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

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Abstract – **Cloud computing world has many challenges and one of the most important challenges in this world is minimizing the response time and cost in instruction, in order to stabilize the load and increase the performance of the business along with customer satisfaction. Decreasing the cost is not only proficient but also be the most import reason for satisfying the customers. Transferring huge quantity of data using a balanced method with low cost is highly beneficial in the Cloud computing environment. By setting the number of processors for each VM, a technique is proposed by us based on fusion Swam Optimization, to determine the optimal solution for allocating our resources, which in turn gives increased distribution map. The response time of our proposed technique is highly efficient when compared to the other algorithms. To determine the Efficient Fusion Algorithm (based on partial swam optimization along with genetic algorithm) and it is related with ESCE, round robin and throttled scheduling to determine the response and processing time, which affects the cost.**

Keywords – **Cloud Computing, Cloudlet, Cloud Analyst, Resource Utilization, Synchronized Virtual Machine.**

I. INTRODUCTION

Cloud is similar to a Visualization environment. The factors of Visualization in cloud computing gives rise to a centralized environment. The concept of IOT is used to find the connection between the things. Now a day's using Internet, humans can finish any job in any part of the world with its help. The main focus of the internet is the pay for using the services. The cloud service provides a trusted environment with the producer, customer with it remaining as a third party. For example in websites like Amazon, Flipkart, and salesforce.com uses cloud service. The major characteristics of cloud computing like elasticity, scalability, and payment model had inspired the businessmen to discard their old infrastructure and adopt this technology. With the increase in number of cloud users, the load will also increase which in turn might affect the performance and operation of the cloud. So in order to have perfect task scheduling and resource management highly efficient load management methods should be introduced [1]. Cloud computing with the help of visualization techniques provides different services like, infrastructure as a service (IaaS), Platform as a service (PaaS) and Software as a service (SaaS) [2]. It also helps the servers in heavy load balancing, to monitor the allocations and release the resources in time. This method has some disadvantages which are related to the overloading status of the VMs. This can be solved by remapping the overloaded VMs with the resources available to provide power enough to complete the task. This is done by migrating the VMs. But in this method the overloaded VMs will be moved to a new host, using most of the systems memory from both overloaded and under loaded host. Thus a huge amount of memory is wasted and VM will be freeze, since it can't offer any service [3]. The objective of this paper is to provide an efficient fusion algorithm (based on partial swam optimization with genetic algorithm) the method which will provide a base for load balance on VMs communication records. With the help of feed backing method the VMs will transfer their extra load to nearest available neighbours. The PSO algorithm is used as an optimization technique to select the perfect VM in order to allot extra tasks. Compared to Efficient Fusion Algorithm the PSO was effective in providing quicker convergence. In ESA, process of tuning is simple and attractive, when compared with PSO. The process of applying the new optimization technique was done by learning the synthesis problem in linear array antennas. The efficiency of EFA was greater than PSO for the model of DRA data center creation. The data centres are from the roots of early computer systems. Each and every data centre has a data center name, data center id, Host id, Ram and along with its own bandwidth. The information are stored in the database. The classification of the remaining paper is as follows. The

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background and the works related to it are in Section II, the proposed algorithm is explained in Section III, the details of Experimental setup are given in Section IV, results are analyzed in Section V and section VI is conclusion.

II. Related Work

In order to create a better task execution method load balancing in cloud computing, Narale, S. A et al [1] the aim of load balancing is to provide perfect application of resources, decrease the response time, increase throughput, decrease the cost of virtual machine and the amount of data, and finally prevent overload. Using hybrid cloud approach this research has reduced the cost of data transfer and virtual machine, and avoided data center processing. Hybrid cloud is a combination of both public and private cloud. The experiment is done by collecting bases from all the regions of the data center. If the bases are from same region it is called private and if they are from different region it is called public cloud. Arora, V., et al. [2] with the increase in the usage of cloud technologies, there has been a rising demand to study, analyze and apply this technology on larger applications. This resulted in development of a tool called Cloud Analyst. Also the virtual machines in the data centre are based on three different algorithms to perform load balance. Patel, J et al[3] the paper describes a method which enriches the affecting points like task execution process , distributing load using efficient methods, using less time to process the load. This altogether gives a collective approach for balancing the load. Volkova, V. N., et al. [4] based on comments about load balancing and using three policies for cloud analyst simulator, it is found that the task of load balancing is hard process. By analysing the results from all the algorithms, it is concluded that the throttled algorithm is effective compared to other algorithms. The time of the data center is also better here. Garg, S., et al. [5] by modifying the throttled algorithm, the present STVMLB is created. This algorithm effectively uses the VM more than throttled and active monitoring. The work flow is described by using an image to explain the process better. A GUI based software; called cloud analyst is used for simulation.

III. Proposed Fusion Algorithm For Load Balancing

The data migration technique is taken for study and analysis. By using the load balancing methods the data migration problems are solved in this paper. Here we use a load balancing framework based on MAPE control loop. It also reduces migration time. In cloud storage system sometimes the load balancing may become slant, and in order to return them back to equilibrium we use these migration techniques. By using the entropy value we can detect the load balancing. If the value is higher the load is distributed evenly and if the entropy value is lower the load is unevenly distributed. A threshold value is fixed and when the entropy reaches the point it automatically migrates the data. PDO is used in this migration to reduce the wastage of resources [7]. The idea that separates this paper from others is that PSO algorithm is from Swam intelligence optimization algorithm and is applied to a storage system under cloud environment. This algorithm reduces the cost of time and load balancing degree, and effectively eliminate the load tilt while maintain time cost. The main explorations of this research includes, developing perfect optimization algorithms in the cloud, implementing both resource allocation and task scheduling models using machine learning concept, and providing a machine learning algorithm for implementing dynamic models and to reduce the essential cloud resources and load balancing. The task optimization and scheduling algorithms along with other challenges like migration and value of service constrictions are studied. This includes researching the methods to handle multi label data like; hybrid level multi swam optimization which can perform both training and testing. Then the results are found out in consideration with other features like CPU column, RAM, bandwidth, and data center. This algorithm is used to construct a suitable migration plan, which yields a few minutes. It mainly used for implementing traditional algorithm like throttle algorithm and round robin algorithm. But since computation is done one by one it takes a long time to process. So we make use of parallel EFA computing technique to save the time and increase the efficiency. This method is normally called as EFA. EFA ingests, filter, analyses and relate the resources utility, and extract the information from it.EFA is used as a tool to create and decide migration. Using continuous data streams EFA can provide response to resource allotment and in this paper we apply EFA to a storage system below the cloud environment. It reduces time and increase load balancing. The experiments states that it can reduce load gradient and maintain time during data migration.

Cloud User ·select the User Region for performing the request -

Cloud computing: Applying the Load balance sachem for completion the work and select the police

Select the Data Center according to requirement 1, 2, 3, 4,…,i.

Data Center: select the Data Center Region for particular function, selected the network Bandwidth, define the cost for utilizing service choose particular host number according to need.

Select the number of host, process, choose the speed of the processor, VM, memory and storage

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Select the Virtual machine

Initiate
While (select the number of task) do
Compute the ratio of technique (Task);
While (find out the value of Timer) < T do
Select the particular load balancer (Task);
If finding the state of particular for load balancing region == Idle then
After select task assign the load balancer for execution according to Region
Else
If the Regional not find out then subsequent Regional Balancer
Compute the waiting (Task);
Compute the expected process completion time (Task);
if Compute the waiting > Compute the expected process completion time
then
Send Task for completion the process for to Subsequent Regional load Balancer;
Else
Assigning the task sequence queue
end if
end if
end while
end while end
Phase 2
Begin
Step 1: start the process using the pheromone
while (if the condition not matching the criteria then termination) do end
end
Step 2: build the swam optimization process according to the solution
Step 3: calculate each and every situation according the fitness 01'
Step 4: find out the best solution according the need
Step 5: update the value of pheromone
End
End

Broker Creation

A broker is a person who enhances communication between data center and VM. The broker, remains as a third person and creates a safe space between the data center and VM. VM or virtual machine is responsible for creating the virtual environment. The host and the data share the cloudlets with other VMs. Each VM has a owner which gives cloudlets to them for processing. It has its RAM, own id and bandwidth.

Cloudlets creation

Here the cloudlets are comprised of selected files. These file are stored in the VM. The cloudlets also have id, size etc. And they are safely kept and processed in the database.

How to distribute clouds to virtual machine

The cloudlets are divided and allotted to each VM separately. This process represents the how they are divided and allotted among the virtual Machines.

IV. Simulations Results And Analysis

Load per node – total number of request received
Simulated Time – the load has to be equally distributed on all loads, load per virtual machine is equal to service broker policy Percentage of tasks executed – it calculates the amount of processed task vs. the total tasks the slave has gotten
Compute the tasks of Percentage = Tasks used of Executed/Total number of Tasks
Received * 100. Average processing time for task execution – the time consumed to move and perform the task and move the results back to user base.
The optimize response time without sorting and mapping is 1.66 and for enhanced response time average processing time is also 1.66.

Simulation Scenario

The simulated scenario is similar to the peer to peer architecture because the masters are similar to datacenters and the slaves are similar to Virtual Machines (VMs). User bases are used to create user request in cloudlets. The following things are taken into account for analysis: load distribution on data centers, amount of tasks implemented, and average time consumed for performing these tasks.

Performance Metrics

1. Load per node- the load on in the nodes of the slave is found based on the amount of request the slave has gotten during the transmission. Technically, the load should be uniform on all nodes. And it is present in our model, since the loads are uniformly placed in the VMs
2. Percentage of task executed- it shows amount of processed tasks vs. the amount of task the slave have gotten

Percentage of tasks = Tasks executed/total tasks received*100

3. Average processing time for execution of tasks- the amount of time consumed for moving and completing the task and time to move the result back to user.

$$\text{Response Time} = F_{int} - A_{rrt} + T_{Delay} \quad (1)$$

Here
A_{rrt} – the time user request has arrived
F_{int} – the time user request has been completed
The delay that occur during transmission is found by

$$T_{Delay} = T_{latency} + T_{transfer} \quad (2)$$

Where
T_{Delay} - transmission delay,
$T_{latency}$ - network latency and
$T_{transfer}$ – the amount of time to transfer a request from source to destination

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$T_{transfer}$ = D / Bwperuser (3) Bwperuser = Bwtotal / Nr (4)
Where
Bwtotal - total bandwidth
Nr - amount of request made by users present in transmission. The user requests that are in movement are also kept in account and added to Nr The study and analysis of these algorithms is done with the help of cloud analyst tool. By placing the gathered cloud analysts above the Cloud Sim tool along with a GUI which is completed to provide simulation at a higher level. The cloud analytic tools 4GB Ram, 10GM hard disk, Intel® Core™ i5 Processors are functioning with the help of these. The users can build and implement a perfect model by using this GUI tool.

Figure. 1: Cloud Analyst GUI user interface

Figure 1. The graph below shows the cost of various algorithms which are not similar in nature. It is proved that the lowest cost is moved to a different location as instructed by the algorithm. This decides the location it has to be moved. It also proves the effectiveness PSO algorithm against other algorithm in load balancing technique, by consuming less time and cost. The difference is very low and with the availability of real time information the migration technique with lowest cost is chosen.

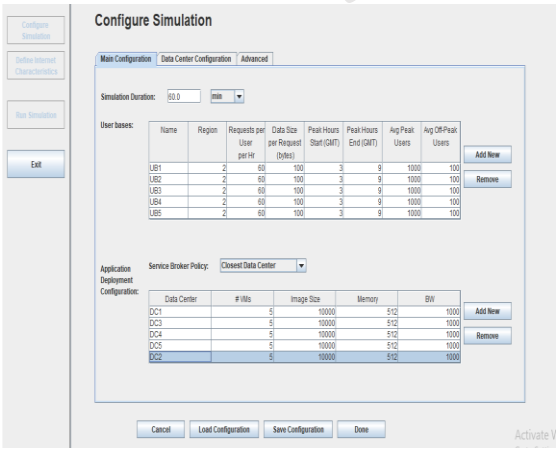

Figure 2: Main configuration

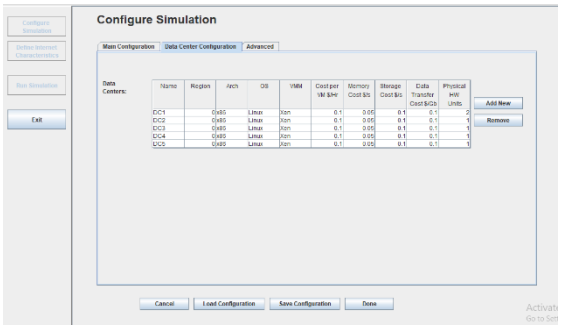

Figure 3: Data centre configuration

Since traditional algorithm lacks this technique, it has a disadvantage with high cost and higher data accumulation.

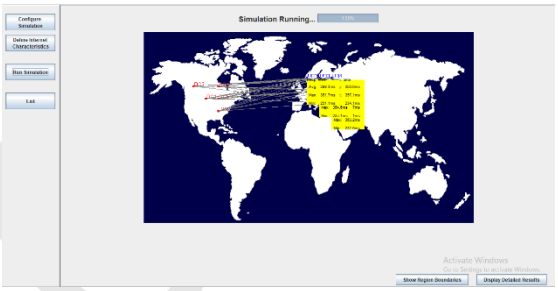

Figure 4: Execution process

Overall Response Time Summary

	Average (ms)	Minimum (ms)	Maximum (ms)
Overall Response Time:	300.02	225.14	366.07
Data Center Processing Time:	0.36	0.02	0.69

Figure 5: Overall response time

Data Center	VM Cost	Data Transfer Cost	Total
DC2	0.502	0.08	0.582
DC1	0.502	0.077	0.579
DC4	0.502	0.074	0.576
DC6	0.502	0.074	0.576
DC5	0.502	0.08	0.581

Figure 6: Total cost

So our proposed method is the best method to provide low cost migration and making the decision of location it has to be migrated. It is efficient than the traditional methods in time, speed and cost thus making it better in all the way.

V. CONCLUSION

This new algorithm we have proposed is mainly used in data centers to get the required load balance. This paper follows the principle of endocrine system and its method of regulating the hormones, to minimize the time that is wasted during the migration of the VM. By using an open source simulator called CloudSim tool evaluation was done. The results have proved that

Endocrine – PSO is the best method for migrating load from one VM to another. The concept of endocrine system was used to construct this algorithm and it is also used as a principle for several other computing technologies.

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