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"Implementation of Load balancing in Cloud computing thorough Round Robin & Priority using cloudSim"

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Abstract

Load balancing in the cloud-computing environment has an important impact on the performance. Good load balancing makes cloud computing more efficient and improves user satisfaction. Load balancing with cloud computing provides a good efficient strategy to several inquiries residing inside cloud computing environment set. complete balancing must acquire straight into accounts two tasks, one will be the resource provisioning as well as resource allocation along with will be task scheduling throughout distributed System. Round robin algorithm can be via far the Easiest algorithm shown to help distribute populate among nodes. Because of this reason it is frequently the first preference when implementing a easy scheduler. One of the reasons for it being so simple is that the only information required is a list of nodes. The proposed algorithm eliminates the drawbacks of implementing a simple round robin architecture in cloud computing by introducing a concept of assigning different time slices to individual processes depending on their are priorities.

Keywords: Cloud Computing, load balancing, Virtual Machine, Round Robin, Datacenter Broker, Host, Cloudlets and Cloud Coordinator.

1. Introduction:

Load balancing in the cloud computing environment has an important impact on the performance. Good load balancing makes cloud computing more efficient and improves user satisfaction. This article introduces a better load balance model for the public cloud based on the cloud partitioning concept with a switch mechanism to choose different strategies for different situations. The algorithm applies the game theory to the load balancing strategy to improve the efficiency in the public cloud environment.A typical Cloud model applying CloudSim involves after four entities Datacenters, Hosts, Virtual m/c in addition application form along with system Software.

1. **Datacenter:** Datacenter is set of host. This can be responsible regarding managing virtual models (VMs) (e.g., VM provisioning). It behaves similar to a IaaS provider from finding requests with regard to VMs via brokers.

2**. Datacenter Broker:** This class represents the broker acting on behalf of a user. It modifies a couple of mechanisms: ones mechanism for submitting VM provisioning requests to be able to data centers and mechanism with regard to submitting tasks to VMs.

3. Host: Host executes actions regarding management of VMs (e.g., creation along with destruction) and update task processing to be able to VMs. a good host possesses the defined policy to provisioning memory, processing elements, and also bandwidth to virtual machines. a good host is associated for

you to the data center. The idea can host virtual machines.

4. VM: This represents the software implementation of a machine that executes applications called virtual machine (VM) which functions to be a physical machine. Each virtual machine divides your own resources received by the host among tasks working from it.

5. Cloudlet: The cloudlet class can be also known as being a task. CloudSim represents your complexity of the application in relation to their computational requirements. the class is managed through the scheduling policy that will be implemented Inside Datacenter Broker Class.

2. Literature Review

Saurabh Kumar Garg [2011] et. al. We presented the main components of the Network-CloudSim with their functionality and how different network topologies and different parallel applications can be modeled. The evaluation results show that Network CloudSim is capable of simulating Cloud data center network and applications with communicating tasks such as MPI with a high degree of accuracy. The further evaluation of task assignment and scheduling policies shows how Network CloudSim can help in building advance scheduling and resource allocation mechanisms for Clouds. We also showed that by observing the impact of shared network on the performance of datacenters researchers can optimize the data center usage. This can in turn help in the development of more power efficient resource management schemes rapidly before committing time and resources in building complex software and network systems that operate within Cloud data centers.
Even though flow network model is sufficient for most network calculations still it is not very accurate when compared to packet level model. In future, we will integrate packet level network model in CloudSim so that users can simulate those Cloud applications which require precise network configurations.

RajkumarSomani [2014] et. al. Though some factors were considered in this work to check the efficiency of the proposed algorithm, still there is a lot to be done. The proposed algorithm can be compared with more available algorithms implemented in real environment. Cost could not be decreased in the proposed algorithm. The hybrid approach gave better results in terms of Response time, Data center request serving time and Data center processing time, when compared with results of Round robin algorithm, Throttled algorithm and equally spread current execution algorithm separately. The proposed hybrid algorithm was efficient in case of same data size per request as well as for different data size per request.

YogitaChawla [2013] et. al. Dynamically optimized task scheduling when combined with task grouping helps reducing the processing time as well as cost. This type of scheduling is beneficial to both user and cloud provider. Using task grouping algorithm for scheduling after prioritization, the processing time is reduce over the algorithm without task grouping. When the virtual machine is selected dynamically on the basis of cost and processing power, the cost is further reduced over the sequential virtual machine selection which the default of CloudSim. Thus the processing cost and time is minimum when both grouping and dynamic optimization are combined.

Er. Shimpy [2014] et. al. In this paper we discuss the different types of scheduling algorithms. Most appropriate technique for scheduling is the heuristic technique. Scheduling is one in all the foremost vital task in cloud computing atmosphere. During this paper we've got analyze varied programming algorithmic rule and tabulated varied parameter. we've noticed that disk space management is vital issue in virtual atmosphere. Existing programming algorithmic rule provides high turnout and is value effective

however they are not working on availableness. Therefore we'd like algorithmic rule that improve availableness and time in cloud computing atmosphere.

B Preethi [2014] et. al. Choosing right load balancer at the beginning is imperative to the success of complex implementations later. So far we studied about the various load balancing algorithms. The proposed algorithm least VM assign method distribute workload across multiple computers to achieve optimal resource utilization with minimum response time. Thus problems in existing algorithms are overcome in proposed method thus achieving increased resource utilization, minimum response time and maximum user satisfaction. Cloudsim simulator is used for algorithm implementations. Cloud sim is a framework which enables modeling and simulation and experimenting on designing Cloud computing infrastructure self-contained platform which can be used to model data centers, hosts, service brokers, scheduling and allocation policies.

Nusrat Pasha [2014] et. al. A virtual machine is a virtual form of computer hardware within software. Virtual machine is a software implementation that executes programs as if they were actual physical machines. We also gives the detailed review on existing scheduling algorithm. The proposed Round Robin VM Load Balancing and existing Round Robin algorithm implemented Java language for implementing VM scheduling algorithm in CloudSim toolkit. Assuming the application is deployed in one data centers having virtual machine (with 2048 Mb of memory in each VM running on physical processor capable of speed of 1000 MIPS). These experimental results shows that Round Robin VM Load Balancing method improves the performance by consuming less time for scheduling virtual machine.

Tejinder Sharma [2013] et. al. In this paper, a new enhanced and efficient scheduling algorithm is proposed and then implemented in cloud computing environment using CloudSim toolkit, in java language. By visualizing the cited parameters in graphs and tables we can easily identify that the overall response time and data centre processing time is improved as well as cost is reduced in comparison to the existing scheduling parameters. The future work includes to overcome the problem of deadlocks and server overflow. We can also implement a new service broken policy in the simulator.

LipikaDatta [2015] et. al. From the above comparisons it can observed that the proposed algorithm is better than some existing algorithms for real time task scheduling in terms of Average Turnaround time, Average Waiting time and number of context switches in most of the cases. If the CPU burst times of the processes vary very widely the algorithm doesn't produce good result. In the other cases the quality of service can improved and overhead can be reduced. Thus memory space which is an important constraint for embedded system applications can be saved. Deadlines of tasks can be considered in future as a new parameter while calculating the time quantum in each round.

GaochaoXu [2013] et. al. Load balancing in the cloud computing environment has an important impact on the performance. Good load balancing makes cloud computing more efficient and improves user satisfaction. This article introduces a better load balance model for the public cloud based on the cloud partitioning concept with a switch mechanism to choose different strategies for different situations. The algorithm applies the game theory to the load balancing strategy to improve the efficiency in the public cloud environment.

Soumya Ray [2012] et. al. This paper presents a concept of Cloud Computing along with research

challenges in load balancing. It also focus on merits and demerits of the cloud computing. Major thrust is given on the study of load balancing algorithm, followed by a comparative survey of these above mentioned algorithms in cloud computing with respect to stability, resource utilization, static or dynamicity, cooperative or non-cooperativeness and process migration. This paper aims towards the establishment of performance qualitative analysis on existing VM load balancing algorithm and then implemented in CloudSim and java language. Execution analysis of the simulation shows that change of MIPS will affect the response time. Increase in MIPS vs. VM decreases the response time. It is observed with thorough study that, load balancing algorithm works on the principle on which situation workload is assigned, during compile time or run

time. Depending on the compile timeor run time it may be static or dynamic. Static algorithms are more stable than dynamic algorithm and it is easy to predict the behavior of static algorithm also. Dynamic algorithms are really works better in case of distributed environments. Novel dynamic load balancing algorithm will be proposed and implemented as a future course of work. It is also necessary to propose a simulation model to evaluate the parameters or components in order to handle the random selection based load distributed problem.

Dr. AmitAgarwal [2014] et. al. Scheduling is one of the most important tasks in cloud computing environment. In this paper we have analyzed various scheduling algorithm which efficiently schedules the computational tasks in cloud environment. We have created FCFS, Round robin scheduling Algorithm and new proposed Scheduling algorithm is (GPA) generalized priority algorithm. Priority is an important issue of job scheduling in cloud environments. The experiment is conducted for varying number of Virtual Machines and workload traces. The experiment conducted is compared with FCFS and Round Robin. The result shows that the proposed algorithm is more efficient than FCFS and Round Robin algorithm.

MayankaKatyal [2013] et. al. Load Balancing is an essential task in Cloud Computing environment to achieve maximum utilization of resources. In this paper, we discussed various load balancing schemes, each having some pros and cons. On one hand static load balancing scheme provide easiest simulation and monitoring of environment but fail to model heterogeneous nature of cloud. On the other hand, dynamic load balancing algorithm are difficult to simulate but are best suited in heterogeneous environment of cloud computing. Also the level at node which implements this static and dynamic algorithm plays a vital role in deciding the effectiveness of algorithm. Unlike centralized algorithm, distributed nature of algorithm provides better fault tolerance but requires higher degree of replication and on the other hand, hierarchical

algorithm divide the load at different levels of hierarchy with upper level nodes requesting for services of lower level node sin balanced manner. Hence, dynamic load balancing techniques in distributed or hierarchical environment provide better performance. However, performance of the cloud computing environment can be further maximized if dependencies between tasks are modeled using work flows

3. Problem Domain:

In Current Scenario, with an environment of cloud the task is divided and disseminated into same size of small jobs i.e. Cloudlets. These Cloudlets as well as Virtual Machines are scheduled according to the various scheduling policy for e.g.

FCFS, Round Robin etc. Generally in Cloud Computing scenario user submit the task to be performed / executed. Cloud Coordinator (CC) divides the task into equal sized cloudlets and passes it to DataCenter (DC). Normally it takes a lot of time because the cloudlets are processed one at a time in FCFS manner as and when they reach to VM. VM executes the cloudlets present in the queue as they reach the VM's. Basically this default job scheduled policy is extremely Time- Consuming, Cost insensitive and inefficient.

4. Aim

Our aim is implement Round Robin with Priority scheduling policy for VM using Cloudsim3.0.we will also implement combination of load balancing algorithms like Round-Robin with priority and less resources first. This synopsis aims towards the establishment of performance qualitative analysis on existing VM load balancing algorithm and then implemented in CloudSim and java language.

5. Objective:

In CloudSim3.0 normally overriding two classes VM Scheduler Space Shared and VM Scheduler Time shared we can implement FCFS and Round Robin scheduling policy respectively. But here we may do same thing using overriding few Classes like Datacenter, Datacenter Broker, Host, Cloudlet, Circular Host, Round Robin, V M Allocation Policy etc.

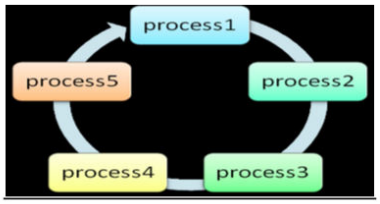
6. Existing System:

Cloud computing is efficient and scalable but maintaining the stability of processing so many jobs in the cloud computing environment is a very complex problem with load balancing receiving much attention for researchers. Since the job arrival pattern is not predictable and the capacities of each node in the cloud differ, for load balancing problem, workload control is. Crucial to improve system performance and maintain stability. Load balancing schemes depending on whether the system dynamics are important can be either static or dynamic. Static schemes do not use the system information and are less complex while dynamic schemes will bring additional costs for the system but can change as the system status changes. A dynamic scheme is used here for its flexibility.

There are three types of VM Load Balancer that is Round Robin, Throttled and active monitoring load balancing algorithms.

Round Robin Load Balancer:-

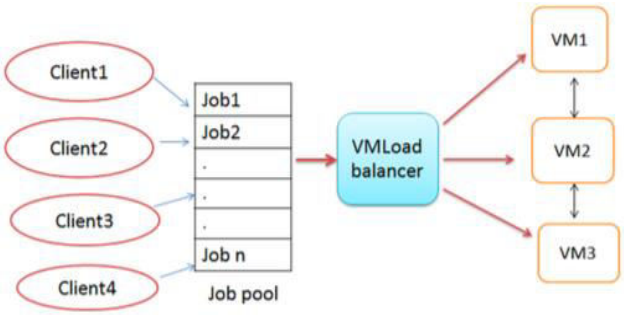
It is one of the simplest scheduling techniques that utilize the principle of time slices. Here the time is divided into multiple slices and each node is given a particular time slice or time interval i.e. it utilizes the principle of time scheduling. Each node is given a quantum and its operation. The resources of the service provider are provided to the requesting client on the basis of time slice.



Throttled Load Balancer (TLB)-

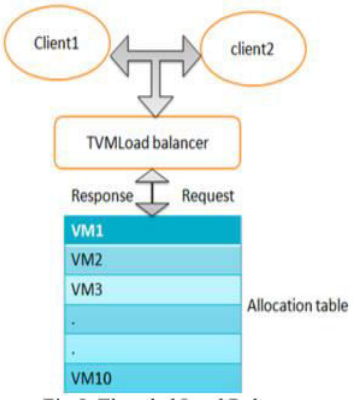
This algorithm ensures that pre-defined number of cloudlets is allocated to a single VM at any given time. If there are more request groups are present than the number of available VM's at data centre

allocate incoming request in queue basis until the next VM becomes available.



Active Monitoring Load Balancer (AMLB)-

The Active Monitoring Load Balancer maintains information about each VM's and the number of request currently allocated to which VM when a request is allocate a new VM arrives. If there are more than one VM, the first identified is selected AMLB returns the VM id to the data centres controller. The data centres controller send the request to the VM identified by that id. The data centre controller notifies the AMLB to new allocation and cloudlets is sent to it.



CLOUDSIM

CloudSim is the many efficient tool you can use with regard to modeling regarding Cloud. during your current lifecycle of an Cloud, CloudSim allows VMs for you to be managed coming from hosts that will inside turn are usually managed by datacenters.

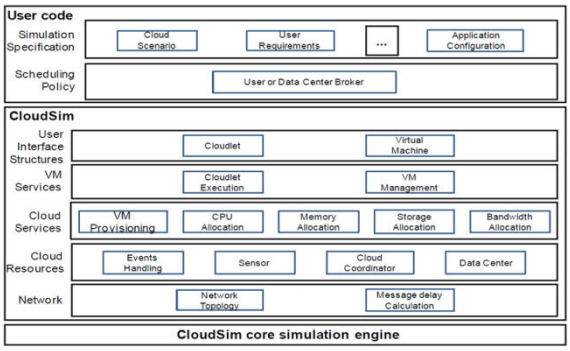


Fig. CloudSim Architecture

CloudSim offers architecture inside four uncomplicated entities. these types of entities offer consumer to set-up the basic cloud computing environment as well as measure your effectiveness involving fill up Balancing algorithms.. Datacenters entity features the responsibility of providing Infrastructure level solutions for the Cloud Users. They act as a home to help a lot of Host Entities or maybe a lot of instances hosts' entities aggregate to help application form the solitary Datacenter entity. Hosts with Cloud are usually Physical Servers The idea have pre-configured processing capabilities. Host is actually responsible regarding providing Software level SERVICE towards Cloud Users. Hosts have their particular storage and memory. Processing features regarding hosts is usually expressed throughout MIPS (million instructions per second).

Algorithm: **Modified Round RobinAlgorithm()**

The Proposed round robin algorithm is as follows:

Step1.

set all the VM allocation is zero and record of each VM index by Round Robin load balancer.

Step2.

a. user request/task/cloudlet receives by data center receivers..

b. On the base of priority allocated virtual machine and calculate range (R)

R=Max Burst Time+Min Burst Time

c. Basis of range and priority, load balancer allocate the time quantum to user request

Step 3.

After the complete of task(cloudlets),VM are allocated to other user request..

Step4.

Checks new /pending/waiting requests in queue by data center controller.

7. Proposed System:

It is a static fill up balancing algorithm, that does not take the previous fill up state of an node for the day involving assigning jobs. This makes USE of your round robin scheduling algorithm regarding allocating jobs. The item selects your very first node arbitrarily and then, allocates jobs for you to just about all additional nodes in an round robin manner [15]. the actual algorithm is effective from random menus of the virtual machines. the datacenter controller allocates your requests for you to a record of VMs with a good rotating basis. your current primary obtain can be assigned to an VM selected randomly by the group subsequently ones details Center controller assigns your requests in the circular order. soon after your own VM is actually allotted your request, your own VM is usually shifted towards end of a record [13].

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Modified Round Robin:

The proposed algorithm eliminates the drawbacks of implementing a simple round robin architecture in cloud computing by introducing a concept of assigning different time slices to individual processes depending on their are priorities. User assigns the priority of a processexternally. In the proposed architecture when a new process arrives in the system it is queued at a small processor. This small dedicated processor is used to calculate the time slices of each process, arranges the processes in ascending order of their burst times and then creates the ready queue for the main processor. This small dedicated processor is used to reduce the burden of the main processor. The processes then execute in the main processor according to round robin scheduling algorithm with their individual time slices. Whenever a new process arrives in the system ready queue, its time slice is calculated and enquired to the main processor's ready queue.

Whenever a process completes its execution it is removed from both the system ready queue and the main processor ready queue. The process continues until the main processor ready queue becomes empty. I am assuming that lesser number implies higher priority

CloudSim Simulator

CloudSim [12] is the many efficient tool you can use with regard to modeling regarding Cloud. during your current lifecycle of an Cloud, CloudSim allows VMs for you to be managed coming from hosts that will inside turn are usually managed by datacenters.

CloudSim offers architecture inside four uncomplicated entities. these types of entities offer consumer to set-up the basic cloud computing environment as well as measure your effectiveness involving fill up Balancing algorithms.. Datacenters entity features the responsibility of providing Infrastructure level

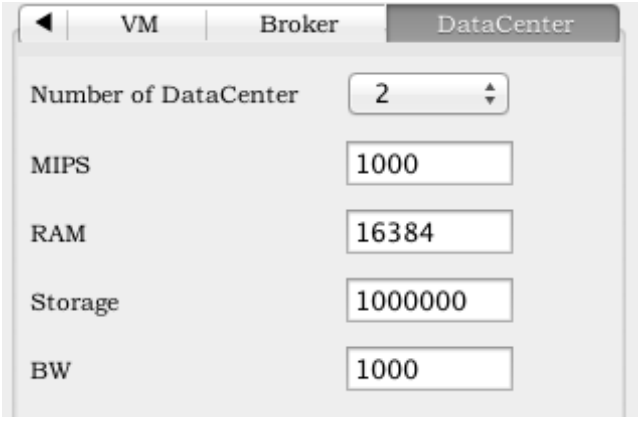
solutions for the Cloud Users. They act as a home to help a lot of Host Entities or maybe a lot of instances hosts' entities aggregate to help application form the solitary Datacenter entity. Hosts with Cloud are usually Physical Servers The idea have pre-configured processing capabilities. Host is actually responsible regarding providing Software level SERVICE towards Cloud Users. Hosts have their particular storage and memory. Processing features regarding hosts is usually expressed throughout MIPS (million instructions per second).

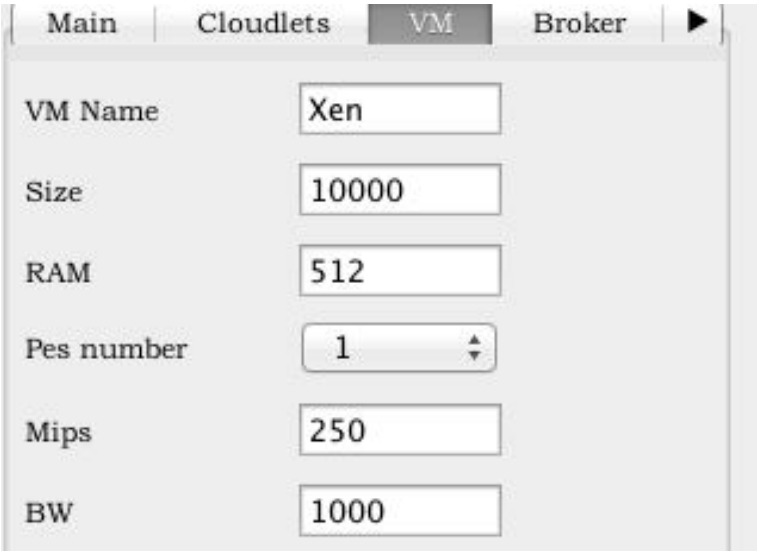
They act to be a home in order to Virtual products or many instances regarding Virtual machine entity aggregate in order to form a Host entity. Virtual Machine will allow development and deployment connected with custom form help models.

They usually are mapped to a great host That matches it\'s critical characteristics like storage, processing, memory, software as well as availability requirements. Thus, similar instances involving Virtual Machine are mapped in order to same instance of your Host based on their availability. Form as well as system software are generally executed from Virtual Machine on-demand.

8.Result Analysis:

Proposed system implemented in NetBeans using advanced JAVA. Cloud simulator is simulated for simulation with different configuration. Before simulation we configure many parameters like number of datacenters, number of cloudlets, VM configuration, bandwidth and MIPS.Round Robin and Modified Round Robin evolution with following configuration which show in below.





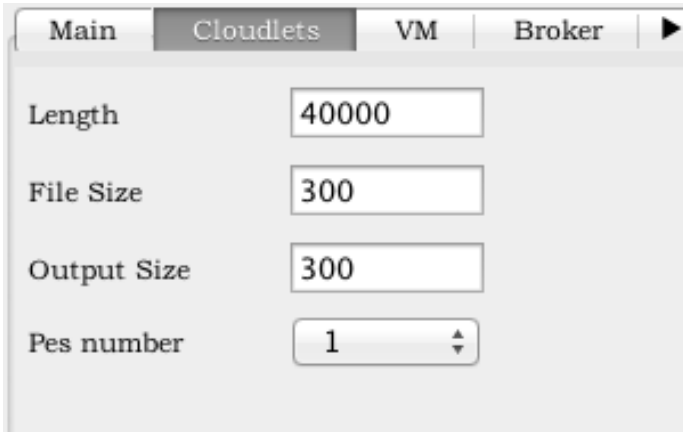


Figure 8.1: Configuration Details of Cloud-Sim Simulator

8.1 Result Evaluation:

We apply Round Robin algorithm on above configuration with the help of cloud-sim simulator. In below show that execution cloudlets, amount of time needed for execution, it is also showing that which cloudlets assign on which datacenter and virtual machine. Response time of each cloudlets is calculate and shown in diagram.

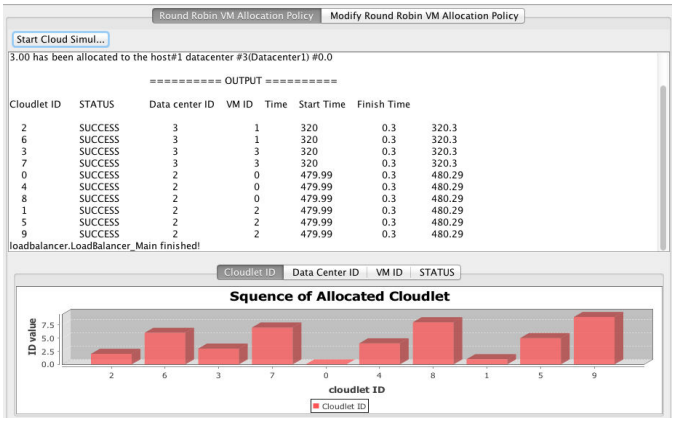
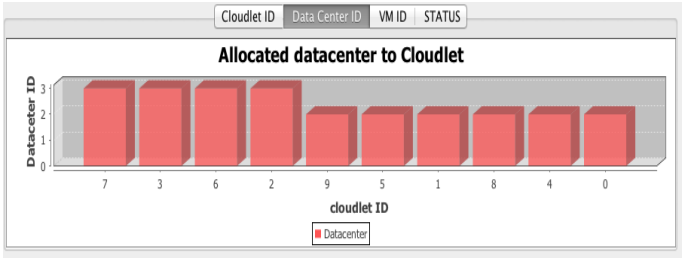


Figure 8.2: Response Time of cloudlets using Round Robin Load Balancing Algorithm

Above snapshots consist of the different Response time of different process including Start time and finish time. So we can easily identify the Response time of each process by above snapshot.



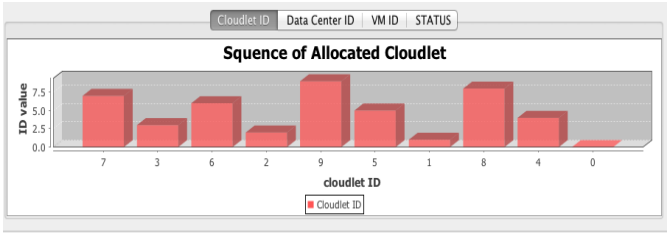


Figure 8.3: Data Centers and VM Allocation using Round Robin Load Balancing Algorithm

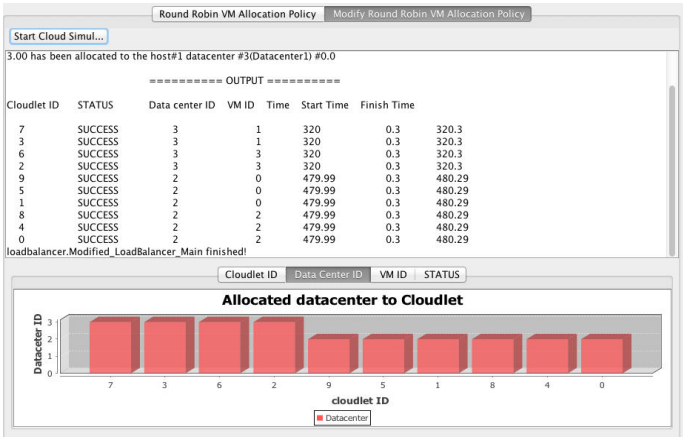


Figure 5.3: Response Time of cloudlets using Modified Round Robin VM Allocation Policy

5.3 Comparison of Existing & Proposed Algorithm:-

We apply Modified Round Robin algorithm on above configuration with the help of cloud-sim simulator. In below diagram 5.4 show that execution cloudlets, amount of time needed for execution, it is also showing that which cloudlets assign on which datacenter and virtual machine.

5.3 Comparison of Existing & Proposed Algorithm:-

We apply Modified Round Robin algorithm on above configuration with the help of cloud-sim simulator. In below diagram 5.4 show that execution cloudlets, amount of time needed for execution, it is also showing that which cloudlets assign on which datacenter and virtual machine.

Table 5.1 Waiting Time Comparisons between algorithms

Cloudlets	**Existing Algorithm**	**Proposed Algorithm**
4	40	12
7	78	40
10	93	65
15	138	110
20	178	160
Average	**105**	**79**

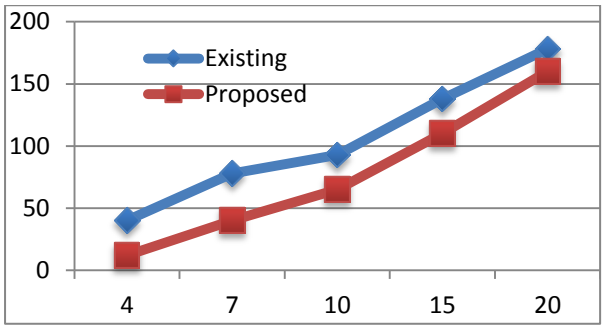
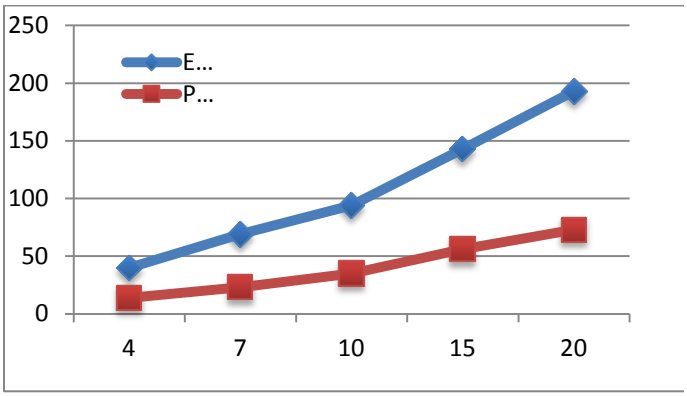


Figure 8.4 Waiting Time Comparisons between algorithms

Table 8.1 Response Time Comparisons between algorithms

Cloudlets	**Existing**	**Proposed**
4	40	14
7	69	23
10	94	35
15	143	56
20	193	73
Average	**107**	**41**



9. CONCLUSION

Cloud Computing along with research challenges in load balancing. It also focus on merits and demerits of the cloud computing. Major thrust is given on the study of load balancing algorithm, followed by a comparative survey of these above mentioned algorithms in cloud computing with respect to stability, resource utilization, static or dynamicity, cooperative or non-cooperativeness and process migration.

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