

A Grouping based Scheduling Algorithm on Load Balancing in Cloud Computing

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Abstract : Cloud Computing is the web based processing where the data, application and infrastructure are provided to computers and other devices on demand over the network. A load balancing is process of distribution of the proper load among different resources .load balancing aim to optimize resources, and avoid overload and under load of resources. We proposed a grouping based scheduling algorithm in which load is assign to virtual machine according to instruction size of given cloudlet to avoid the underutilization and improve the response time, data transfer cost and waiting time.

Keywords : Cloud Computing, Datacenter, Host, Virtual machine, Datacenter Broker, Load Balancing.

1. INTRODUCTION

Cloud Computing provide a network of remote servers to deliver the resources to the user on demand. Cloud management software has to manage the resources at large scale.it provides the efficient use of underlying hardware. Cloud computing aims to provide a different services to user like servers, data storage, applications without knowledge of installation method. The basic approach is user can access any resource from remote server at anywhere.

Load balancing, is a technique to distribute the load among different virtual machines for effective utilization of virtual machines and to minimize the response time by handling the condition of under loaded and overloaded virtual machines. The load balancing improves the utilization and throughput.

Load balancing algorithms follow two main points :

- Depending on how the charge is distributed and how processes are allocated to nodes (the system load);
- Depending on the information status of the nodes (System Topology).

Related work :

- Nguyen Khac Chien (2016) has proposed a load balancing algorithm which is used to enhance the performance of the cloud environment based on the method of estimating the end of service time. They have succeeded in enhancing the service time and response time of the user.
- Mohamed Belkhouraf (2015) has main motive to provide services to users, such as platform, software and infrastructure with reasonable and decreasing cost for the clients. The proposed load balancing algorithm improve performance, security and provide continuous available services to user.
- Reena Panwar (2015) aims to describe the proposed dynamic load management algorithm that is used to distribute the incoming requests to different virtual machines effectively.
- Abhishek Patial,Sunny Behal(2012) aims to provide secure data from unauthorized access using RSA algorithm by encrypting the data using key combinations and decrypting the data by only authorized person's private key.

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- Surbhi Kapoor(2015) aims to achieve high user satisfaction by minimizing response time of different tasks and improve system performance by even and fair allocation of resouces.the proposed algorithm called Cluster based load balancing algorithm which works in heterogeneous nodes environment and reduces overhead.
- Abhishek Patial, Sunny Behal (2014) explores security methods such as network security, access control, information security, application security. The Proposed algorithm using RSA algorithm to provide security using encryption and decryption procedure.

2. PROPOSED ALGORITHM

Grouping-based scheduling algorithm : A proposed grouping-based scheduling algorithm is avoid the concept underutilization and overutilization of resources and provide load evenly among different virtual machines .We are dividing the cloudlets and VMs into high end group and low end group depending upon threshold value. Threshold value is computed using the average mean of all the VM’s and Cloudlets. Moreover the cloudlets in the high end class will be assigned to the VM’s of high end class and the cloudlets in low end class will be mapped to the VM’s of low end class.

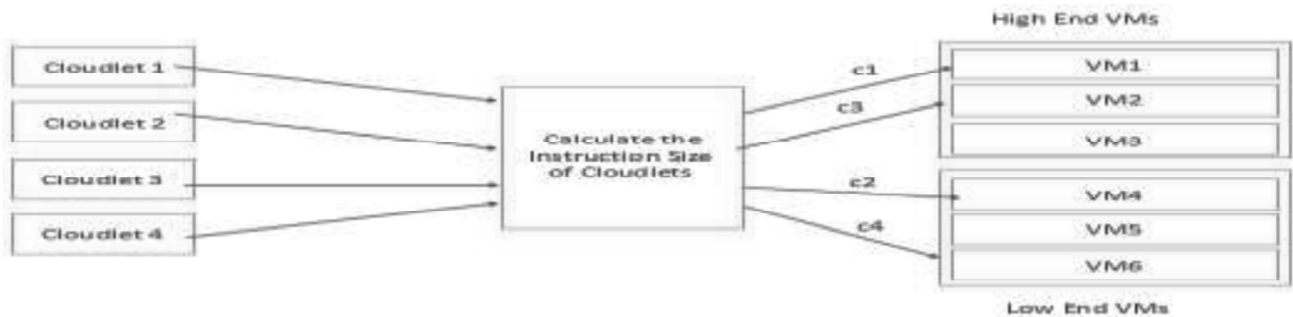


Fig. 1. Assign cloudlets to Virtual machines using Instruction size.

Table 1.Cloud Parameters.

<i>VM ID</i>	<i>MIPS</i>	<i>RAM</i>
1	125	256 MB
2	250	256MB
3	500	1GB
4	750	1GB
5	1200	2GB

3. RESEARCH METHODOLOGY

The main objective of this paper was to answer the question: in identical cloud environments, which load balancing architecture: centralized, decentralized or hierarchical architecture will give the best results in terms of response time and server load

To answer this question a robust evaluation framework was implemented which includes the following steps:

- To balance the load equally among different VMs.
- Fetch all the available virtual machines in the datacenter/host.
- Retrieve the processing capacity of the available virtual machines.
- Divide the VM’s into 2 groups of high end Virtual machines and low end virtual machines by using the threshold value.
- Retrieve all the cloudlets and fetch the instruction size of all the cloudlets/tasks.

- Divide the Cloudlet's into 2 groups of high end Cloudlet class and low end Cloudlet class by using the threshold value.
- The task with higher instruction size is allocated to the group of high end virtual machine and the task with lower instruction size is allocated to the group of low end virtual machine.
- The task is allocated with the help of load balancing algorithm.

Algorithm of the proposed work is written as follows :

Input : Unallocated Tasks/Cloudlets/Virtual Machines.

Output : Response Time, Waiting Time, Processing Cost.

Algorithm :

1. Input the Cloudlets(CL) to the CloudSim.
2. foreach Cloudlet k in CL.
 - find the Instruction length of k .
 - end
3. compute the average instruction length using the Mean of all Instruction length.
4. foreach Cloudlet k in CL
 - if $Cklength \geq Mean$
 - Add Ck into high end class
 - else
 - Add Ck into low end class
 - end for
5. Create Virtual machines (VMs) in the CloudSim.
6. foreach VM m in VMs.
 - find the capacity of each m .
 - end
7. compute the average capacity using the Mean of all capacities of VMs.
8. foreach VM m in VMs
 - if $VMmcapacity \geq Mean$
 - Add VMm into high end class
 - else
 - Add VMm into low end class
 - end for
9. foreach Cloudlet i in high end class
 - assign Cloudlet i to VMi of high end class
 - increment the VM.
 - if $VMmax \geq ListSize$
 - $VMindex = 0$;
 - end for
10. foreach Cloudlet j in low end class
 - assign Cloudlet j to VMj of low end class
 - increment the VM.
 - if $VMmax \geq ListSize$
 - $VMindex = 0$;
 - end for

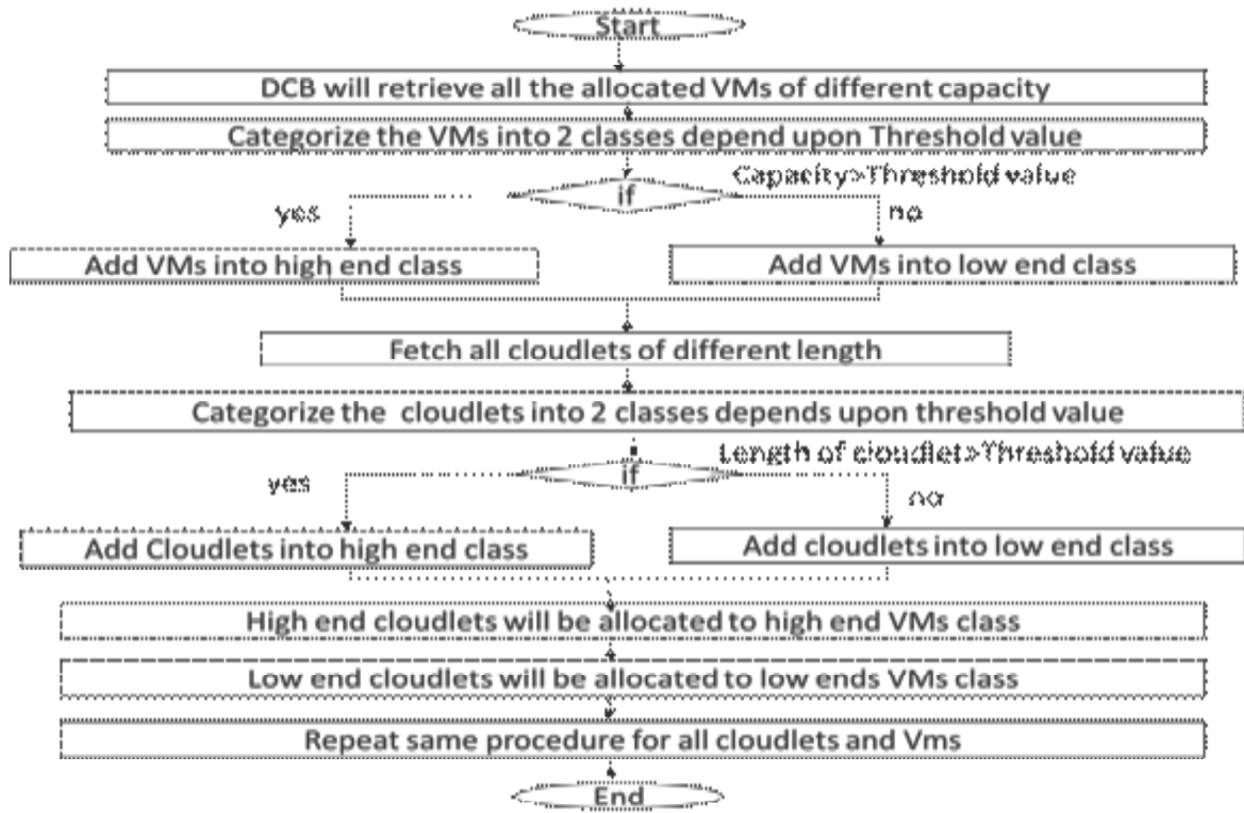


Fig. 1. Flow Chart of Proposed work.

4. EXPERIMENT RESULTS

CLOUDSIM

CloudSim simulator is used to evaluate the performance .we use three parameters for the performance comparison of new a group-based scheduling algorithm to the existing algorithm. We use clouds environment to verify the correctness of proposed algorithm.CloudSim toolkit is used different cloud resources such as processing elements, virtual machines, RAM,bandwidth,processing elements cost. For the simulation, we calculate the total response time, processing cost and waiting time.

The experiments are taken many times by taking different number of cloudlets like 3000, 5000,8000,10000 and so on. The total processing time, total processing cost and total waiting time have been computed below as;

Processing Time/ Execution Time : Processing Time is the time to receive the first response given by cpu of the submitted request. Following figure shows the total processing time/execution time of different number of cloudlets.

Table 2. Processing Time

<i>Number of cloudlets</i>	<i>VM load balancing Processing time</i>	<i>Grouping based scheduling algo.Processing time</i>
3000	750167.5787	628676.7712
8000	2000463.694	1677085.657
10000	2500762.519	2096483.442
30000	7503603.993	6290392.066
50000	1.25E + 07	1.05E + 07

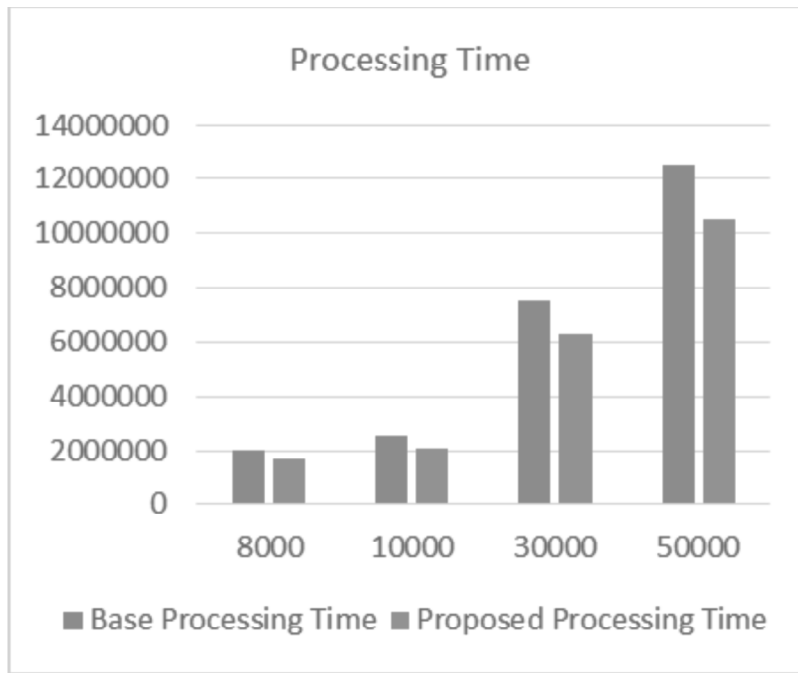


Fig. 2. Comparison of Base and Proposed Algorithm Processing Time.

Processing Cost : The processing cost is the total Cpu time taken by the task for completion using cloud resources and cost of resources per second. In graph, there is comparison of both base processing cost and proposed processing cost.

Table 3. Processing Cost

<i>Number of cloudlets</i>	<i>VM load balancing Processing cost</i>	<i>Grouping based scheduling algo.Processing cost</i>
3000	2288761.283	1918092.829
8000	6103414.729	5116788.338
10000	7629826.446	6396370.983
30000	2.29E+07	1.92E + 07
50000	3.82E+07	3.20E + 07

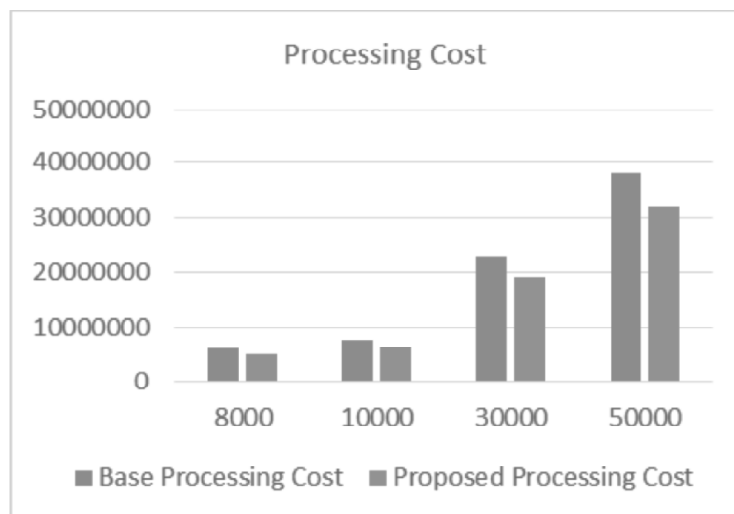


Fig. 3. Comparison of Base and Proposed Algorithm Processing Cost

Waiting time: Waiting time is the time taken by task in ready queue. Average waiting time is total time for which tasks were kept in queue for execution.

Table 4. Waiting Time.

<i>Number of cloudlets</i>	<i>VM load balancing Waiting Time</i>	<i>Grouping based scheduling algo. Waiting Time</i>
20000	2.47E + 09	2.33E + 09
30000	5.57E + 09	5.25E + 09
40000	9.90E + 09	9.34E + 09
50000	1.55E + 10	1.46E + 10
60000	2.23E + 10	2.10E + 10



Fig. 4. Comparison of Base and Proposed Algorithm Waiting Time.

5. CONCLUSION

A new Load balancing algorithm called Group-based Scheduling algorithm is proposed and implemented in clouds environment using java language. In this research work we proposed a new load balancing algorithm and compare this new load balancing algorithm to existing load balancing algorithm using different parameters. We can analyses from tables and graphs that overall response time, waiting time and processing cost is improved in comparison to the existing scheduling parameters.

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