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Comparative Analysis of Load Balancing Algorithms in Cloud Computing

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***Abstract*-Issues with the performance of business applications can cause detritions of an organization business performance. A recent research study indicates that organizations could lose significant part of their revenues due to delay beyond defined baselines for performance of their web applications. This paper shows that end users would wait between 4 and 6 seconds for a page to open. This paper works on several issues in IT industry like delay time, response time i.e. overall response time with the data centre processing time. The result of this paper is to reduced delay & response time towards throughput .IT industry improve application performance such as revenue growth, cost saving and reputation**.

***Keywords*—Cloud computing, round robin algorithm, equally spread current execution, throttled algorithm, business application performance, resource allocation, job scheduling.**

I. INTRODUCTION

Cloud computing involving distributed technologies to satisfy a variety of applications and user needs. Share resources, software, information via internet are the main functions of cloud computing to reduced cost, better performance and satisfy needs. To improve the response time of the job, distribute the total load of the collective system. By this removing a condition in which some of nodes are overloaded while some other are under loaded. Load balancing algorithms dose not taken the previous state or behaviour of the system, it depends upon the present behaviour of the system because it is dynamic in nature. Round robin algorithm process on circular order by handling the process without priority but equally spread current execution handle the process with priories. Throttled algorithm the client first requests the load balancer to find a suitable Virtual Machine to perform the required operation. The architecture is complete formation for virtual machines, less response time and minimum delay to transfer. Therefore model estimated the virtual machine cost and low data transfer cost. This type of computational model promises to reduce the capital and operational cost of the client.

The total execution time is estimated in three phases. In the first phase the formation of the virtual machines and they will be idle waiting for the scheduler to schedule the jobs in the queue, once jobs are allocated, the virtual machines in the cloud will start processing, which is the second phase, and finally in the third phase the cleanup or the destruction of the virtual machines. The throughput of the computing model can be estimated as the total number of jobs executed within a time span without considering the virtual machine formation time and destruction time

II. DISTRIBUTED LOAD BALANCING FOR CLOUD

Distribute workload of multiple network links to achieve maximum throughput, minimize response time and to avoid overloading. We use three algorithms to distribute the load. And check the performance time and cost.

A. *Round Robin Algorithm*

Round robin algorithm is random sampling based. It means it selects the load randomly in case that some server is heavily loaded or some are lightly loaded.

B. *Equally Spread Current Execution Algorithm*

Equally spread current execution algorithm process handle with priorities. it distribute the load randomly by checking the size and transfer the load to that virtual machine which is lightly loaded or handle that task easy and take less time , and give maximize throughput. It is spread spectrum technique in which the load balancer spread the load of the job in hand into multiple virtual machines.

C. *Throttled Load Balancing Algorithm*

Throttled algorithm is completely based on virtual machine. In this client first requesting the load balancer to check the right virtual machine which access that load easily and perform the operations which is give by the client or user. In this algorithm the client first requests the load balancer to find a suitable Virtual Machine to perform the required operation

III. PROPOSED WORK

The randomly transfer load environment can cause some server to heavily loaded while other server is idle or other is lightly loaded. Equally load distributing improves performance by transferring load from heavily loaded server. On the basis of comparison analysis of the algorithms the efficient scheduling and resource allocation is a critical characteristics of cloud computing based on which the performance of the system is estimated. To improve the response time and processing time considered the impact of cost optimization.

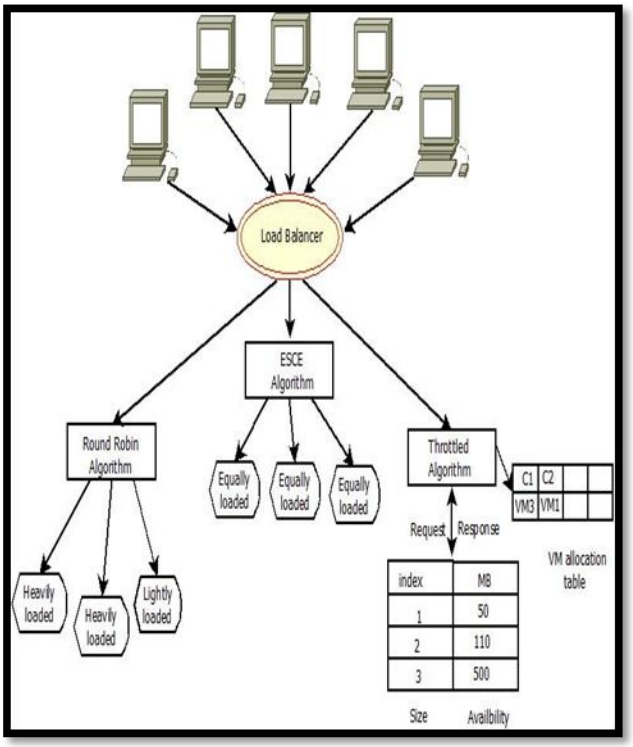


Figure 1: Load Balancing Approaches Used in Cloud Analyst

Decision making steps for efficient Load Balancing:

1. The clients send the request or task to the cloud co-coordinator.

2. The cloud co-coordinator divided the task in cloudlet and sends it to data centres, after then data centres co-coordinator working on scheduling.

3. There are three possibilities to take the decision for efficient load balancing, and data centre coordinator selects the algorithm.

4. The first possibility is round robin algorithm, distribute the load on random basis and introduce next to next VM for sequentially distribute the loaded task.

5. The second possibility is equally spread current execution algorithm, the cloud coordinator transfer the task in equally manner and takes less VM according to the distribution process or according to the size of the task.

6. The third possibility is throttled algorithm; in this cloud coordinator can't distribute the task.

- Direct request send to the VM.
- VM takes the decision to transfer the task according to the size and availability.
- Each size is represented with the index value.
- The index value is mapping with the availability. If space is available for the task, then availability section sent response to VM.
- After completion the task, the response is store in VM allocation table.

Efficient scheduling is the critical concept of the load balancing cloud computing based on the performance. In complex and large systems, there is a tremendous need for load balancing. For simplifying load balancing globally in a cloud Round robin load balance random sampling based .So random sampling based means it select the load randomly In the case some server to be heavily loaded or some lightly loaded so overcome the problem we use ESCE load algorithm. ESCE load equally divide the current load to all server. Throttled algorithm can't distribute the task but scheduling with the help of size and availability.

IV. PERFORMANCE ANALYSIS

We had used the cloud analytical tool to evaluate the algorithms round robin , equally spread current execution and throttled algorithm for three cases closest data center, optimize response time & reconfigure dynamically LB by using user base(1-6)

with different regions & data centers (1-6) with different virtual machine monitors.

A. *User Base*

The design model use the user base to represent the single user but ideally a user base should be used to represent a large numbers of users for efficiency of simulation.

User Base	Region
UB1	0
UB2	1
UB3	2
UB4	3
UB5	4
UB6	5

Figure 2: User Base

B. *Datacenter*

Datacenter manages the data management activities virtual machines creation and destruction and does the routing of user requests received from user base via the internet to virtual machines.

Data center	Vm m1	Vm m2	Vm m3	Vm m4	Vm m5	Vm m6
DC1	1	10	25	50	75	100
DC2	1	10	25	50	75	100
DC3	1	10	25	50	75	100
DC4	1	10	25	50	75	100
DC5	1	10	25	50	75	100
DC6	1	10	25	50	75	100

Figure 3: Data centres

After performing the simulation the result computed by cloud analyst is shown in following below figures. We have used the above defined configuration for each load balancing policy one by one and depending upon that result calculated for table like response time and cost in fulfilling the request.

1).Round robin algorithm for reconfigure dynamically LB

Round robin algorithm with VMM	Reconfigure dynamically LB	
	Time	Cost
R 1	50.37	16.09
R10	50.45	20.81
R25	78.90	28.36
R50	50.90	40.70
R75	67.47	49.91
R100	50.73	53.45

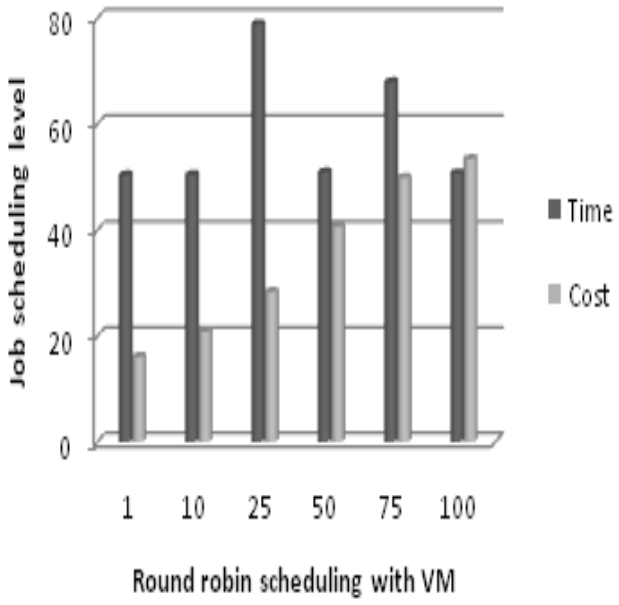


Figure 4: Graph of round robin algorithm

2). ESCE algorithm for Reconfigure dynamically LB

ESCE algorithm with VMM	Reconfigure dynamically LB	
	Time	Cost
EC 1	50.09	0.99
EC10	50.07	5.50
EC25	50.17	13.03
EC50	50.33	25.58
EC75	50.49	38.12
EC100	50.66	50.67

Throttled algorithm with VMM	Reconfigure dynamically LB	
	Time	Cost
TH 1	50.10	0.99
TH10	50.09	5.50
TH25	50.19	13.03
TH50	50.35	25.58
TH75	50.51	38.12
TH100	50.68	50.67

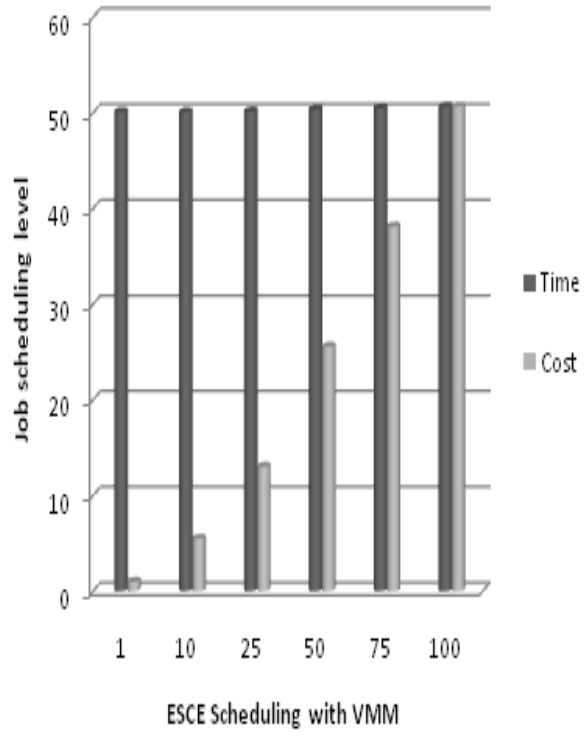


Figure 5: Graph of ESCE algorithm

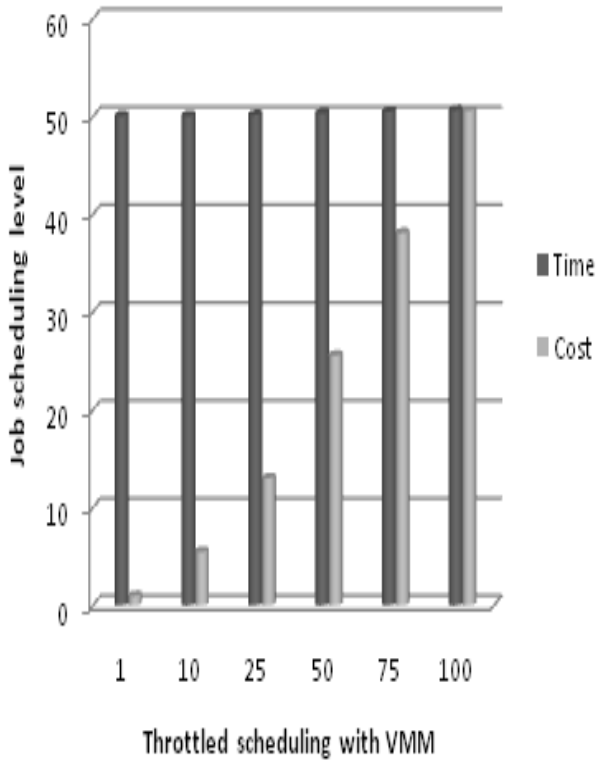
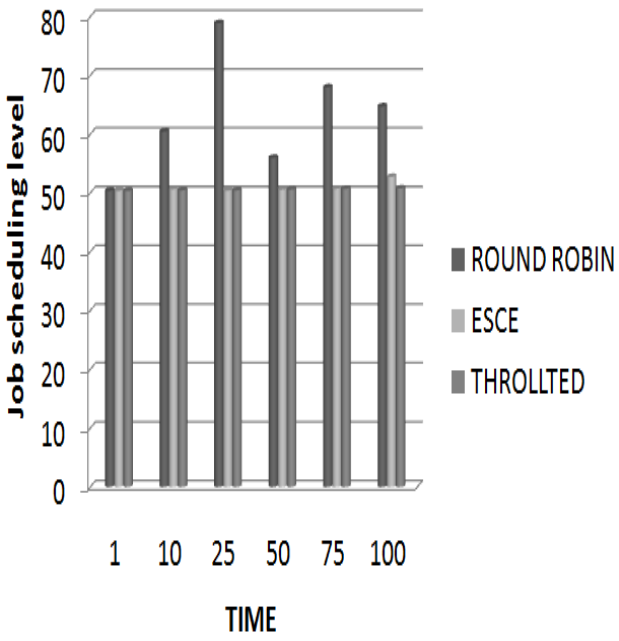


Figure 6: Graph of throttled algorithm

3).Throttled algorithm for Reconfigure dynamically LB

V. RESULT

Comparing with the table and graph, overall response time and data centre processing time is improved. It is also seen that the virtual machine cost and data transfer time in the ESCE and throttled algorithm is much better when compared to round robin algorithms. The results strongly shows that around 50%-60% gain has achieved using ESCE algorithm and throttled algorithm.



VI. CONCLUSIONS

The response time and data transfer cost is a challenge of every engineer to develop the products that can increase the business performance in the cloud based sector. The several strategies lack efficient scheduling and load balancing resource allocation techniques leading to increased operational cost and give customer satisfaction.

The paper aims to development of enhanced strategies through improved job and load balancing resource allocation techniques. Equally spread current execution algorithm and Throttled algorithm dynamically allocates the resource to the job in a queue leading reduced cost in data transfer and virtual machine formation. The simulation result shows the reduction up to 50-60%in the cost and time.

This improves the business performance and retention to the total customer satisfaction.

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