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An Efficient Enhanced Dynamic Load Balancing Weighted Round Robin Algorithm for Virtual Machine in Cloud Computing

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Abstract
Cloud Computing is A Remarkable technology in the IT field Various services are provided by the cloud computing over the internet. According to the usage computing resource services IT charges in the cloud Yahoo, Amazon, Google are some of the cloud used organisations which are having number of users.Cloud Computing is an internet based computing approach.So there is a sharing of applications resources and software in between the computing devices.Mentioning of loads in cloud environment is most challenging issue.Balancing of float in the main intention in making of visual machine balance which not be overload or underload.An efficient and its dynamic load balancing weighted Round Robin algorithm for virtual machine in cloud computing is presented in this paper.Task or uses the modified algorithm of inspired Honey Bee behaviour and for balancing the workload on virtual machine uses the modified Round Robin Algorithm in the cloud system.By using this energy system performance is improved minimum completion time can be achieved and better resources are utilized.The efficiency of this load balancing method is better than the previous methods.
Keywords: *Load Balancing,Cloud Computing,Virtual Machine,Modified Round Robin.*

1 Introduction

Large-scale distributed and parallel computing systems are widely used in present days which are controlled by the advanced computer networking technologies. For developing the virtual computing Cloud computing is most used technique and it is a field of information technology [1].

In many services are delivered by the cloud computing as storage, servers, networking, databases, analytics, software and mostly in Internet [2]. To the user many benefits are given by the cloud computing as flexibility, scalability, virtualization and demand services. So many universities and organizations are attracted by the public clouds. In cloud environment the number of challenges is increased with the increment in number of users. Challenges or problems are such as data loss, communication delay, heterogeneity, security and load balancing. Among these one demanding issue is load balancing in the cloud service providers [3].

Several algorithms are proposed to achieve this problem and these load balancing algorithms are makes the systems effectively, to worldwide. As skin cancer is getting common all over the world, it is really crucial to detect the cancerous cell as early as possible so that the mortality can be controlled. Although there have been many research for early detection of skin cancer, effective study cannot be found yet [2]. Cancer is mainly classified as melanoma or non-melanoma. Melanoma refers to those cells which are harmful where non-melanoma are non-harmful cells. As utilize the cloud resources of software and hardware and thus resource utilization and throughput are maximized [4]. Different load balancing techniques are evolved with the increasing the load balancing issues. Performance of the system is increased by dropping the load balancing response time. Load balancing techniques are classified into two groups in general namely as static load balancing technique and dynamic load balancing technique [5]. Information with average execution time, arrival time and require amount of resources, to the virtual machines requests are assigned in static load balancing technique. The requests are assigned in the

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order only [6]. Stable and homogeneous environment systems cannot accept the dynamic changes in the structure so these are not flexible. So homogeneous or stable environments static load balancing techniques are gives the best results. In dynamic or heterogeneous environment [7] efficient results are produced by using the dynamic load balancing technique and it is flexible in this field. At the time of execution, load conditions are considered in making decisions for request transfer by using the Dynamic load balancing algorithms. Dynamic load balancing technique is having some addressing issues so to the processor hosts workload is not assigned in statically. Load balancing operation is having a problem of load balancing decision of host which includes the migration and collection of information between the hosts is solved [8].

2 Cloud Computing and Load balancing

2.1 Cloud computing (CC)

By using the delivery service of computing, cloud computing is better to understood. Some online services are surrounded by the cloud environment. Services are online gaming, online compiler storage space and etc. Online is used by the various resources of cloud computing [9]. Some payable or free services are offered by the cloud. Day-to-day enhancements in the cloud are required to improve the performance. In present many companies such as Microsoft, Amazon, Apple, Google and so on are uses the cloud computing technology. Various locations are acquired by the various data centers in the cloud. A data center can accept the requests from the user and provides its service to the user. Online platforms some as online video gaming, online compiler, online music player and data storage space are offers by the cloud and the user has to pay for the services [10]. Three types are present in the Cloud deployment. These are:

a. Public: It is a standard model and in this cloud the service should be public. Most of these services are free of cost for the user [11].

b. Private: In this Private cloud, for the selected users service is provided and this service is highly secured. Some additional features are also provided in this cloud. The users should pay for all these services in this cloud [12].

c. Hybrid: The integration of public cloud and private cloud yields the hybrid cloud. IT infrastructure is enhanced by using this hybrid cloud. More data deployed options are provided in this hybrid cloud [13].

In present days cloud computing is one new improving technology used by the most of the companies in their infrastructure. One of the modern technologies is cloud computing (CC). Based on the qualities of cloud, the services of cloud are divided into three types as

Software as a Service (SAAS)
Infrastructure as a service (IAAS)
Platform as a service (PAAS)

The operation on the service should be like stack because services are processed in the form of layers. In the present era most of the companies are shows their interest towards to cloud computing (CC).

2.2 Load Balancing (LB)

Improvement in the cloud computing is can be achieved by the process of cloud computing with the load balance (LB).In uniform manner the load can be distributed among the nodes [14]. By using several algorithms load balancing process is achieved. According to cloud computing, load balancing is works. The distribution of the load is processed by using the load balancer in uniform manner. Load balancing algorithm is maintains a main role in the Software as a Service (SAAS). This algorithm must have some features as less turn-around time, good performance and good response time. Performance of the cloud computing is improved by good load balancer. The load balance algorithms are categorized as two:

a. Static: The stable and homogenous system environment uses this static algorithm. Changing of loads in this system is independent of the present system status so command is required in this static algorithm about the system resources. Less variation of loads are taken because of decent mixture of algorithm.

b. Dynamic: Both homogeneous and heterogeneous environments are uses the modified dynamic algorithm effectively. The system current state is utilized by the Dynamic load balancing. Managing the loads of the system must use the current state of its [15]. But its speed is quite slow while comparing with the static algorithm. The static algorithm is designed for the heterogeneous request only. Load balancing algorithm main aim to improve the request allocation to VM. Between the developer and user an agreement is required which is namely as service level agreement (SLA). By using this agreement the algorithm is properly implemented in successful manner.

3 Efficient Enhanced Dynamic Load Balancing

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Algorithm

In the cloud environment, an efficient load balancing model is presented by this paper to overcome the disadvantages of previously existed systems such as high cost and more completion time. First the processes are short listed according to the cost for getting outputs as cost and effective. By using honey bee algorithm, cost effective processes are taken and VM's are selected to create new crossover. Then, effective processes which are based on the time and cost are assigned to the clients. Scheduler and load balancer are the two sections which are used in this paper. A suitable virtual machine which is having low load can be discovered by the logic of scheduler and then it assigns a task for the virtual machine by using the modified round robin algorithm based on user request in the cloud. In the cloud environment, the tasks from the over loaded virtual machines are removed by the load balancer and these tasks are transferred to the under loaded machines in order to maintaining the load. The priority based tasks are used in the load balancing algorithm of modified honey bee behavior and if there no priority for the tasks then that tasks are used the load balancing modified round robin algorithm (MRRA).

The main aim of the proposed work is completion time as minimum, improvement in the system performance and best usage of resources of cloud. Minimum completion time can be assigned to the task of the virtual machine. Minimum number of priority tasks is owned by the virtual machines because of modified honey bee algorithm. Two types of parameters are considered by the modified algorithm of honey bee behavior; in that first one is high priority tasks in the virtual machines are minimum and second is maintaining of minimum completion time in the virtual machines for tasks. Enhanced dynamic load balancing weighted round robin algorithm[19] for Virtual Machine (VM) in cloud computing[20] is presented in the below Fig. 1

Algorithm

Step 1: Start
Step 2: processes are to be select
Step 3: List out the processes based on the cost (cost on the basis of service)
Step 4: If ((Distance && resource requirement && process length) <= Threshold value) // assume threshold value =35%
Cost effective process for VM

Else Costly process // search next vm

Step 5: Configuration can be done after entering the number of VMs, DCs, task
Step 6: In the virtual machine current load state to be determined.
Step 7: According to the loads, the virtual machines are to be arranged as lowest loaded to highest loaded machines.
Step 8: Based on the Modified Round robin algorithm, the incoming tasks are assigned to the virtual machines with low loads.
Step 9: If (distance of vm and process < threshold)
If (vm have sufficient-space for process run)
Process assign to VM
Else Search next VM for process
Else Not sufficient
Step 10: For new arrival process, 2 to 8 steps are repeated.
Step 11: VM is assigned by the Process.
Step 12: Exit

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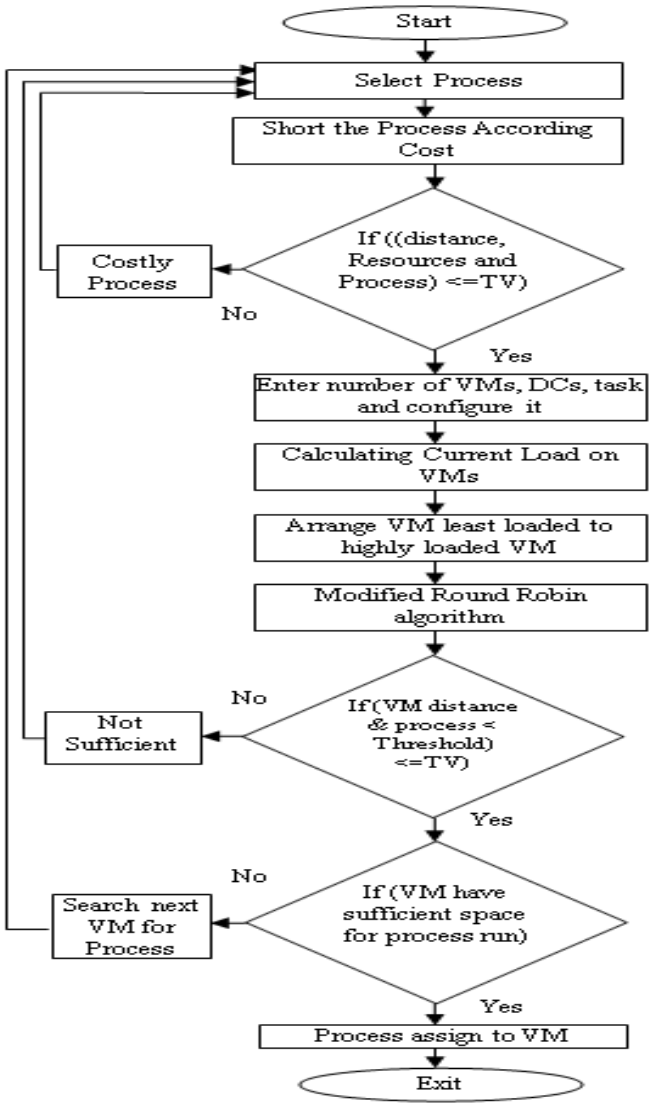

Fig. 1. Frame work of Enhanced Load Balancing Algorithm for VMs in Cloud Computing

The virtual machines are first grouped according to the loads by using the Modified Honey Bee behavior inspired algorithm [21]and then they are arranged in descending order based on the loads. Tasks in the virtual machines are sorted based on the priority (high execution time). Afterward allocates the Virtual Machine as

1. Task with High (Th)

→ VMd | min(∑Th) & *Expected minimum completion time*

2. Task with Medium (Tm)

→ VMd | min(∑Tm + ∑Th) and

Expected minimum completion time

3. Task with Low priority (Tl)

→ VMd | min(∑T) and Expected minimum completion time

As per newly added task the number of the tasks is modified to VMd and for both virtual machine VMs and VMd, the priority based tasks and load can be modified. Then updated loads are takes into action.

Pending execution time is determined by the enhanced Modified Round Robin Algorithm for total virtual machines and sorted these VM's in ascending order based on the execution time. Afterwards, tasks are to be assigned for the obtained list. After each task completion this process can be repeated for all virtual machines.

4 Results

The comparing results of previously existing systems of load balancing with the enhanced load balancing algorithm are implemented. The less computational or completion time and processing time are achieved in enhanced load balancing algorithm by using the

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cloudsim tools. In addition to this for designing the enhanced algorithm uses the development kit of Java, library of common math and eclipse. CloudSim[22] is software by which the number of virtual machine and cloud data centers logical and physical structures is simulated. This simulation based study of the enhanced algorithm is needed for efficiency evaluation. By using hosts with different processing capabilities these simulation results are carried out in the cloud environment. Every host having virtual machines. Task T can be calculated as VMni{∑x n=1; where number of hosts are indicated by n and |∑k i=1; where k is represents the number of virtual machines. Consider the virtual machines and hosts for simulation of enhanced Modified Round Robin algorithm[23] whereas too many resources are availability present in the cloud environment. Several variable virtual machines are taken with the different RAM and MIPS ratings in order to improve the performance of load balancing modified round robin algorithm (MRRA). Under different situations this experiment is carried out. In the first situation less number of virtual machines is taken and in the next stage virtual machines[24] count is increased accordingly. The load is to be calculated in virtual machines for all cases. Minimum loaded virtual machines in each situation are assigned by the tasks apart from the number of virtual machines. Then the algorithm is worked efficiently. In the first situation six virtual machines are taken and their simulation results are described in the following Fig. 2.

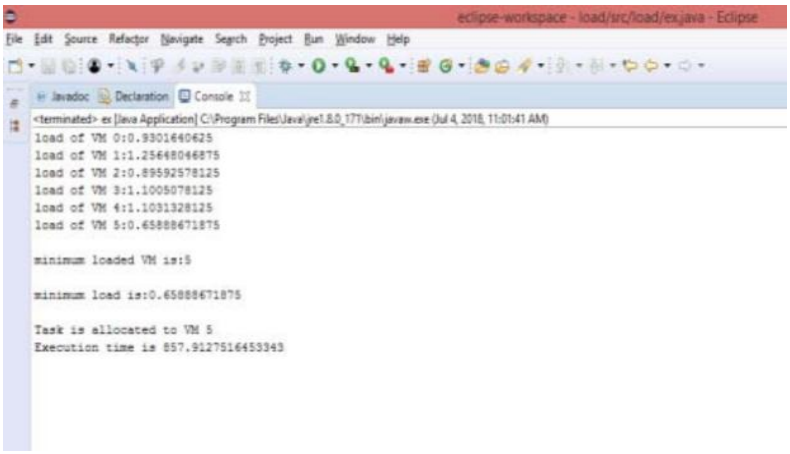

Fig. 2. Minimum Loaded VM Selection

The number of virtual machines is increased in the second situation and the simulation results of this case are described in the following Fig. 3.

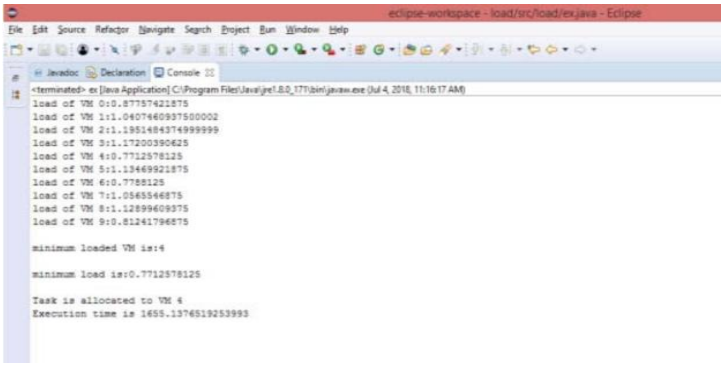

Fig. 3. Minimum Loaded VM Selection Among 10 VMs

The number of virtual machines is 20 in the next situation and the simulation results are shown in below Fig. 4.

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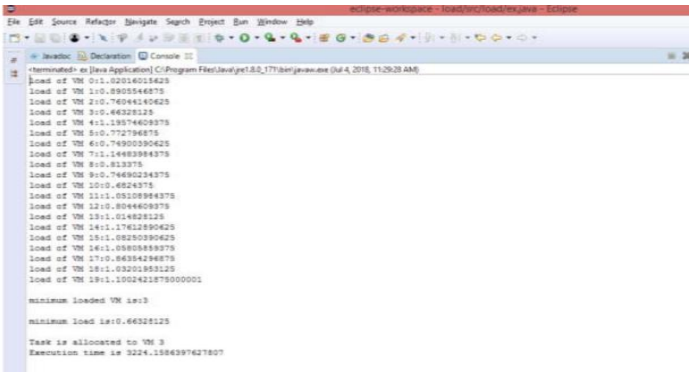

Fig. 4. Minimum Loaded VM Selection among 20 VMs

For all virtual machines the load is calculated and then minimum load virtual machine is selected for the task assignment. The comparative analysis of CPU processing time for enhanced load balancing algorithm with honey bee behavior algorithm and weighted round robin load balancing algorithm is shown in Fig. 5. Each node is assigned to some weight and based on their weight tasks are attached to every node which is described in the MRRA. This algorithm results that, its processing time is not better than other two balancing algorithms. The result of honey bee algorithm illustrated that; tasks are assigned to the virtual machines with under loaded by removing the task with high priority from the fully loaded machine. Whereas load balancing algorithm of honey bee behavior has CPU processing time lower than MRRA algorithm and higher than modified load balancing algorithm.

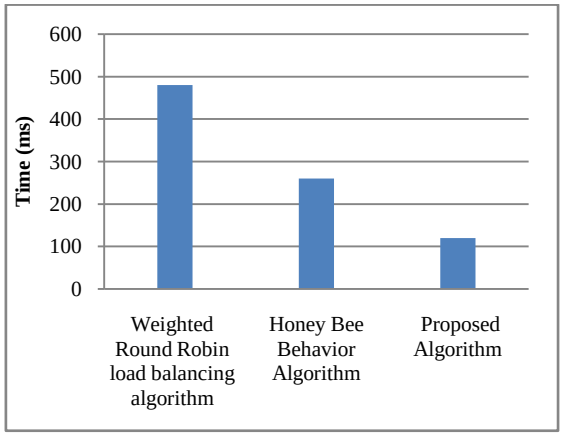

Fig. 5. Processing Time of CPU Comparative Performance

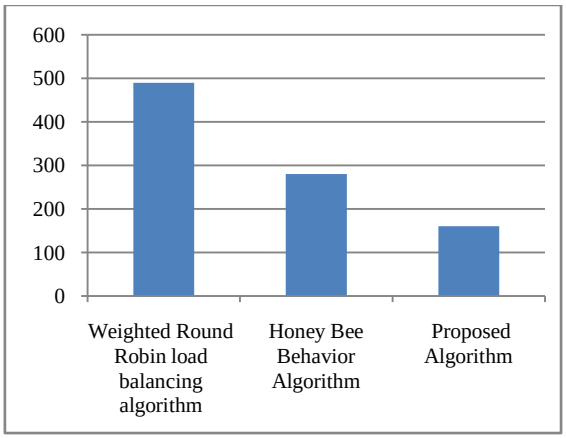

Fig. 6. Computation Time Comparative Analysis

The comparative analysis of completion time of CPU, for proposed algorithm of load balancing with the algorithm of weighted round robin and honey bee behavior algorithm is shown in Fig. 6. This result shows that the load balancing algorithm of weighted round robin completion time is not better than other two balancing algorithms. Whereas the honey bee behavior load balancing algorithm has completion time is less than the weighted round robin load balancing algorithm and higher than proposed modified load balancing algorithm.

Better processing time of CPU and minimum completion time can be achieved by the weighted round robin load balancing algorithm. Tasks are removing the load from the virtual machines after it assigned to the particular virtual machine according to the priority levels. The completion time is also based on the priority level. Completion time of every virtual machine can be calculated according to the assigned task. The CPU processing time and completion time can be calculated by using the several algorithms such as weighted round robin algorithm, algorithm of honey bee behavior and an efficient enhanced dynamic load balancing[25]weight round robin algorithm. The comparative analysis of processing time and computational time are can be illustrated in the Fig.5 and Fig.6 accordingly. From results it is clear that the enhanced algorithm[26][27] gives the less computational time and fast processing time.

4 Conclusion

In the field of information technology Cloud computing is one of the emerging techniques. Based on usage-payment model this cloud technology offers services to the users. Load balancing techniques are used to handle the requests which are from users in cloud computing. Handling of load balancing is a main problem in the cloud. In this load balancing method the work load dynamically prearranged to the user and in this method resources are highly utilized. Load balancing technique main functions are Virtual machine load maintaining and transferring of overloaded machine tasks to the under loaded machine. Least loaded VM's are allotted the tasks first, when the new requests are detected. So this under loaded virtual machine is now fully loaded with tasks. Then these tasks are moved to another under loaded VM after some time. Completion time of every virtual machine can be calculated according to the assigned task. So using of an efficient enhanced dynamic load balancing weight round robin algorithm minimum completion time, maximum utilization of resources and efficient performance of the cloud computing environment is achieved.

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