

**A Novel CPU Scheduling method and Comparison with Round Robin Scheduling: A Hybrid approach**Pragya Mishra¹, Shubhi Saxena², Nitin Arora³, Richa Choudhary⁴^{1,2,3,4}School of Computer Science
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Abstract: One of the greatest commanding parts of the personal computer asset is the central processing unit. There are number of projects in the memory to be kept running in the meantime. Central processing unit planning manages the issue of picking a procedure from the prepared line to be executed. As processor is the imperative asset, central processing unit booking turns out to be vital in finishing the working framework plan objectives. Most existing central processing unit scheduling algorithms concentrate on extending central processing unit utilize and throughput and constraining turnaround time, reaction time, holding up time, and number of setting exchanging for an arrangement of solicitations. This paper proposed a novel scheduling algorithm. Results demonstrate that new algorithm gives better results comparative to other existing algorithms.

Keywords: Scheduling Algorithms, Operating System, Context Switch, Turnaround time, Central Processing Unit.

I. INTRODUCTION

An Operating system is programming that goes about as a mediator between the client of a personal computer and personal computer equipment. The inspiration driving an operating system is to give an area in which a customer can execute programs in a compelling way. Central Processing Unit Scheduling is one of the essential assignments of working framework. Every one of the assets related with a PC framework are expected to plan before application programming can utilize them. Planning is a strategy to give an arrangement to CPU in which it ought to execute forms right now in principle memory. CPU Scheduling Algorithms: First Come First Serve scheduling algorithm, Shortest Job First scheduling algorithm, Priority Queue, Round Robin, and so on.

These calculations are anything but difficult to execute, yet it for the most part does not give the best outcome. Round Robin Scheduling Algorithm is opted for comparison. This calculation has the hindrance of having high Average Waiting Time and high Average Turnaround Time. This result depicts a change in Round Robin calculation. The objective is to propose and examine a CPU Scheduling calculation to limit the Average Turnaround Time and Average Waiting Time by consolidating Round Robin Algorithm with Shortest Job first scheduling Algorithm. Consequently, this paper is utilizing Round Robin alongside most brief employment first in the task.

The paper is composed as Section 2 describes the literature review. Section 3 exhibits the proposed scheduling algorithm. Section 4 describes the results and comparison with one existing algorithm. In section the conclusion and future aspect has been described.

II. LITERATURE SURVEY

The most vital asset of the PC framework is CPU that is the reason in multiprogramming working framework; the fundamental memory has a few procedures and there must be appropriate criteria to serve these procedures, known as CPU Scheduling. There are distinctive CPU booking calculations, every one having their own benefits and faults. A portion of the well-known CPU booking resembles First Come First Served scheduling algorithm, Shortest Job First scheduling algorithm, and Priority Scheduling and Round Robin Scheduling algorithm. Round Robin scheduling algorithm has the negative mark of having high Average Waiting Time and high Average Turnaround Time. Improved Round Robin picks the main procedure from the prepared line and dispenses the CPU to the procedure for a period interim of up to time quantum. After finish of employment time quantum, it checks the rest of the CPU time of the right now running activity, the Improved Round Robin scheduling algorithm was portrayed [1] in 2012.

The summation of mean and standard deviation based time quantum planning calculations which is hybrid of Shortest Job First scheduling algorithm and Round Robin scheduling algorithm was proposed [6] in 2012.

In 2013 [7] Enhanced Round Robin calculation was proposed, by altering the time quantum of just those procedures which require a marginally more noteworthy time than the assigned time quantum cycle. The rest of the procedures will be executed in the ordinary Round robin way.

Another variation of Round Robin planning calculations was proposed in 2011, in which the procedures were executed by the new computed Fit factor, which utilized the idea of dynamic time quantum.

In 2012 [11] middle and some other esteem was added to the time quantum. In 2012, [20] a work was proposed in which the procedures were organized in climbing request as indicated by the most limited outstanding burst time and the Time Quanta was figured by duplicating the normal summation of least and greatest Burst Time.

III. PROPOSED SCHEDULING ALGORITHM

The novel scheduling algorithm works as follows:

1. Apply quick sort algorithm for arranging all the available processes in increasing order of their burst interval.
2. **while** (ready queue!= NULL)

$$TQ = \sqrt{\frac{(A1 + A2 + A3 + \dots + An) * An}{n}}$$

An: highest burst time
3. Now, to Calculate residual burst interval of each processes.
 - for (k = 0 to n)
 - if(TimeQuantum>array[k])
 - array[k++] →0;
 - else
 - array[k++]→array[k]-TimeQuantum
 - Showresidual burst time.
4. **if**(new process is arrived and BurstTime !=0)
 - goto step1.
 - else if(new process is not arrived and BurstTime!=0)
 - goto step 2.
 - else
 - goto step 5.

end if.

end while.
5. Calculate AverageTurnaroundTime, AverageWaitingTime and CS,
6. End

IV. RESULTS AND COMPARISONS WITH ROUND ROBIN SCHEDULING ALGORITHMS

Suppose there are 5 processes with CPU burst time in milliseconds (Process P1=11), (Process P2=22), (Process P3=35), (Process P4=52),(Process P5=80).

Arrival Time = 0

For Round Robin time quantum = 20.

For proposed scheduling algorithm time quantum = 56.

4.1 Experimental Analysis

Analysis of IMRRSJF and Round Robin

Table 1: Input processes with their burst time

Process No.	Burst Time(ms)
Process P1	11
Process P2	22
Process P3	35
Process P4	52
Process P5	80

Round Robin Scheduling Technique

Table 2: Processes with their turnaround time and waiting time for RR Scheduling

Process No.	Turnaround Time(ms)	Waiting Time(ms)
Process P1	11	0
Process P2	92	70
Process P3	106	71
Process P4	157	105
Process P5	196	116
Average	112.4	72.4

IMRRSJF Scheduling Technique

Table 3: Processes with their turnaround time and waiting time for IMRRSJF Scheduling

Process No.	Turnaround Time(ms)	Waiting Time(ms)
Process P1	11	0
Process P2	33	11
Process P3	68	33
Process P4	120	68
Process P5	199	119
Average	86.2	46.2

Table 4: Waiting time and turnaround time for RR and IMRRSJF

CPU Scheduling	Waiting Time(ms)	Turnaround Time(ms)
Round Robin	79.8	119.8
IMROUND ROBINSJF	46.2	86.2

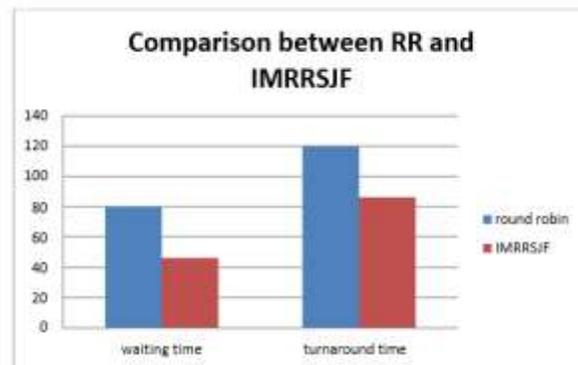


Figure 1: Comparative bar chart of waiting time and turnaround time

4.2 Snap Shoots

4.2.1 Round Robin Scheduling Algorithm

```

C:\Users\user\Documents\RoundRobin.exe
Enter Total Process: 5
Enter Arrival Time and Burst Time for Process Process Number 1 :0
11
Enter Arrival Time and Burst Time for Process Process Number 2 :1
22
Enter Arrival Time and Burst Time for Process Process Number 3 :3
52
Enter Arrival Time and Burst Time for Process Process Number 4 :4
80
Enter Arrival Time and Burst Time for Process Process Number 5 :5
35
Enter Time Quantum: 20

Process |Turnaround Time|Waiting Time
P[1] | 11.000000 | 0.000000
P[2] | 92.000000 | 70.000000
P[3] | 143.000000 | 108.000000
P[4] | 157.000000 | 105.000000
P[5] | 196.000000 | 116.000000

Average Waiting Time= 79.800000
Average Turnaround Time = 119.800000
    
```

Figure2: Input output for round robin scheduling algorithm

4.2.2 IMROUND ROBINSJF Scheduling Algorithm

```

C:\Users\user\Documents\minorCode.exe
P[4] | 0.000000
P[5] | 23.431458
Process deleted from queue are :
P [1] Burst time: 0.000000
P [2] Burst time: 0.000000
P [3] Burst time: 0.000000
P [4] Burst time: 0.000000
Processes left in Ready Quene: 1
Do you want to enter a new process(y/n)
n

Process |Turnaround Time|Waiting Time
P[1] | 11.000000 | 0.000000
P[2] | 33.000000 | 11.000000
P[3] | 68.000000 | 33.000000
P[4] | 120.000000 | 68.000000
P[5] | 199.000000 | 119.000000

Average Waiting Time= 46.200000
Average Turnaround Time = 86.200000
1.Insert processes to the Ready Queue
2.Display all processes of the Ready Quene along with sorting
3.Quit
    
```

Figure3: Input output for IMROUND ROBINSJF scheduling algorithm

V. CONCLUSION AND FUTURE SCOPE

Central Processing Unit Scheduling manages the issue of picking a procedure from the prepared line to be executed by the Central Processing Unit. As processor is the vital asset, Central Processing Unit booking turns out to be imperative in finishing the working framework outline objectives. Results demonstrates that new planning calculation is functioning admirably and creates better outcomes. Later on work, more work should be possible on this to create more productive planning calculations.

REFERENCES

- [1] Iswari Rajput, Deepa Gupta, "A Priority based Round Robin CENTRAL PROCESSING UNIT Scheduling Algorithm for Real Time Systems", International Journal of Innovations in Engineering and Technology (IJIET), Oct 2012.
- [2] Radhe Shyam and Sunil Kumar Nandal, "Improved Mean Round Robin with Shortest Job First Scheduling", International Journal of Advanced Research in Computer Science and Software Engineering, July 2014.
- [3] Raman, Dr. Pradeep Kumar Mittal, "Efficient Dynamic Round Robin CENTRAL PROCESSING UNIT Scheduling Algorithm", International Journal of Advanced Research in Computer Science and Software Engineering, July 2014,
- [4] Mohd Vasim Ahamad, Atiqua Ansari, Uqba Jabeen, "Performance Analysis of Modified Round Robin CENTRAL PROCESSING UNIT Scheduling Algorithm", International Journal of Advanced Research in Computer Science and Software Engineering, June 2017.
- [5] <http://javahungry.blogspot.com/2013/09/round-robin-scheduling-algorithm-with-example-java-program-code.html>