A New Approach of Energy Efficient Virtual Machine allocation in Cloud Computing

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Abstract : Cloud computing could be a model for providing service as Platform, Software, Hardware as a service over web facultative ,on-demand network access to a shared pool of configurable computing resources. Cloud consists of datacenters with each datacenter having large number of physical machines. These physical machines have virtual machine to balance its load. In this paper a dynamic allocation of VM based solution for VM allocation is proposed. The proposed dynamic We have developed the algorithm in such way that as much workloads as possible can be served using least number of servers in a data center. We also cared about the performance degradation, VM migration response and startup time, which will be shown as result in the outcome

***Index Terms* - : Energy Efficiency, Load balancing, Power Consumption, VM allocation.**

I. INTRODUCTION

Cloud computing offer on-demand access to computational resources over the internet.
One of the major challenge for cloud provider is proper vm allocation which contain less SLA violations. There are many virtual machine allocation policies that have been implemented but still we need to find a better energy efficient Techniques. Power Consumption of data center create impact on total energy used by cloud system. There are many algorithms for VM Allocation. In Energy consumption main thing is to saving power consumption and to reduce the number of active physical machine using the virtual machine.[2]

We use Framework for minimize energy cost and also maintain startup time, scale up time and scale down time of virtual machine. Startup time is time taken by vm for initiate and ready for use. Scale up time is time taken to add new additional resources to active vm machine. And scale out time is time take to add new additional virtual machine to existing set of virtual machine.[1]

One of the challenges posed by cloud application is Quality of service (QOS) management which is the problem of allocating resources to the application to guarantee a service level along dimension such as performance, availability and reliability. In this paper SLA parameter and QOS parameter considered as comparison parameter.

SLA Violation with the better QOS is the major issue where research can be useful for improvement. Our target is to get the lower start up time and scale up time to depict the improvement in research.SLA parameters, availability, and up time specific performance benchmarks to achieve actual performance will be compared like application Response time. Scalability, Performance and minimum use of power supply can also be focused.

II. RELATED WORK

The methodology section outline the plan and method that how the study is conducted. This includes Universe of the study, sample of the study, Data and Sources of Data, study's variables and analytical framework. The details are as follows;
SLA Violation with better QoS is a major issue where research is useful for improvement.
Load balancing is the process of distributing workloads and computing resources across one or more servers.
Cloud load balancing is a Process of distributing workload across multiple nodes. Management of resources & request in cloud environment for balancing load. Cloud service provider manage large no. of user request to provide service according to user demand. Load balancing is used to improve user satisfaction & improve overall performance. The workload is distributed among two or more servers, hard drives, network interfaces or other computing resources, enabling better resource utilization and system response time. loud providers like Amazon Web Services (AWS), Microsoft Azure and Google offer cloud load balancing to facilitate easy distribution of workloads.

.kriti Agrawal,priyanka Tripathi[3] uses power aware Artificial Bee colony algorithm is used for vm allocation and reducing energy consumption. and then compare it with genetic algorithm for power aware in cloud. ABC is Inspired by the behaviour of Honey bees .There are two types of bees Employed bees and Unemployed bees, where employee bees are expert in exploiting the food source and share the information by waggle dance whether unemployed bees calculate fitness value and by which they find the new food source by observing that waggle dance. In vm allocation technique vm are allocated to physical machine in data center and paper conclude that ABC algorithm work better than existing GAPA Algorithm.

Shaden M. AlIsmail ,Heba A. Kurdi[5] propose a new novel scheduling algorithm for reducing power consumption and compare it with DVFS & ESWCT(Energy aware Scheduling algorithm using Workload-aware Consolidation Technique). This paper use two server named powerful server(Ps) and small server (Ss) ,where powerful server means Processing capability more than capability threshold and Ss means processing capability less than capability threshold. Two Phase

Allocation phase and Consolidation phase is used improving resource utilization where server becomes switch on and resources are available than it run in allocation phase and wait for new vm request when it arrived server ensure that it has enough resources or not and admits the request. Now, Ps change from allocation to migration phase based on two migration rules: Global Migration rule and local migration rules. As a result shown improvement in Resource Utilisation and Energy Consumption are shown in both large and small data centers but disadvantage is that is does not contain any SLA parameters.

Ysstheen raprakash govindraju, Hector DuranLimon [1] propose a QoS aware load balancing and resource allocation framework for IaaS cloud providers. Our framework includes VM life cycle parameters while energy consumption is minimized. includes service level agreement (SLA) parameters related to the Virtual Machine (VM) life cycle such as VM startup times. It include SLA parameters related to the Virtual Machine (VM) lifecycle, namely startup time, scale up time, and scale out time of VMs. These proposed models are going to be validated by testing the models in the cloud simulator environment CloudSim and comparing the simulation results with the actual measurements in a real cloud platform.

Baljinder Kaur, Arvinder Kaur[2] proposed new energy aware Hybrid Algorithm for VM allocation which is also consider SLA parameters, response time, Throughput. The main focus is to provide an efficient resource allocation to achieve the green computations for data centers. The methodology is proposed that works for reducing energy consumption. In this hybrid Energy aware is compared with Minimization of migration(MM) algorithm .Results is the Hybrid Energy Aware algorithm provides less energy consumption with effective response time and throughput while meeting all considered SLA metrics. But , this paper does not provide other QoS parameter like cost or Security.

Shaden M. AlIsmail ,Heba A. Kurdi[7]. It optimizes Virtual Machines' (VMs') allocation and consolidation so as to improve resource utilization of running servers and the shutdown of idle servers. The proposed algorithm was evaluated and compared with two benchmarks DVFS (Dynamic Voltage Frequency Scaling) and ESWCT (Energy-aware Scheduling algorithm using Workload-aware Consolidation Technique). . It combines the VMs in the minimum number of powerful servers and accordingly switches off inactive servers. And the experimental results show a significant improvement in reducing energy consumption and improving resource utilization. Disadvantages of this paper are that various SLA parameters are not considered.

P.Aruna, S.V asantha [6] focus on to how can cloud providers multiplexing their physical resources to cloud user to reduce the power consumption of the data centers. This paper, explored the particle swarm optimization algorithm for the virtual machine provisioning to make the cloud data centers as power efficient. Also discussed the power model for the servers, propose the power aware PSO algorithm for the virtual machine provisioning in the cloud. In the future, we would incorporate the PSO algorithm to the consolidation unit with this work. The disadvantage is that it does not provide other metrics like SLA violation, cost etc.bera test is used to test the normality of data.

III. PROPOSED WORK

A SLA violation with better QoS is a major issue where research can be useful for improvement**.**

Power efficient cloud process in any term(Process scheduling, resource allocation, data transfer process) is a major issue. So ,Here Created a new algorithm by applying two algorithm Genetic Algorithm and Ant colony Optimization (ACO) algorithm that is explained below. Flow of the proposed work is as shown in figure 1.Our target is to get the lower startup time and scale up time to depict the improvement in research. Conditions or Assumption are taken in algorithm where algorithm works better by performing these conditions.

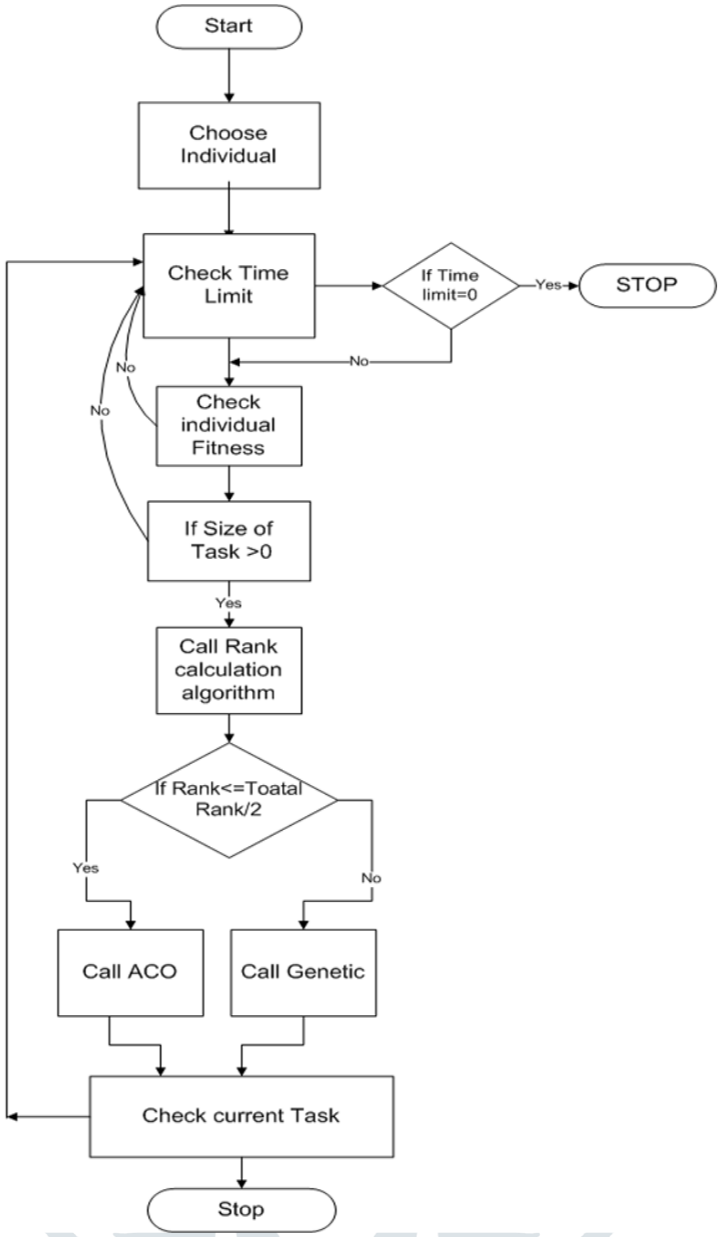

Figure 1. Flow of Work.

A. Proposed Algorithm

opt any of the algorithm depending upon criteria specified for process steps:
The condition/assumptions:
1) Tasks can be expressed within the range of code instruction length, which also is the size of the task
(2) The arrival of tasks follows the random distribution and the length of the queue is unbounded.
(3) Each node is independent of all others and each node can only execute one task at a time.
(4) When nodes fail, they do so independently of one another.

Steps of algorithm are as follow:
1. Choose the initial population of individuals.
2. Evaluate the fitness of each individual in that population
3. Repeat on this generation until termination: (time limit, sufficient fitness achieved, etc)
4. calculate the size of task
5. while (size of task > 0)
Repeat
6. calculate rank of vm
call calc_rank()
7. if the rank <= totalrank/2
call mod_aco()
8. else
call mod_gen()
9. if task != finished
calculate fitness of vm
call calc_rank()
Return
else
stop
End While.

Procedure mod_aco()
Initial population;
For chr-num = 1 to Max-chr
Assign two solution for each ant
For each ant
For I = 1 to N
Select next node according to rank generated
Update pheromone locally
End For
//Solution of this ant is now completed
Apply 2-Opt local search on solution of this ant
Update pheromone globally by equation
End For.

Procedure mod_gen()
Initial population;
For chr-num = 1 to Max-chr
while (host == available & not Overload
And Underload)
select individuals to apply crossover;
apply crossover and generate individual(s);
set individual in sorted order as per fitness
if(random number < MR)
mutate new individual(s);
Add new individuals to population;
End While
Remove extra individuals from population;
End for.

Here, Two Algorithm Genetic and Ant colony Optimization is used. Where once the population is chosen fitness value is calculated based on fitness function. Size of task is calculated based on the rank of task where it is chosen use genetic or ant colony algorithm. Here, genetic algorithm is used to enhance load search and provides the basic means to search for an

optimal solution.ACO algorithm is an application is use as an application of genetic algorithm in order to design a connected algorithm. Pheromone trails, a method from Ant colony Optimization are used to influence the genetic algorithm.

IV. RESULTS AND DISCUSSION

The proposed virtual machine allocation technique is implemented using cloud sim. Here we used Three parameters named Scale up time, Scale out time and start up of virtual machine.
The VM start up time can be measured as the time between receiving the VM request and the time when the VM is ready to use.
The VM scale out time is taken to add additional VMs to currently running VMs.
Tso = Max (Tst)
Tso -VM scale out time
Tst = Set of Startup time
The VM Scale up time is taken to add additional CPU and/or Memory to running VMs.
Tsu = Tsn + Tst,
Tsn, Time taken to create Snapshot.

By calculating we get Startup time for VM is 0.2s
Scale out time = max (Tst)
Scale out time for VM is 0.2s

No.of VM	Total Time(ms)	Start-up Time(ms)
1	1.0	0.2
2	1.3	0.2
3	0.8	0.1
4	1.1	0.2
5	2.0	0.1
6	2.2	0.1
7	1.5	0.2
8	2.1	0.2
9	1.6	0.1
10	1.9	0.1

Table 1: Implementation Results

V. CONCLUSION

The use of energy aware virtual machine allocation algorithms for cloud computing framework provides great elasticity with the capability to allocate migrate virtual machines across physical machines. Goal of this project is to use minimum power utilization and improve the Energy Efficiency for allocation of virtual machine. We have found better results yet and will perform it with different parameters to check compatibility.
In future work we Implement and propose the energy efficient and virtual machine allocation system on Hardware.

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