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# EFFICIENT VIRTUAL MACHINE LOAD BALANCING USING CLOUD COMPUTING ENVIRONMENT

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***Abstract*:** Cloud computing is designed to provide a scalable and low cost way to delivering on-demand IT resource services over the internet. Over a period of time cloud computing experienced tremendous development . Nonethless, the economic model centered on hardware and software demand based on technological requirements (CPU utilization, memory...) or strongly contributed to productive use of computer resources. Load balancing is therefore a crucial aspect of cloud computing. Cloud computing requires optimizing the efficiency of the various services provided by the cloud providers to minimize SLA infringement, i.e,.high degree of security, availability and responsivity. As cloud computing is growing increasingly and customers are demanding better performance and more services, cloud resource scheduling and load balancing has become a very interesting and significant research field .Therefore SLAs are emerging as an important factor between consumers and providers. In the existing algorithms there are drawbacks due to their single objective. But in this work, we are considering multiple objectives and multiple parameters for balancing load across virtual machine and to achieve less power consumption and reduce SLA violation.

***Keywords:*** virtual machine, load balancing, cloud computing, Datacenter

## INTRODUCTION

Cloud computing allows users to access cloud based IT resources remotely. It is ubiquitous since it allows users to access clouds service from anywhere and anytime through internet. Cloud storage is a software platform that stores data on remote servers and allows users to access cloud-based data through an internet browser.

Cloud usually uses a "pay-as-you-go" model that can result in increased operating costs if managers are unfamiliar with cloud pricing models. Cloud infrastructure has a number of features such as measured usage, on- demand availability, multitenanacy . Clouds may belong to one organization or it may be accessible to several organization

Cloud computing mainly offers three type of services

Software as a service – software is provided as a cloud service to wide range of consumers.

Platform as a service – A ready-made ecosystem consisting of resources already installed and pre-configured is delivered to consumers as a service

Infrastructure as a service - Iaas provider offer computing, storage, networking and other components through internet.

There are mainly four cloud deployment models as follows:

Public cloud – It is managed by a third party cloud provider and is open to anyone wishing to use it via internet.

Private cloud – It is operated by a single organization and it is dedicated to that company only.

Community cloud – It is close to public cloud but its functionality is limited to particular cloud user network.

Hybrid cloud – public cloud and private cloud together form Hybrid cloud.

Load Balancing is a mechanism that allows to distribute workload uniformly among resources .Good Load balancing can improve the performance and capacity beyond what a single IT resource can provide.

Cloud Analyst is a tool whose purpose is to promote assessment of social network resources by consumer geographic distribution .It contains following entities:

Datacenter – It is a resource provider and contains set of hosts.

DataCenter Broker – It acts as an interface between user and datacenter.

Host – It consist of several virtual machines on which task is executed.

Virtual Machine – They are created using virtualization technique and responsible for executing cloudlet

## I. LITERATURE SURVEY

Efficient Load balancing guarantees optimal efficiency and SLA violations. This section reviews some of the existing load balancing algorithms.

In[1] introduced load balancing algorithm using fuzzy technique that holds the details in each virtual machine and number of requests that are allocated to a virtual machine when new request is sent. Fuzzy judgement has many advantages, such as easy to apprehend, versatile, tolerant of ambiguous statistics. The fuzzifier performs the fuzzification procedure in their proposed method and the fuzzifier takes two inputs such as speed of processor and VM load to produces output such as balanced load.
In[2] introduced enhanced honey bee algorithm for balancing load . This algorithm takes number of datacenter , number of virtual machines ,VM configuration and number of tasks as input and determines capacity of all virtual machines ,on the basis of which the weight is assigned to virtual machine and checks whether or not the load on virtual machine is balanced .if not assign the task to virtual machine based on the resource requirement.

In[3] introduced genetic algorithm for load balancing .this algorithm sorts the processes according to the cost and cost effective processes are taken for creating new chromosome by crossover. The Broker assigns process to virtual machine which has a sufficient space for process to run or else it searches next virtual machine for process
.
In[4] implemented the MTBLB algorithm that sets aws cloud watch to gather all requests for resources from all the users of the virtual machine for resources. All requests starts processing when aws cloud watch is set to zero, all requests start processing. It uses crone jobs for processing. Instead round robin is introduced to avoid the cycle of malnutrition, and the entire system operating time is reduced. This algorithm also uses awscloudwatch, cranejobs algorithm, and round robin in a single algorithm. This approach operates in chain sequence and generates efficient results.

In [5] Proposed improved central load balancer algorithm. This algorithm optimizes certain parameters such as data processing time, response time based on metrics such as overall response time ,throughput. Priority formulas is applied to select a suitable machine for incoming request. This algorithm reduces resource wastage .once priority function is evaluated ,analyse the parameters and based on that it selects best suitable machine for incoming request. Advantage of this algorithm was costeffectivenness, reducing resource wastage.

In [6] Proposed novel load balancing algorithm
.This algorithm prevents rapid over burdening of under loaded virtual machine .It considers threshold workload value for determining whether a given virtual machine is overloaded or not. it considers VM status and determines underutilized virtual machine and then transfers the task to underloaded virtual machine thus prevents over burdening of virtual machine.

In [9] proposed new load balancing strategy based on intermediary nodes. This algorithm stores intrinsic node attributes prior to the implementation of load balancing strategy .When a new task arrives at a node it sends a request signal to the intermediate node responsible for transmitting the signal to edge node, which returns its real time property values

In [10] proposed checkpoint based load balancing which is based on selection of services based on users requirement and ranking of corresponding services .It takes input as a set of services and calculates correspondence value, prefer value, priority value for each service and ranks each service based on check points , load balancing and priority values. In this approach simple ranking technique has been used which can be improved by other approaches which are based on rating of services can be used.

In [11] has suggested new algorithm for load balancing. This model splits the public cloud into several partitions. The cloud balancer and main controller plays significant role in determining the appropriate load balancing method for each partition . The benefits of this approach are that it simplifies load balancing and hence increases the performance and maintain stability. The strategy has the downside of scalability.

In [12] proposed a NVMMP algorithm which was based on virtual machine priority without SLA violation. Proposed algorithm selects subset of Virtual machine for migration which is having minimum execution done such that their maximum execution left. This algorithm helps to decrease network overhead by migrating only Non-Critical VMs,having longest job completion time left without disturbing critical Virtual machine having shortest job completion time left in first phase. This algorithm reduces network performance parameters like congestion, latency.
Sayda Khidr Fadlalah Ali[8] has developed an EDF load balancing algorithm to balance load across Virtual Machines . It implements EDF scheduling policy, assigns a certain number of cloudlets to cloud computing data center resources simulated by cloudsim, and assesses cloudlet efficiency by checking the number of hosts and variations in the deadline value when applying the same number of cloudlets using EDF policy. It evaluate cloudlet performance by comparing the number of hosts and the time-limit variance when uploading the same number of cloudlets using an EDF broker to evaluate cloudlet output results under an EDF broker. Therefore , EDF broker decreases the amount of cloudlets missing, waiting time, wall time and delay after the deadline.

K R Remesh Babu[7] suggested Enhanced Bee colony algorithm for efficient load balancing .This algorithm uses the feeding behavior of honey bees for successful load balancing across virtual machine and reschedules the cloudlets into virtual underloaded machine .The foraging behavior of honeybees is mapped into cloud environment in order to achieve load balancing .In this work, power of swarm intelligence algorithm is used to delete tasks from overloaded virtual machine, and these tasks are submitted to the most suitable virtual machine under loaded. This algorithm can be improved by optimizing Ant colony hybridization and optimizing particle swarm.

There are some algorithms which support static load balancing and others support dynamic load balancing. Many algorithms consider single objective for balancing load by taking into account various parameters such as a maximum capacity, minimum response time, cost efficiency , optimal usage of resources.

PM1, PM2…..PMm are the m physical machines

4. Virtual machines are assigned across the physical machines and balance the load of the virtual machine by considering energy consumption and SLA

II. PROPOSED SYSTEM

Load balancing in general increases device performance. Obviously, greater the difference between the rates of task arrival at different processors, the more unbalanced the system is. Therefore, more performance enhancement can be done with the load balancing algorithm.

In proposed work, based on current usage of physical machine and current usage of virtual machine, task allocation takes place. Here task is allocated to virtual machine which is having less usage.

1. Client sends the requests to the cloud.
2. Load balancer is deployed on top of cloud. It takes request from clients and distributes workloads uniformly across available virtual machines.
3. VM1, VM2….VMn are the n virtual machines

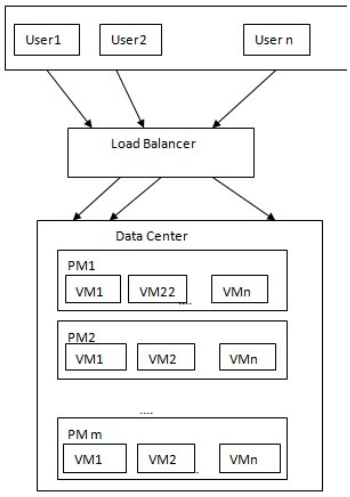



Figure1: Shows Load balancing mechanism

Algorithm:

VM_ALLOCATION( )

For each physical machine in datacenter

Get physical machine current usage

If physical machine usage is less than 0.5 Allocate VM to given PM

Update PM usage Step2:

For each physical machine in datacenter Sort the VM based on the usage Get VM usage

IF VM usage is less than 0.5

Allocate task to the current VM

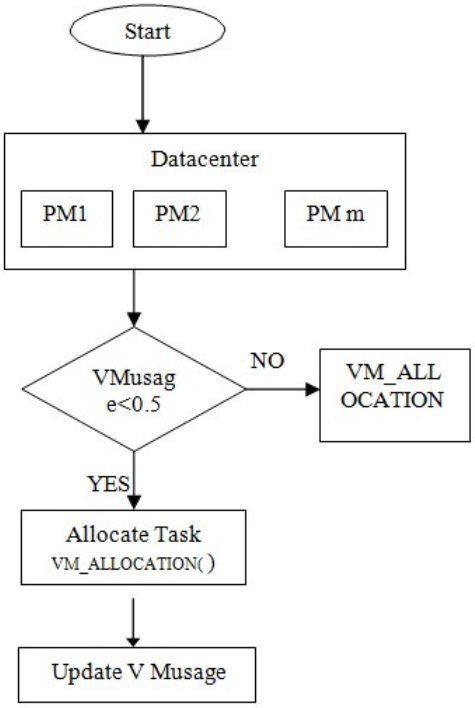
RESULTS AND DISCUSSION

Table 1: Represents the comparison of different ALgorithms

| SLNO | Existing Algorithm | Average Response time |
|---|---|---|
| 1 | Round Robin | 111.68 |
| 2 | Equally Spread current Execution Load | 111.65 |
| 3 | Throttled | 112.15 |
| 4. | Improved Throttled | 110.12 |

Else

FLOW CHART



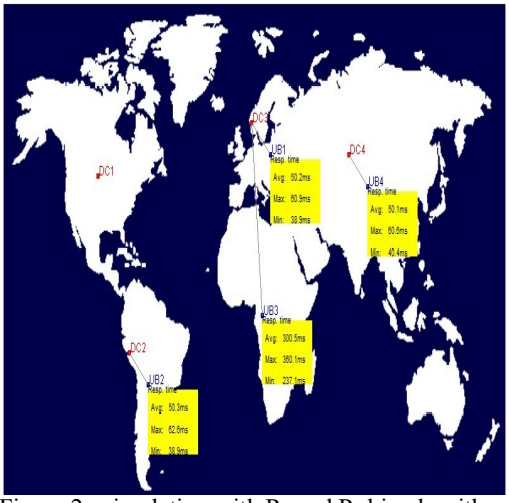



Figure 2 : simulation with Round Robin algorithm

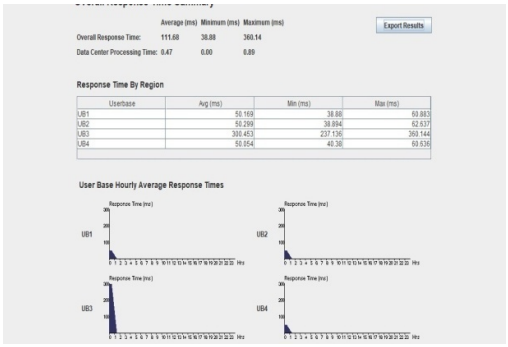



Figure3: Response Time Summary for Round Robin algorithm

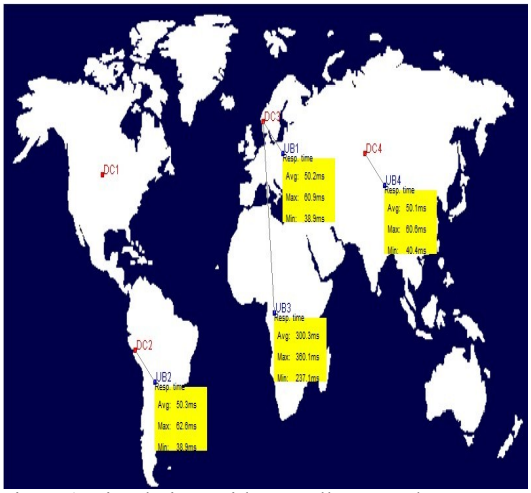



Figure4: simulation with Equally spread current execution load algorithm

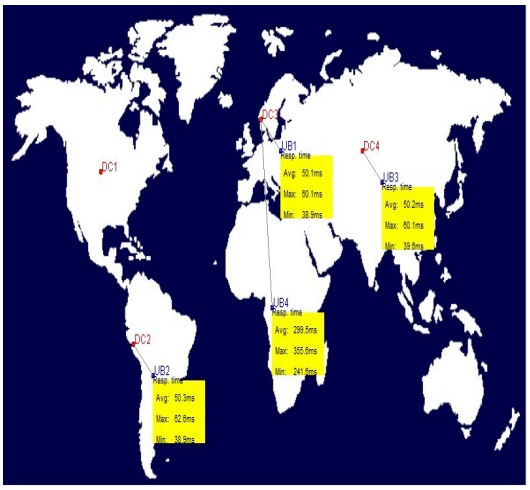



Figure5:Response Time Summary for Equally spread current execution load


Figure6:simulation with Throttled algorithm


Figure7: Response Time summary for Throttled algorithm

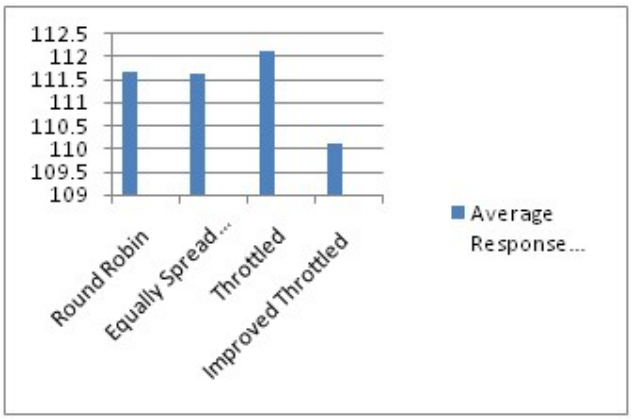


Figure 8: Shows the Comparison of Existing system with proposed Improved throttled Algorithm.

Above figures shows simulation results and response time for certain algorithms in cloud analyst. Simulator consists of 6 regions represented as R0, R1, R2, R3, R4, R5.

Figure2 represents simulation results using Round Robin algorithm..In this algorithm time will be considered at various slices and every node is assigned a particular time interval. Incoming requests are allocated to virtual machine in round robin fashion.

Figure3 represents the response time summary for Round robin algorithm

Figure4 represents the simulation results for equally spread current execution load. This algorithm makes all balancer to assign a same quantity of load to all VM that are present in datacenter .Load Balancer maintains assigned requests of Virtual machine and a hash table. When any new request arrives it scans the hash table to identify lightly loaded virtual machine

Figure5 represents the response time statistics for Equally spread Current Execution Load algorithm.

Figure6 represents the simulation results for Throttled load balancing algorithm. Throttled load balancer maintains index table of virtual machines. This index table contains status of all virtual machines. When the request arrives for the first time since all the virtual machines are available it allocates a request to suitable virtual machine. similarly when requests arrive it scans it index table to find whether suitable VM is available or not .If it is available it returns VM id..

Figure7 represents response time summary for Throttled load balancing algorithm.

## VII. CONCLUSION

Cloud computing allows resources to be accessed remotely through internet. It allows large number of users to access scalable, distributed it resources in cloud via internet. cloud computing faces serious obstacles . Load balancing is one of the major challenge. To overcome this problem many algorithms and broker policies are designed and analysed.

Load Balancing is very important in cloud computing since it increases performance, reduces SLA violations and also helps to achieve maximum throughput, minimum response time, cost effectiveness. It allows to distribute workload uniformly among resources .The proposed work balances the load based on the current usage of physical and virtual machine.

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