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Energy-Efficient Load Balancing Technique to optimize Average response time and Data Center Processing Time in Cloud Computing Environment

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Abstract: Cloud infrastructure is a modern computing system in which pooled services are made available to users at various times depending on their demands. The process of distributing workload among computing system nodes is known as load balancing. Loads include things like CPU power; ram capacity, and network traffic. A well-balanced load avoids the situation when some nodes are fully loaded while others are inactive or not working. Where there are many tasks in a virtual machine (VM), these tasks are delegated to underutilize VMs in the same or a separate datacenter. Modified Round Robin and Modified Honey Bee Algorithms are proposed in this article for effective load balancing based on honey bee and Round Robin foraging activity to control load through VMs. Tasks taken from VMs that are crowded are viewed as honey bees. In the suggested method which is a circular ribbon, filled VMs are considered. In order to ensure a fast responding time and a minimum number of task migrations, the planned protocol also explores the aims of tasks in VM queues. The results of the test indicate that the quality of service has improved considerably (QoS).

Keyword - Cloud computing, Load balancing, Modified Round Robin, Modified Honey Bee Algorithms, QoS.

1. INTRODUCTION

Cloud computing refers to an internet-based system for saving, manipulating, and downloading data from many locations. Family, public, and hybrid clouds are the three forms of clouds. Private clouds are managed by a single enterprise and provide features like availability, scalability, automation, and power. The public cloud is another kind of cloud, which provides developers with resources like apps and Storage and free access to them over the internet for the public. In a mixed cloud environment, both public and private clouds are mixed. [1].

Cloud computing employs a virtualized network of automatic provisioning of hardware, software, and data sets allows for flexible networks on demand. Load balancing methods is used in data center networks. IAAS, SAAS and PAASIn mobile and green cloud computing architecture, both deployment platforms are found. Cloud balance is a strategy to maximise the consumption of energy and increasing system performance. Throughput (the amount of tasks that have been completed), Reaction Period (the shortest time it takes to complete a task), and Resource Usage (maximum resources used),Relocation time and scalability are important features of load-cloud balancing algorithms[2].

The Round Robin algorithm is one of the most important and popular algorithms. Round Robin variations include MRR, PBDRR, FairRR and several more. There are many different algorithms available. The Modified round robins (MRR) algorithm measure the time slice (TS), which takes into account the discrepancy between the maximum and minimum explosion periods separated by [PR (priority) x no processes in queue (p)]. Bust time (BT) for the calculation of the complex quantic time (TQ) for each step in the queue is used in the FairRR algorithm. They start by choosing the process with the quickest bust time, and then assigning dynamic TQ to each process with the shortest bust time [3]

The Bee Colony algorithm is an information swarm algorithm that imitates honey colony drilling behaviour in order to solve problems with computational feature optimisation. The drilling conduct of honey-bees is imitated. It has recall functions, multi-character search, local search and an optimization scheme, making it the optimal solution for problems of optimization. The algorithm consists of Scout bees, foragers and bees of food supply. Scout bees for food supplies in bee hives. It performs a waggle dance as it returns to the bee hive after finding a food source. The waggle dance is used by the other hive bees are used to collect food quantity and distance from the hive detail. International bees then accompany the Scout bees to the location of the bee hive and proceed to harvest it. The bees choose randomly the place of food supplies. [4].

2.   RELATED WORKS

Anureetkaur et al. [5] proposed model that manages VM demand which minimizes average waiting time for the tasks in the queue. In order to quantify the CPU time as quickly as possible, the proposed model is structured (EFT). The load is determined as a share of resource utilization while the costs of connectivity are measured using the allocation of work memory, memory needs and data size, and the communication cost is then added to the operation cost to arrive at a final number. When compared to existing models, the experimental results revealed that the proposed model is more efficient.

Karan D. Patel et al. [6] in a cloud infrastructure, suggested an algorithm for load balancing by combining two workload balancing algorithms. For non-priority-based tasks, used an improved modified round bee algorithm and for priority-based tasks an updated compliance-inspired honey bee algorithm. Analysis needed since it helps to increase the reliability of the system, the utilization of resources and the completion time.

OjasveeKaneria et al. [7] Cloud computing is a distributed computing model that enhances efficiency, accessibility, and usability. From development to execution, that is from usage to maintenance, the cloud migration process is divided into many phases. A variety of aspects contribute to the effective use of the cloud such as security, speed, safety, and so on. Our primary goal here is to allow better use of cloud services and improve access speed by tweaking algorithms for load balancing that are easy. The distribution of virtual machines to user bases has also been improved, and CloudBus' CloudSim toolkit is used for authentication.

Luocheng Shen et al. [8], An optimization problem based on the load balance algorithm of the Artificial Bee Colony (ABC) is proposed to increase the overall efficiency and adaptiveness of load balance. The

ABC algorithm is optimized, and the cluster virtual machine (VM) features of smart grid cloud sources are used. Simulation analysis backs up the usefulness of the proposed procedure.

Chapram Sudhakar et al. [9][10] proposed a method based on honey bee optimization-based load balancing methodology has been proposed, resulting in rapid responsive times [11][12]. Experiments in regular data sets have shown that the proposed implementation has outperformed 5.2% to 9.7% of the original honey bee algorithmin terms of answer time and 13.8 percent to 68.2 percent better in terms of processing time, suggesting a substantial change. S. Pal et. al [13-17] have discussed different scheduling algorithms to optimize waiting in cloud environment to get better benefits.

3.   PROPOSED SYSTEM

We created a novel hybrid algorithm in our proposed work by integrating ModifiedRound Robin in a Load Handling Technique Inspired by Honeybees. Check for overburdened and under burdened virtual machines, uninstall operations from overburdened virtual machines, and give a priority to them. If a priority exists, use the Honeybee Influenced load balancing algorithm to Use virtual machine weight and delegate non-preemptive tasks to underused virtual machines. The algorithm of the Modified Round Robin will also perform proactive tasks where there is no prioritization.

Algorithm1. The Algorithm of the proposed method.

1. Determine each virtual machine's capacity and based on the ability of each virtual machine allocate weights.
2. On any virtual machine, measure the load.
3. Check to see if the demand on virtual computers is evenly distributed.
4. If anything is in place,
5. Exit
6. If load exceeds power,
7. $V_M = OV_M$ (Overloaded Virtual Machine)
8. Instead, if load capacity is available,
9. $V_M = UV_M$ (Under loaded Virtual Machine),
10. Assign weight, depending on the processing power of each VM, if a priority exists.
11. Assign relevant VMs to high-priority roles depending on their weight.
12. If anything else fails
13. Based on processing power, assign a weight to each VM.
14. Apply a Round Robin scheduling strategy and delegate assignments to VMs based on resource requirements.
15. Check the load on the VMs.

Algorithm2. Modified Honey Bee Algorithm.

1. Arrange the virtual machines by load (OVM, UVM, and BVM).
2. Organize the ascendant OVM and the ascending UVMs.
3. Prioritize the functions of virtual machines (i.e. optimal execution time).
4. Choosing a Virtual Machine to Assign
5. 5. Tm ->VMd | min (°Tm + °Th) and Minimum Expected Completion Period Tl ->VMd | min (°T) and Minimum Completion Time Scheduled Tasks of High, Medium, and Low Importance Tl ->VMd | min (°T) and Minimum Completion Time Planned Tasks of High, Medium, and Low Importance (Th, Tm, Tl)
6. Adjust the task number to correspond to the newly implemented task in VMd.
7. The number of tasks allocated to VMd based on objectives should increase or decrease.
8. Adjust the load for VMs and Virtual Machines 8. (VMd).
9. Make modifications to packages UV_M, OV_M and BV_M.

Algorithm3. Modified Round Robin Algorithm.

1. Determine the virtual machines' pending execution periods and in ascending execution order, organize them.
2. Transfer operations from virtual machines with longer execution times to one with shorter execution times.
3. Add the work to the list of duties you've been assigned.
4. Steps 1, 2, and 3 will be repeated before each virtual machine's mission has been accomplished.

The number of data centers, computing servers and virtual machines is next. capability was entered. Then, depending on their processing power, virtual machines are allocated weights.

Loading is measured for each virtual machine. Go, if it's equilibrium. If not, delete functions and revise their priority from the virtual machine's overwhelmed state.

For high-priority jobs, the Modified Honeybee Inspired load balancing algorithm with weight is used.Using Modified Round Robin for low-priority activities. Using these equations, the removed tasks are assigned to underutilized virtual machines based on choice, Resulting for each virtual machine to be equalized.

Table1. The proposed method's data centre computing time and average response time.

	Modified Round Robin	Modified Honey Bee	Proposed method
Average response time	160 (ms)	149(ms)	119(ms)
Data center processing time	0.25(ms)	0.33(ms)	0.22(ms)

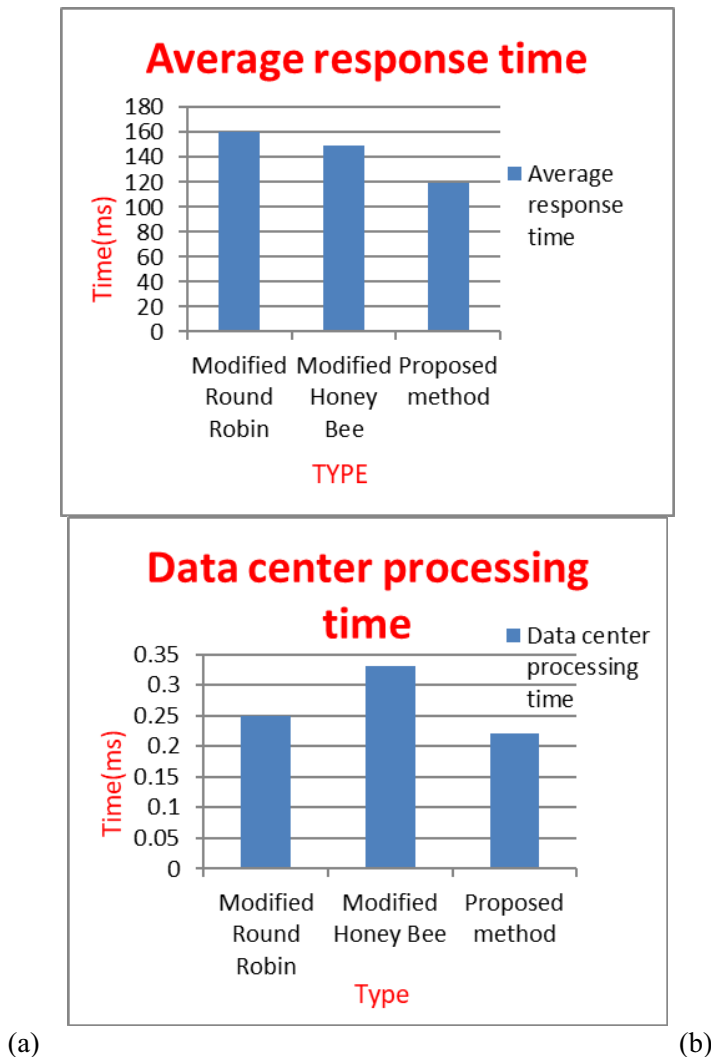(a)   (b)

Figure1.The proposed method's data centre computing time and average response time.

Figure1 shows comparison of Modified Round Robin, Modified Honey Bee Algorithm, and Proposed Algorithm load balancing normal reaction time and processing time in the data centre. When opposed to the current situationalgorithms the proposed algorithm reaches better resultsin normal reaction time and processing time in the data centre.

4. CONCLUSION

We are proposing a new algorithm that implements the algorithm Modified Round Robin. The modified Honeybee algorithm eliminates tasks from virtual overloaded machines and pass them to virtual machines that have been utilized. It chooses available virtual machines for tasks of greater priority, depending on each virtual machines current task. The algorithm Modified round robin gives weights dependent on computer power for virtual machines and then assigns tasks to them.In our proposal to delegate virtual machinery to tasks depending on their resource specifications, we use a Modified Honeybees Inspection Algorithm. We can use the Modified Round Robin algorithm for tasks that don't have a given priority. Our experimental findings demonstrate that our algorithm accelerates reaction time and the loading time of the data centre.

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