A RESEARCH PAPER ON DYNAMIC TIME QUANTUM BASED ON ROUND ROBIN SCHEDULING ALGORITHM

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ABSTRACT

As we know that IT industry is enhancing day by day, Cloud Computing is an emerging technology for computing and storage the data. These data in the form of text, images, videos, etc. The most challenging issue today in cloud servers is to ensure data security and privacy of the users [1]. Many algorithms are used to reduce the load in the cloud environment. Round robin is one of the simplest algorithms used for load balancing technique. In this paper, enhanced round robin algorithm is proposed to minimize waiting time and turnaround time using average burst time[2]. The aim of this paper is to use various concepts during communication along with its application in cloud computing and to enhance the security of encrypted data in cloud servers along with minimizing the consumption of time, cost and memory size during the encryption and decryption.

Key words – cloud computing, round robin, load balancing, waiting time, turnaround time
Load balancing technique, first come first served.

INTRODUCTION

Cloud computing is using to storage data. We can define cloud storage as storage of the data online in the cloud. Now-a-days cloud computing is the fastest growing technology. It can serve many facilities to the business such as resources, infrastructure, platform etc. Various cloud service providers are amazon, google, IBM, Microsoft. A cloud system consists of several elements such as clients, data center and distributed servers [3].

Cloud computing architecture can be divided into 2 sections: front end and back end.

Load balancing is the process of increasing system performance in the situations of heavy load.

The load balancing metrics in cloud computing:

1. Turnaround Time: The total time taken to execute a specific task in queue.
2. Throughput: The number of tasks which complete execution per unit time and maximize the throughput.

This used determines the selection of backend servers to forward the traffic. This is based on:

i) Server health
ii) Predefined conditions

Depending on the distribution of the load, whether it is on the network or application layer, algorithms widely vary.

1. Round Robin Algorithm: Two types are :
   i.) Weighted round robin
   ii.) Dynamic round robin
2. Least connections
3. Weighted least connections
4. Source IP hash
5. URL hash
6. The least response time

ROUND ROBIN CPU SCHEDULING ALGORITHM

The Round Robin Scheduling algorithm is one of the simplest and mostly used scheduling algorithm up to this moment. The concept of this algorithm is to share the CPU time among all scheduled tasks on a ready queue. The most important aspect of the Round Robin algorithm is the time slice that will be allocated to each task submitted for execution [4]. While the time quantum is a decisive characteristic on the Round Robin algorithm, various proposed Round Robin based algorithms are suggesting static time quantum that segments the CPU time among all submitted tasks, nevertheless, a static time quantum is not always the best solution. A more viable alternative is the use of dynamic time quantum that adapts the CPU time slices to the tasks changes happening on the ready queue for execution [5]. Under the same topic, the Round Robin based algorithm proposed on this paper uses a dynamic time quantum and adds a smarter layer to the existing algorithm in order to adjust the CPU time to different situations [6].

WEIGHTED ROUND ROBIN

Weighted Round Robin scheduling is used for scheduling time-shared applications. The weights of jobs can speed up or retard the progress of each job toward its completion. WRR has been used for scheduling real time traffic in high speed switched networks [7].

WRR approach does not require a sorted priority queue, only a RR queue. It is suitable for ultrahigh-speed networks. By giving each job a fraction of the processor, a Round Robin scheduler delays the completion of every job. We can speed up the progress of each job [8].

DYNAMIC ROUND ROBIN

Dynamic algorithms are used for scheduling network discipline. Each packet flow or connection has its own packet queue in a network. Mainly, it is a lightest server preferred to balance the traffic [9]. In comparison between these two algorithms, although round robin algorithms based on simple rule, more loads conceived on servers and thus imbalanced traffic discovered as a result.

METHODOLOGY

The main use for dynamic time quantum is round robin algorithm. The average for the given tasks is calculated using burst time and set as the time quantum for the first iteration in algorithm[10].

The first iteration is done with **initial burst time** and **mean**.

The **average value** is calculated using remaining burst time for the second iteration and execution time of the tasks will be the remaining burst time of each task[11].

The **average waiting time** of the given tasks is computed by subtracting turnaround time and burst time of each task.

Turnaround time of each task for each round is calculated by subtracting completion time of the task for each round and the arrival time of each task[12].

IMPLEMENTING ROUND ROBIN

```
public int getNextAvailableVm()
{
        currVm++;
        if (currVm >= vmStatesList.size())
        {
                currVm = 0;
        }
        allocatedVm(currVm);
        return currVm;
}
```

IMPLEMENTATION OF ALGORITHM

Input: Ti where i = 0, 1, 2, 3 ….. n - 1.
Output: executed tasks with minimized waiting time and turnaround time.

Begin
Step1: TQ = 0
CBT=0 (CBT – Complete Burst Time)
TBT= BT0 + BT1+……BT (n-1) (TBT- Total Burst time)
RBT = 0 //Remain Burst time

Step2: Compute M for BTi of Ti

TQ=M

Step3: For i = 0 to n-1

Execute Ti with M

If Ti becomes CTi from the list //complete task

Then remove CTi from the list Ti

Tn = Tn-T(completed)

Step4: Compute M with RBT

// M = ∑RBT / Tn

RBT=TBT-CBT

TQ = M

Step5: Repeat step 3 and step 4 till Tn = 0

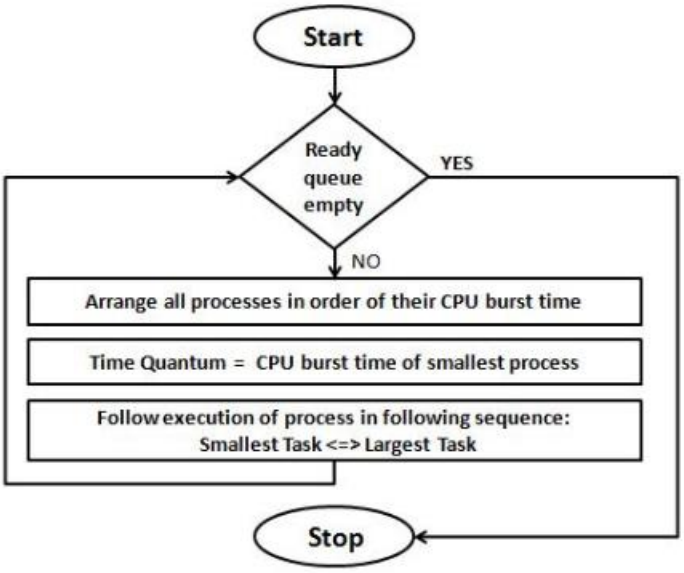


Fig1. Improved Technique for Round Robin (Flowchart)

RESULTS AND DISCUSSION

The algorithm is explained by using sample data set given below:

T	B.T.	A.T.
T1	10	0
T2	6	0
T3	26	1
T4	12	2
T5	28	3
T6	21	4

B.T. – Burst Time

A.T. - Arrival Time

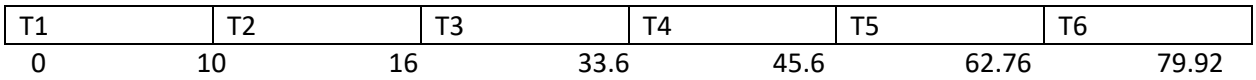
Mean = TQ (Time quantum)

Calculating mean and setting TQ:

M = ∑BTi / Tn

Round1:

TQ = 17.16



In first round T1, T2 and T4 are completed. Now, the completed tasks are removed from the queue and the mean of remaining burst time (RBT) of uncompleted tasks (T3, T5, T6) is calculated to set TQ for the next round. And total number of tasks (Tn) is also updated with Tn = Tn - Tcompleted

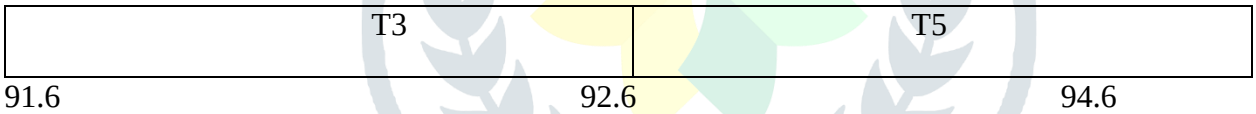
Round 2:

TQ = 7.84

In the second round T6 is completed and removed from the queue for the next iteration. And the total number of the task and remaining execution time of the T3 and T5 is also updated for the next iteration.

Round3:

TQ = 2



Round 4:

TQ = 1

Waiting Time = W.T
Turnaround Time = T.A.T
Completion time of Ti = C.T

CONCLUSION

Round robin process is a scheduling and traditional algorithm for balancing the load in the cloud environment. Time quantum not just plays an important part in giving fairness amongst processes additionally influences the system performance. Each round gives assurances for the fulfillment of one Process and additionally decrement in the remaining time of the largest process. Various optimization algorithms can be combined with Round Robin to calculate dynamic time quantum. The algorithm gives better result than the standard round robin and SRDQ algorithms concerned with waiting time and turnaround time.

In this paper, an enhanced version of the Round Robin algorithm, called Smarter Round Robin (SRR) has been introduced.
Cloud Computing and Big Data platforms as well as on bringing more intelligence to the proposed scheduling algorithms especially neural networks that can have a massive impact on compute resources allocation.

REFERENCES

[1]Priyanka Gautam and Rajiv Bansal, Extended Round Robin Load Balancing in Cloud Computing, International Journal of Advanced Computing and Communication Systems (IJACCS), Volume 3 Issue 8, PP 1-6.

[2] Savitha. P, J Geetha Reddy, A Review Work On Task Scheduling In Cloud Computing Using Genetic Algorithm, International Journal of Scientific & Technology Research, Volume 2, Issue 8, August 2013

[3]Dr.D.Ravindran, Ab Rashid Dar, Cloud Based Resource Management with Autoscaling, IJSRSET, Volume 2, Issue 4, 2016.

[4]G. T. Hicham, EL.Chaker, Cloud Computing CPU Allocation and Scheduling Algorithms using CloudSim Simulator, International Journal of Electrical and Computer Engineering, Vol 6, No 4, 2016

[5]V.A. Jane, B.J. Hubert Shanthan and L. Arockiam, A Survey of Algorithms for Scheduling in the Cloud: In ametric Perspective, International Journal of Computer Sciences and Engineering, Volume-6, Special Issue-2, PP 66 - 69, March 2018

[6]Apoorva Tripathi, Saurabh Shukla and Deepak Arora,"A Hybrid Optimization Approach for Load Balancing in Cloud Computing", Advances in Intelligent Systems and Computing, ISBN 978-981-10-3772-6, PP 197-206.

[7]Ramandeep Kaur and Navtej Singh Ghumman ,A Load Balancing Algorithm Based on Processing Capacities of VMs in Cloud Computing, Advances in Intelligent Systems and Computing, PP 63-70, ISBN 978-981-10-6619-1.

[8]S. R. Ishwari, G. Deepa, A Priority based Round Robin CPU Scheduling Algorithm for Real Time Systems, International Journal of Innovations in Engineering and Technology, Vol. 1, Issue 3, Oct 2012

[9]N. Abbas, K. Ali, K. Seifedine, A New Round Robin Based Scheduling Algorithm for Operating Systems: Dynamic Quantum Using the Mean Average, International Journal of Computer Science Issues, Vol. 8, Issue 3, No. 1, May 2011

[10]M. Rakesh, H. S. Behera, P. Khusbu, D. Monisha, P. Lakshmi, Priority Based Dynamic Round Robin (PBDRR) Algorithm with Intelligent Time Slice for Soft Real Time Systems, International Journal of Advanced Computer Science and Applications, Vol. 2, No.2, February 2011

[11]M. Manish Kumar, K. Abdul Kadir, AN IMPROVED ROUND ROBIN CPU SCHEDULING ALGORITHM, Journal of Global Research in Computer Science, Volume 3, No. 6, June 2012

[12] G. Siva Nageswara Rao, N. Srinivasu, S.V.N. Srinivasu, G. Rama Koteswara Rao, Dynamic Time Slice Calculation for Round Robin Process Scheduling Using NOC, International Journal of Electrical and Computer Engineering, Vol. 5, No. 6, December 2015