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IN CLOUD COMPUTING**

**Mr. Vinod B Jadhav<sup>1</sup>, Dr. Shrikant  
Zade<sup>2</sup>**

*<sup>1</sup>Department of CSE, RIT Polytechnic,  
Pune, India*

*<sup>2</sup>Department of CSE, NIT,  
Nagpur, India*

# ANALYSIS OF ROUND ROBIN ALGORITHM FOR LOAD BALANCING IN CLOUD COMPUTING

Mr. Vinod B Jadhav<sup>1</sup>, Dr. Shrikant Zade<sup>2</sup>

<sup>1</sup>Department of CSE, RIT Polytechnic, Pune, India

<sup>2</sup>Department of CSE, NIT, Nagpur, India

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*Abstract — Cloud computing is the updated internet-based technology which focuses world wide computing. Cloud is a Source providing runtime pool resources and virtualization. Depending on a Cloud service model pay as you go, it give permission installing applications from customer. To fully utilize the resources load balancing is required for the work that are gives to the facilitator Load balancing mechanism is used to improve the performance of centralized server. In this situation, Different policies in relation to the algorithms developed are analyzed using an analysis tool, Such as cloud analyst. Comparison is also available for verities of Round Robin (RR) algorithms.*

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*Keywords—Cloud Computing; Virtual machines; Cloud service provider; Cloud Analyst; CloudSim; Cloud Service broker.*

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## I. INTRODUCTION

Cloud computing is recently a new technology. Its is more useful to business owners for its working and as per need we start at small and increase our resource in future [1]. Cloud computing is supported by state-of-the-art data centers that usually employ Virtual Machine (VM) technologies for consolidation and environment isolation purposes [2]. Cloud computing delivers an infrastructure, platform, and software (applications) as services that are made available to consumers in a pay-as-you-go model. In industry these services are referred to as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) respectively [3]. Many computing service providers including Google, Microsoft, Yahoo, and IBM are rapidly deploying data centers in various locations around the world to deliver cloud computing services.

## II. BALANCING A Load

The importance of load balancing is to maximize the performance by balancing the load among various resources (net links, CPU, disk spaces etc.) to gain maximum resource utilization, maximum output, maximum turnaround time, and neglecting load on server [4]. Load balancing is a advance technique that gives networks and resources by avail a optimal output with minimum response time [5]. Segregating the load among servers, information can be broadcast and captured neglecting important delay. Various types of algorithms are useful that helps dividing of traffic loaded, between useful servers. A important example of load balancing in daily life can be related to WWW Neglecting l o a d -

Balancing, workstation facing delays, timeouts and problem with responses. Load balancing gives the platform for maximum time apply to healthy servers which is useful for a maximum distribution of the communication load so that the website existence is finally tackle [5]. The load balancing algorithms can be typed significantly into two sections as mentioned in the following section.

### A. The Static Algorithms

Static algorithms segregate the load same between servers. By this method the load on the servers will be distributed smoothly and concurrently it will make the state more in not perfect manner. This algorithm, which segregates the load same, is announced as round robin algorithm. However, there were lots of difficulties related with this algorithm. That why, weighted round robin was introduced to solve the problem and issues of round robin. In weighted round robin algorithm every servers is noted a weight and considering to the max weight they obtained max connections. In a situation, when all the weights result in same, servers will obtain balanced traffic [6].

### B. The Dynamic Algorithms

Dynamic algorithms introduced important weights on servers at run time by searching the whole network. The lightest server is equipped to maintain the traffic. When choosing an targeted server required real time communication with the networks, which leads to extra load added to the workstations. Dynamic algorithm initiate on query that are made frequently on servers. However, sometimes prevailed traffic prevents these queries to be answered, and correspondingly more added overhead can be distinguished on network.

Almost round robin algorithms are based on simplified rule, max load is injected on servers all around the network and thus not maintaining the unbalancing the traffic [6].

The base of this paper is organized as follows. Part 2 gives the co related work. Part 3 introduce the algorithm and introduce the environment methods. Part 4 practical's Part 5 segregates of the practical results. Part 6 gives the analysis result.

## III. RELATED WORK

RR, MRR and TSPBRR had been introduce in the work scheduling task in cloud computing. The findings on them received very good results and their efficiency had been solved. There are also many interrelated work under solution. Randles, M. et. al., [7] & Alakeel [8] have introduced a comparative of static and dynamic load balancing algorithms for cloud computing.

Padhy, R.P., Goutam, P., and Rao, P., [9] mentioned some basic concepts of cloud computing and load balancing by observing some of the current load balancing algorithms applicable to clouds. Jiyin et.al, [10] have proposed a resource allotting mechanism with introduced able task execution which maximize the engaging of clouds. They introduced an adaptive resource allocation algorithm for cloud system with preempt able tasks. However, their methods do not contain to cost utilization and time utilization.

Stewart, D.B., and Khosla, P.K., [11] introduced the maximum-urgency-first algorithm, which most used to mostly schedule randomly changing systems. The time method of the maximum-urgency-first causes a critical task to fail. Thus, a modified maximum urgency first scheduling algorithm was proposed by I. Ahmad, Y.-K. Kwok, M.-Y. Wu, and K. Li which resolved the above-mentioned problem.

Singh et. al [13] proposed a modified round robin (MRR), which is superior than RR and has less waiting response time, usually less pre-emption and context switching thereby reducing the overhead and saving of memory space. Yashuwaanth [14] proposed another MRR algorithm which overcomes the limitations of simple RR. Mohanty et. al. [15] have considered dynamic time quantum which changes with every round of execution. Their results show that PBDRR performs better than MRR algorithm in terms of reducing the number of context switches, average waiting time and average turnaround time.

H. Casanova et al. [16] and Baraglia et al. [17] proposed the heuristic algorithms to solve the scheduling problem based on various static data such as the execution time and system load. Unfortunately, all information such as execution time and workload cannot be determined in advance of dynamic grid environments.

Katevenis et al. [18] have proposed weighted round-robin cell multiplexing in a general-purpose ATM switch chip. Shreedhar and Varghese [19] have discussed the efficient fair queuing using deficit round robin. Wickrema et al. [20] present how Cloud Analyst can be used to model and evaluate a real world problem through a case study of a social networking application deployed on the cloud. The issues such as how the simulator can be used to effectively identify overall usage patterns and how such usage patterns affect data centres hosting the application are illustrated in the present work.

#### IV. SCHEDULING CRITERIA

For the task scheduling based on RR, MRR and TSPBRR, the criteria include the following:

**Context Switch:** A context switch is computing process of storing and restoring state of a CPU so that execution can be resumed from same point at a later time. Context switch are usually computationally intensive, lead to wastage of time, memory, scheduler overhead so much of the design of operating system is to optimize these switches.

**Throughput:** Throughput is defined as number of process completed per unit time. Throughput will be slow in round robin scheduling implementation. Context switch and throughput are proportional to each other.

**CPU Utilization:** We want to keep the CPU as busy as possible.

**Turnaround Time:** Turnaround time is sum of periods spent waiting to get into memory, waiting in ready queue, executing on CPU and doing input output. It should be less.

**Waiting Time:** Waiting time is the amount of time a process has been waiting in ready queue. The CPU scheduling algorithm does not affect the amount of time during which a process executes or does input-output; it affects only the amount of time that a process spends waiting in ready queue.

**Response Time:** Response time is the time it takes to start responding, not the time it takes to output the response. Large response time is a drawback in round robin architecture as it leads to degradation of system performance.

$$\text{Response Time} = \text{Fint} - \text{Arrt} + \text{TDelay}$$

Arrt is the arrival time of user request.

Fint is the finish time of user request.

$$\text{TDelay} = T + T(2) \text{ latency transfer}$$

TDelay is the transmission delay

Tlatency is the network latency

Ttransfer is the time taken to transfer the size of data of a single request (D) from source location to destination.

$$T_{\text{transfer}} = D / B_{\text{wperuser}} \quad (3) \quad B_{\text{wperuser}} = B_{\text{wtotal}} / N_r \quad (4)$$

Bwtotal is the total available of bandwidth

Nr is the number of user request in transmission

A good scheduling algorithm must possess following

Characteristics:

1. Minimum context switches.
2. Maximum CPU utilization.
3. Maximum throughput.
4. Minimum turnaround time.
5. Minimum waiting time.
6. Minimum response time.

#### V. HEURISTICS

##### A. Scheduling based on RR

The scheduling process based on RR experimentation is represented in Fig.1.

1. The scheduler maintains a queue of ready Processes and a list of blocked and swapped out processes.
2. The PCB of newly created process is added to end of ready queue. The PCB of terminating process is removed from the scheduling data structures.
3. The scheduler always selects the PCB at head of the ready queue.
4. When a running process finishes its slice, it is moved to end of ready queue.
5. The event handler perform the following action,
  - a) When a process makes an input -output request or swapped out, its PCB is removed from ready queue to blocked/swapped out list.
  - b) When input-output operation awaited by a process finishes or process is swapped in its process control block is removed from blocked/swapped list to end of ready queue.

Fig.1. Pseudo code for task scheduling process based on RR

C. Scheduling based on MRR

In MRR algorithm, Time Slice (ITS) is calculated which allocates based on (range× total no of process (N)) divided by (priority (pr)× total no of process(p)). Range is calculated by (maximum burst time + minimum burst time) divided by the scheduling process based on MRR experimented in this paper is represented in Fig.2.

```

1) While (ready queue!=NULL)
{
For i to n
{
Range=maxbt+minbt/2
ts = ( range×N) / (pr×p)
} end of for
} end of while
    
```

Fig.2. Pseudo code for task scheduling process based on MRR

TABLE I. Calculation of time slice for MRR

Pr No	Burst Time (BT)	Priority (Pr)	Range (R)	N	P	Time Slice (TS) R×N/ Pr ×P
P1	25	2	15	5	5	8
P2	5	3	15	5	5	5
P3	15	1	15	5	5	15
P6	8	5	15	5	5	3
P5	10	4	15	5	5	4

Where,

- N= Total no of process
- P= Total no of priority
- Range = Maximum BT+Minimum BT /2
- Range = 5+25/2 =15
- Time slice=Range ×N/ Pr×P
- TS = 15 × 5/ 2 ×5 =8

D. Scheduling based on Time Slice Priority Based RR.(TSPBRR)

Let 'TQ<sub>i</sub>' is the time quantum in round *i*. The number of rounds *i* varies from 1 to *n*, where value of *i* increments by 1 after every round till ready queue is not equal to NULL.

The scheduling process based on TSPBRR experimentation is represented in Fig.3.

VI. EXPERIMENT

Scheduling algorithms described in the previous section were implemented and tested in CloudSim. There were 5 numbers of users and 3 resources in the mod. For users in the model, each of them requests execution of 100 tasks with different length (in MI) between 1 and 50. The initial information of the resource in the model is described in Table II.

TABLE II. Calculation of time slice for MRR

Pr No	Burst Time (BT)	Priority (Pr)	Range (R)	N	P	Time Slice (TS) R×N/ Pr ×P
P1	25	2	15	5	5	8
P2	5	3	15	5	5	5
P3	15	1	15	5	5	15
P6	8	5	15	5	5	3
P5	10	4	15	5	5	4

TABLE III. Calculation of time slice for proposed algorithm

Process No	TS	ROUNDS				
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
P1	8	4	6	9	6	0
P2	5	5	0	0	0	0
P3	15	8	7	0	0	0
P4	3	2	3	3	3	0
P5	4	2	2	5	5	0

TABLE IV. Calculation of AVG TAT, AVGWT of MRR & TSPBRR

Algorithm	Average TAT	Average WT	CS
MRR	45.2	37.4	12
TSPBRR	42.4	32.4	13

P1	P2	P3	P4	P5	P1
0	8	13	28	31	35
P4	P5	P1	P4	P5	P1
43	46	50	58	60	62
					63

Gantt chart for MRR

P1	P2	P3	P4	P5	P1	P3
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```

1. Calculate TS for all the processes present in the ready queue.
2. While (ready queue!= NULL)
   {
   For i=1 to n do
   {
   if ( i ==1)
   {
   TQi = ½ TSi
   }
   Else
   {
   TQi = TQi-1 + ½ TQi-1
   }
   If (remaining burst time -TQi) <=2
   TQi = remaining burst time
   } End of For
   } End of while
3. Average waiting time, average turnaround time
and no. of context switches are calculated
End
    
```

Fig.3. Pseudo code for Task scheduling process based on TSPBRR

0	4	9	17	19	21	27	34
P4	P5	P1	P4	P5	P1		
34	37	39	48	51	56	62	

Gantt chart for TSPBRR

VI. ANALYSIS

The experiments as described in the previous section is carried out by considering 25 and 50 VMs which are present in different regions with 1 DC and 2 DC. The simulated results the different variants of RR are presented in Fig. 4 through Fig. 7. It is observed that the response time is better in case of TSPBRR as compared to others variants. It is also observed that the Avg TAT and Avg WT in TSPBRR superior than that in MRR algorithm.

Fig.6. Response time vs. Avg peak value for 25 VMs 2DC

Fig.7. Response time vs. Avg peak value for 50 VMs 2DC

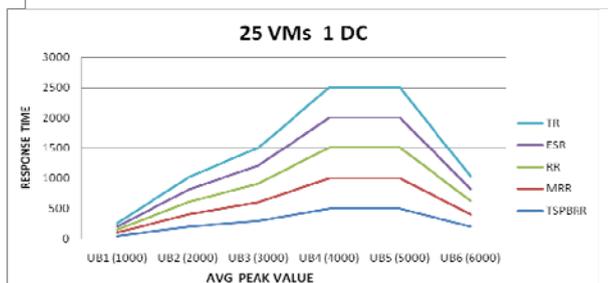
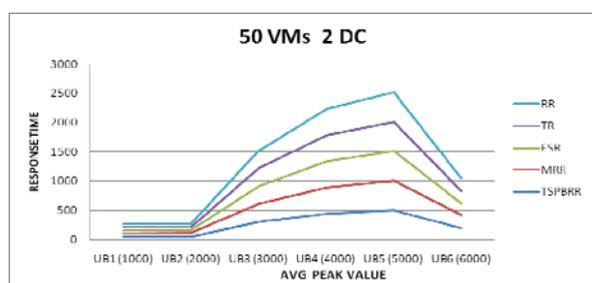


Fig.4. Response time vs. Avg peak value for 25 VMs 1DC

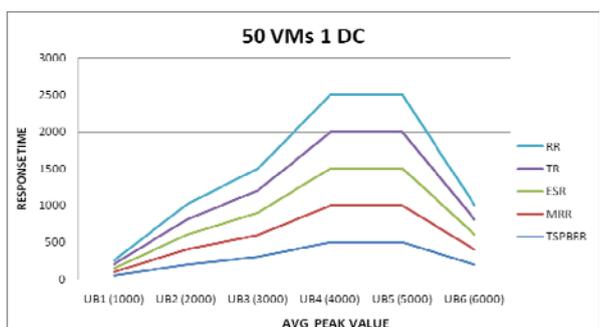
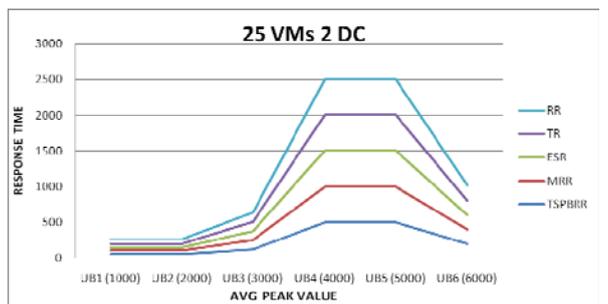


Fig.5. Response time vs. Avg peak value for 50 VMs 1DC



III. CONCLUSION

The load distribution problem on various nodes of a distributed system is solved in the present work to improve both resource utilization and job response time by analyzing the variants of RR algorithm. The overloading and under loading situations are avoided. Thus, load balancing ensures that all the processor in the system or every node in the network does approximately the equal amount of work at any instant of time. The proposed algorithm shows better response time as compared to the other algorithms.

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