REMODELLED ROUND ROBIN SCHEDULING ALGORITHM FOR EFFICIENT UTILIZATION OF CPU

[1]Kajol Kathuria, [2]Reetu Singh
[1]M.tech Computer Science and Engineering, [2]M.tech Computer Science and Engineering
[1]School of Computing Science and Engineering,[2]School of Computing Science and Engineering
[1]Galgotias University, Greater Noida ,India,[2]Galgotias University,Greater Noida,India

Abstract : The more people are getting involved in the technology, faster they want to process things, for faster evaluation of the work good , efficient processors are required. For Optimum Usage of CPU(Central Processing Unit), scheduling of the task is essential. CPU scheduling is the chief task of multi -programmed operating systems. Since Modern working frameworks are being switched from single job environment to multitask environment and technologies like big data ,cloud computing have already boomed up that utilization of resources with traditional scheduling algorithm are not efficient. The purpose of this paper is to introduce a variant of Round Robin algorithm with a new method of calculating Time Quanta also known as time slices. Time Quanta is a fixed amount of time by which number of processes are executed. Here,in this paper time quantum is calculated using mean of Minimum burst time and maximum burst time of the processes. This scheduling method gives a better result than other methods of improved round robin scheduling and traditional Round Robin Scheduling**..**

***IndexTerms* - CPU Scheduling, Round Robin Algorithm, Time Quantum , Mean, Better turnaround time, Waiting time**

I. INTRODUCTION

Since Operating system is the heart of computers[1] it is a framework programming that oversees computer hardware and software functioning. The significant elements of an OS incorporate Process Scheduling, Memory Management and File Management. Different functionalities incorporate Device Management, Protection and Security. The central function of an OS is scheduling. The system chooses which job ought to be executed first based on preferred algorithm. Most of the time CU sits idle when processes indulge in Input output task, to overcome this idleness next process in the ready queue is to be executed.
By switching the CPU among processes, the operating system can make the computer more effectively.When one process has to wait, the operating system takes the CPU away from that process and gives the CPU to another process with this, waiting time is no more wasted, useful work is accomplished. With multiprogramming, and multiprocessing we try to use the time productively..

II. SCHEDULING PRINCIPLES

The following principles are used to compare algorithms for scheduling:

Performance :

- **Turnaround Time**: The time taken between the arrival of the process to execute and its completion.(Completion time – Arrival time)
- **Waiting Time:** Amount of time a process has been waiting in a ready queue or Time spent by a process in a waiting state when it (process) requires some input output operations.
- **Response Time**: An amount of time it takes from when a request was submitted until the first response is produced(Not the output)

System Oriented Criteria:

- **Throughput**: Number of processes that complete their execution per unit time.
- **Processor Utilization:** Amount of time in which the processor is busy.

III.TYPES OF SCHEDULING ALGORITHM

Some of the scheduling algorithms referred to in this paper are:

- **First-Come-First-Serve (FCFS):** It is the simplest scheduling algorithm. Here the processes are executed in the chronological order in which they arrive. Its average waiting time is moderately high.

- **Shortest Job First (SJF):** The process having the shortest burst time executes first from the ready queue and move to the running state and if two processes have the same burst time the FCFS is followed.
- **Shortest Remaining Time (SRT):** Among number of processes in the ready queue those process will be executed whose remaining burst time is lowest so that the process finishes its task.
- **Round Robin (RR):** In this method a unit of time, called a quantum or time slice is given to each process present in the ready queue and every process has to execute fairly with the confined time quantum.

Any process will have basically five states are-

1.New 2.Ready 3.Running 4.Waiting 5.Terminate

TABLE 1:Process state

New State	When a user request for a Service from the System , then the System will call it an initial Process and this new Operation which is Requested to the System is known as the New Born Process
Ready State	When the Process is Ready to Execute but is waiting for the CPU to Execute it is called as the Ready State
Running State	When the Process is being executed by using some shared resources , then this is called as the Running process.
Waiting State	When a Process is Waiting for Some Input and Output Operations to be performed then this is called as the Waiting State.
Terminate State	After the Completion of the Process , the Process will be automatically terminated by the CPU

III. FLOW CHART OF PROCESS EXECUTION

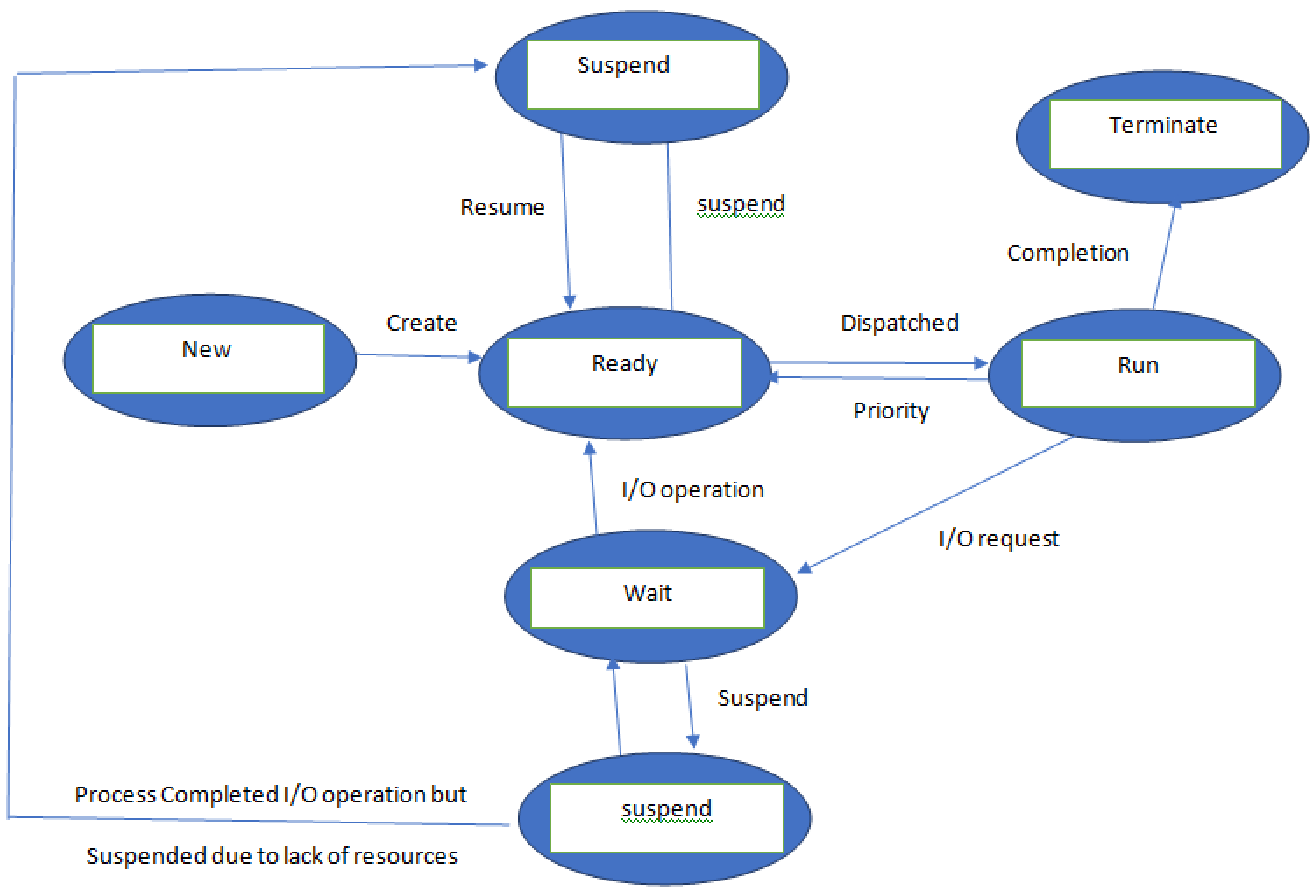

Figure1:flow chart execution

IV.RELATED WORKS

There has been numerous of works done on improvising the round robin process scheduling algorithm. Many authors have proposed a n number of methods by including 2 or more scheduling algorithm in Round Robin algorithm and by using changeable time quantum

that decides a value that is neither too large nor too small such that this value gives the best scheduling criteria and every process is getting realistic response time and the throughput of the system is not at all decreased due to unnecessary context switching.
The objective of is to modify Round Robin algorithm by adjusting time slices of different rounds depending on the remaining CPU bursts of currently running processes and coinciding their waiting time until that round in request of the other processes' waiting time. The proposal calculates different time slices for individual processes coinciding their priorities.
In Year 2012, Manish Kumar Mishra describes an improvement in RR. IRR picks the first job from the ready queue and allocate the CPU to it for a time interval of up to 1 time quantum. After completion of job time quantum, it checks the remaining CPU time of the currently running job. If the remaining CPU burst time of the currently running job is less than 1 time quantum, the CPU again allocated to the currently running process for remaining CPU time.In year 2012, P.Surendra Varma performed a work, In which the improved version of SRBRR (Shortest Remaining Burst Round Robin) by assigning the processor to processes with shortest remaining burst in round robin
manner using the best possible time quantum. In this paper the time quantum is computed with the help of median and highest burst time. In year 2010, Rakesh Kumar Yadav, Abhishek K Mishra, Navin Prakash and Himanshu Sharma.

V.PROPOSED ALGORITHM

In this, we have modified the approach of Round Robin algorithm to increase the throughput of the CPU. Based on observations, we have tried to derive a formula to calculate time quantum. Quantum is calculated using mean of Minimum burst time and maximum burst time of the processes. This scheduling method gives a better result than other methods of improved round robin scheduling and traditional Round Robin Scheduling.

5.1 Pseudo code

- All the procedure are arranged in increasing order of their arrival time.
- Calculate the time quantum q.
  M1=min burst time
  M2=max. burst time
  Q=ceiling(M1*M2)/2;
- while ready queue isn't vacant
- Select the shortest remaining time in ready queue.
- Select the procedure with shortest remaining time for execution. On the off chance that two procedures have the same shortest remaining time at that point, select the one with min arrival time.
- Repeat this methodology untill ready queue isn't unfilled.

Example1 :

Process id	Arrival time	Burst Time (BT)	Completion Time	Turn around Time	Waiting Time
P1	0	4	4	4	0
P2	1	5	15	14	9
P3	2	2	7	5	3
P4	3	1	5	2	1
P5	4	6	21	17	11
P6	6	3	10	4	1

Time Quantum= (Minimum BT x Maximum BT)/2
= (1x6)/2=3

Ready Queue= p1,p2,p3,p4,p5,p6

Gant Chart:

P1	P1	P4	P3	P6	P2	P2	P5

Average Turn Around Time(**TAT**): (mean of TAT)= 46/6 = **7.666**
Average Waiting Time **(WT):** (mean of WT)= 25/6 = **4.166**

5.2 Traditional round robin

Time Quantum=2

Process id	Arrival time	Burst Time (BT)	Completion Time	Turn around Time	Waiting Time
P1	0	4	8	8	4
P2	1	5	18	17	12
P3	2	2	6	4	2
P4	3	1	9	6	5
P5	4	6	21	17	11
P6	6	3	19	13	10

Ready Queue: p1,p2,p3,p1,p4,p5,p2,p6,p5,p2,p6,p5

P1	P2	P3	P1	P4	P5	P2	P6	P5	P2	P6	P5

Average Turn Around Time(**TAT**): 65/6= **10.83**
Average Waiting Time **(WT):** 44/6= **7.33**

VI.CONCLUSION

One of the most important job of the operating system is the assignment of CPU to the procedures waiting for execution. Numerous CPU scheduling algorithms have been proposed with a few favourable circumstances and burdens. A remodelled round robin CPU scheduling algorithm is proposed in this paper,it work on the basis of calculated formulized time quantum, which is calculated with the help of minimum and maximum burst time. By using this formula of Time quantum in Round Robin algorithm in operating system in uniprocessor systems we get comparatively less waiting time then the traditional round Robin which leads to better utilization of CPU , better throughput and Turn around Time.

REFERENCES

[1] BarkhaChhugani and Mahima Silvester , Improving Round Robin Process Scheduling Algorithm. International Journal of Computer Applications (0975 – 8887) Volume 166 – No.6, May 2017
[2] Amit Kumar Sain, Dynamical Modified R.R. CPU Scheduling Algorithm, International Journal of Computer Trends and Technology- volume4, Issue2- 2013
[3]Lalit Kishor, Dinesh Goyal, “Time Quantum Based Improved Scheduling Algorithm”, Issue International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 3, 2013.
[4] Mohd Abdul Ahad. Article: Modifying Round Robin Algorithm for Process Scheduling using Dynamic Quantum Precision. IJCA Special Issue on Issues and Challenges in Networking, Intelligence and Computing Technologies ICNICT(3):5-10, November 2012., Pp 510
[5] Silberschatz, A. P.B. Galvin and G. Gagne (2012), Operating System Concepts, 8th edition, Wiley India
[6] LipikaDatta, Efficient Round Robin Scheduling Algorithm with Dynamic Time Slice. I.J. Education and Management Engineering, 2015, 2, 10-19 Published Online June 2015 in MECS.
[7] Aashna Bisht, Mohd Abdul Ahad, Sielvie Sharma, Enhanced Round Robin Algorithm for Process Scheduling using varying quantum precision, Proceedings of ICRIEST AICEEMCS, 29th December,2013.pp 11-15
[8] H. S. Behera, Rakesh Mohanty, DebashreeNayak.A New Proposed Dynamic Quantum with Re-Adjusted Round Robin Scheduling Algorithm and Its Performance Analysis.International Journal of Computer Applications, Vol. 5, No. 5, August 2010
[9] Principles of Operating System, Naresh Chauhan, Oxford University Press, 2014.
[10] Kevin Jeffay, F. Donelson Smith, Arun Moorthy, James Anderson, “Proportional Share Scheduling ofOperating System Services for Real-Time Applications”, In Proceedings of the 19th IEEE Real-TimeSystems Symposium, Madrid, Spain, December 1998.
[11]Mohd Abdul Ahad , “Modifying Round Robin Algorithm for Process Scheduling using Dynamic Quantum Precision” International Journal of Computer Applications ICNICT 2012, November 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 (IJECE)
[13] Suman Bhatia, Supriya Raheja ,” Modified Round Robin Scheduling Algorithm Using Variable Time Slice”, International Journal of Engineering Research and Development
[14] Rami J. Matarneh, “Self-Adjustment Time Quantum in Round Robin Algorithm Depending on Burst Time of the Now Running Processes”, American Journal of Applied Sciences 6 (10): 1831-1837, 2009
[15]Dolly Khokhar , Mr Ankur Kaushik, “Best Time quantum round robin Cpu Scheduling Algorithm” International Journal of

Scientific Engineering and Applied Science (IJSEAS) – Volume – 3, Issue – 5, May 2017

[16] PandabaPradhana , Prafulla Ku. Behera , B.N.B.Ray , "Modified Round Robin Algorithm or Resource Allocation in Cloud Computing", International Conference on Computational Modeling and Security (CMS 2016)

[17]Samih M. Mostafa1 , Safwat H. Hamad and S. Z. Rida," Improving Scheduling Criteria of Preemptive Tasks Scheduled under Round Robin Algorithm using Changeable Time Quantum" Mostafa et al., J Comput Sci SystBiol 2011