, V., et al[6]. The PSO is considered as the main problem-solving method here in this research paper. Here only authorized users will get the authority to access. If any unauthorized person will try to access the account of another user then that authorized user will be intimated by the third party with the help of user phone or another mail ID.

IV. PROPOSED METHODOLOGY

Load balancing to the multiple virtual machines is considered as the main challenge among all. This is important to balance the load among all the machines to avoid underutilization or overutilization of single resource. This optimization problem needs an effective load balancer to perform different tasks. So, it's important to bring an efficient load balancer with the best strategy to the changing environment. Different load balancing algorithms are implementing for cloud computing and researchers are still working for bringing something more advanced to avoid different challenges. The load balancing algorithm is working with the aim to perform in a improved way with better quality service and that too in a cost-effective manner. It is also important while implementation of any algorithm to maintain the efficiency, effectiveness as well as for as its fairness throughout the process. There are many existing load balancing methods that can deteriorate the system performance because of the challenges they are facing in peak time for different public cloud during load distribution.

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The user request, resources availability, and the user's applications in the cloud provider's data center will decide which type and amount of resources are going to be allocated. A scheduler or load balancer of the user's application will come in the role after allocation of resources to assign subtasks to any resource. Performance calculation always plays an important cost-cutting role during building choices for this.

Existing load balancing methods for cloud computing have following challenges-

1) *Slower Response Time:* System will show poor performance because of the slower response time.
2) *Higher Execution Time:* It also performs poorly because of thehigher execution time.
3) *Selection of Load Balancing:* Dynamic Load is balancing can be performed better.
4) *Selections of Partitioning Method:* Static portioning methods for load balancing to large environment need to be improved because they are less efficient.
5) *Prediction of Task arrival Patterns:* The identification of exact arrival pattern of jobs from different nodes is difficult to identify in existing methodology.
6) *Priority of Task:* Priority wise execution of jobs is another difficult task to perform during load balancing.

a) *Proposed Fusion Based Load Balancing Algorithm:* The Algorithm is associated with the advantage of Ant colony optimization and is for the VM resource scheduling in cloud computing environment. This algorithm is presenting balanced scheduling approach of VM resources. By our proposed algorithm we are presenting best solutions for scheduling for the initialization in cloud computing environment. According to the compute portability we will use algorithm to select the scheduling solution in the absence of the VM resources during initialization. Through the enhance of VM resources and running time in the system the past information will help to compute the solution.

The main procedures are as follow.

i) *Step 1:* In initialization, there will be no past information because of the absence of VM resources. But the VM resources will be scheduled in the scheme with the help of computed portability. Based on this algorithm will proceed with the selection of the free physical machine and schedule will start soon.
ii) *Step 2:* From the scheduling solution the algorithm will help to compute the difference of each physical machine in each solution. This will be proceeded according to the previous information through enhance of VM resources in the system as well as enhance of running time.
iii) *Step 3:* For each solution, the excellent mapping solution will be computed with the help of Fusion PSO with a modified genetic algorithm. For the excellent mapping solution variance should meet the predefined load constraints;
iv) *Step 4:* The best mapping solution will be cost effective as well as efficient because the algorithm will compute the cost and cost divisor for every solution in S.
v) *Step 5:* As each solution will get cost divisor it will help the algorithm to prefer one with the lowest cost as the scheduling resolution and then it will complete the schedule.
vi) *Step 6:* Scheduling necessitates novel VM resources.

b) *Return to Step 2:* To discover the best scheduling solution we have used fusion based partial swam optimization with modified that genetic algorithm. In this best scheduling solution need to be found to attain the load balancing. The load balancing defined as the process that can distribute load on each node in the collective for efficient and effective response. The one time scheduling is not enough to accomplish because of the particular reasons. Hence, there are various techniques that can be helpful for the load balancing in cloud computing. For better results the existing algorithms need modifications to achieve right balancing.

The aim of this work is associated to develop an efficient load balancing method for cloud computing to achieve:

i) Efficient and effective load balancing
ii) Best throughput
iii) Decreased Waiting time
iv) Optimization of computing resources
v) Decreased Response time

To raise the performance and utilize entire resources in cloud computing it is important to get the Load balancing. It can be considered as one of the pre necessities here. But Load balancing raised as the main issue to cloud computing. It is must to distribute to every node to improve the resource utilization as well as to improve the performance of the distributed system. To attain this it is always needed the best algorithm that can help in load balancing.

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This algorithm will help to avoid the situation in which some nodes are overwhelmed and others are underutilized. Load balancing algorithms should be implemented attain the results that need for best performance. Cloud computing is providing services to different clients and located at a different geographical location all over the globe. There are numerous data centers that are sliced into virtual servers and serving clients.

This whole system need proper load balancing for the sake of best performance and these current system have these load balancing system existed too. But still, there is a need for best as well as the efficient algorithm for load balancing for virtual servers. Load balancing proceeds its work in different ways to avoid overutilization and underutilization as well as it checks that which virtual machine is stable and which one needs to go on hold. With the help of the best Load balancing bandwidth usage will be reduced and results in decreased machine rate. It will also help to get most out of the services that service providers are availing to the clients. Researchers can also work toward other investigations too that include: (1) to construct efficient scheduling optimization algorithms in cloud computing, (2) Resource sharing and task scheduling models development, and (3) it will lead toward minimizing cloud resources and load balancing by building machine learning algorithms and dynamic models.

V. CONCLUSIONS

This research is totally based upon to generate an efficient performance model for cloud computing. To use the various resources of InterCloud Computing efficiently there is a need for solving some crucial problems that can create hindrance in the great future of Cloud Computing. It needs to take care of the major problem that is called load balancing or load distribution for the better utilization of the server and to make it less complex. It is also important for minimum response time for the development of the user's request in InterCloud environment because this is considered as the main threat for privacy in the cloud. For the cloud service providers, it is easy to monitor the user's data lawfully as well as unlawfully when they outsource their data on the cloud. To make it private users are able to encrypt data before outsourcing on to the cloud and now service providers will use the encrypted data. This brings the challenge for effective data utilization. However, service providers are able to operate on encrypted data and still there is the possibility of leak of the data. This is the reason Cloud computing need to distribute in a way that cloud service providers will achieve optimum utilization of data or resource to achieve higher throughput. On the other hand, cloud users need the minimum expenditure with great performance. All the resources that are assigned to a user are based on the cloud application. The user makes the request to the cloud service provider and as per the availability of the resources; they are assigned with the resource.

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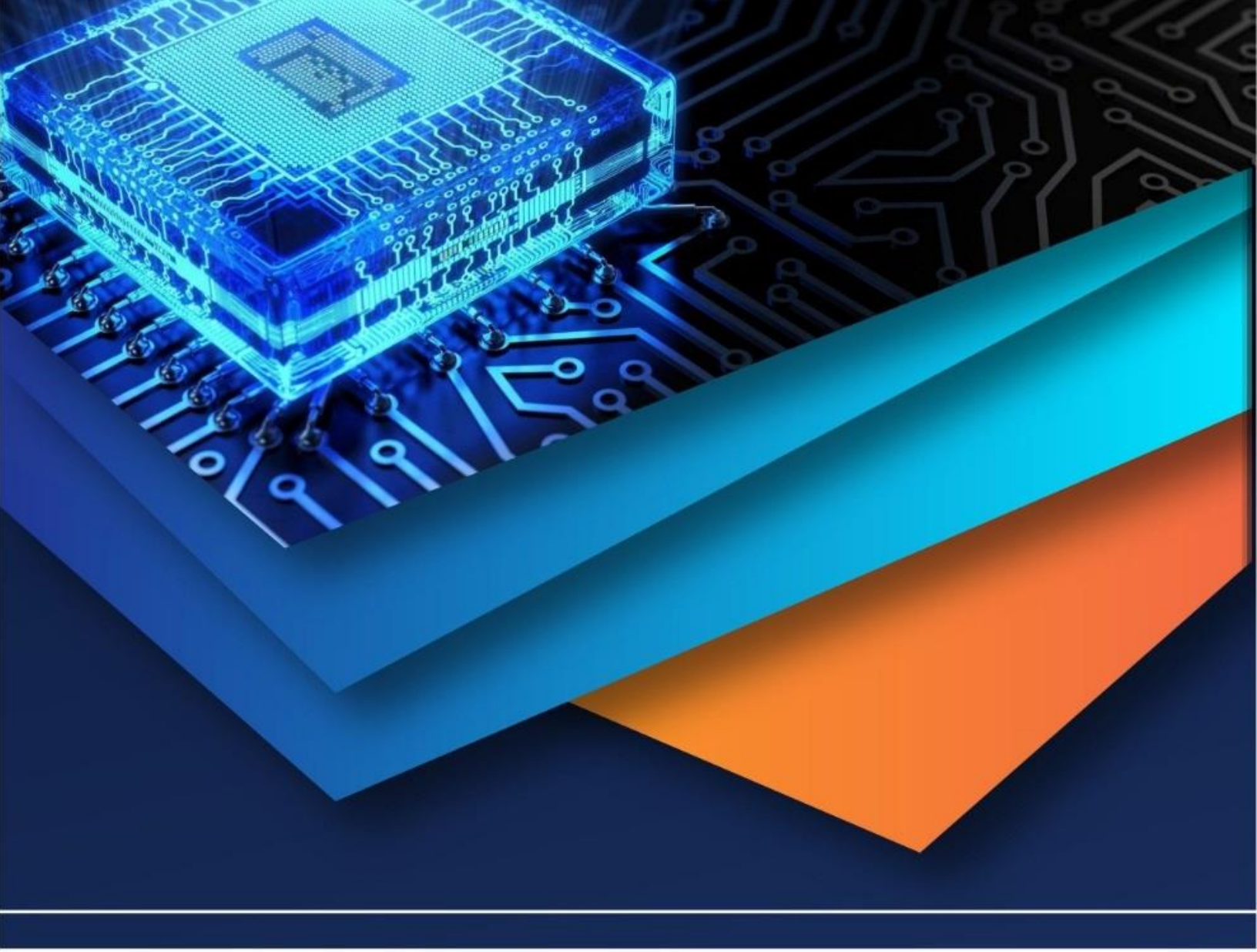
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