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Improvised Round Robin Scheduling Algorithm and Comparison with Existing Round Robin CPU Scheduling Algorithm

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Abstract – *CPU scheduling is a process which allows one process to use the CPU while the execution of another process is on hold(in waiting state) due to unavailability of any resource like I/O etc, thereby making full use of CPU. The aim of CPU scheduling is to make the system efficient, fast and fair.The Objective of this paper is to improve the existing Round Robin Scheduling by reducing the individual process waiting time and also reduces average waiting time and turnaround time.*
In this paper we also compare the existing round robin scheduling algorithm with the proposed algorithm with the help of Gantt charts.

Keywords– *CPU Scheduling, Round Robin Scheduling, Improvised Round Robin Scheduling, Waiting Time, Turnaround time.*

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I. Introduction

According to Silberchatz, Galvin and Gagne; CPU scheduling play a vital role by switching the CPU among several process. The aim of operating system to allow a number of processes concurrently in order to maximize the CPU utilization. In a multi-programmed Operating system, a process is executed until it must wait for the completition of some input-output request. Round Robin is the one of the effective algorithm among other scheduling algorithms but has got some disadvantageslike

1.1 Scheduling Criteria

- There are several different criteria to consider when trying to select the "best" scheduling algorithm for a particular situation and environment, including:
  - **CPU utilization** - Ideally the CPU would be busy 100% of the time, so as to waste 0 CPU cycles. On a real system CPU usage should range from 40% (lightly loaded) to 90% (heavily loaded.)
  - **Throughput** - Number of processes completed per unit time. May range from 10 / second to 1 / hour depending on the specificprocesses.
  - **Turnaround time** - Time required for a particular process to complete, from submission time to completion. (Wall clock time.)
  - **Waiting time** - How much time processes spend in the ready queue waiting their turn to get on theCPU.
  - **Response time** - The time taken in an interactive program from the issuance of a command to the commence of a response to thatcommand.

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1.2 Round Robin SchedulingAlgorithm:

According to Silberchatz, Galvin, Gagne in operating system design and operating system by D M Dhamdhere, the simple RR scheduling algorithm is given by following steps:-

1. The schedular maintains a queue of ready processes and a list of blocked and swapped outprocesses.
2. ThePCBofnewlycreatedprocessisaddedto end of ready queue. The PCB of terminating process is removed from the scheduling datastructures.
3. The schedular always selects the PCB at head of the readyqueue.
4. When a running process finishes its slice, it is moved to end of readyqueue.
5. The event handler perform the followingaction

a) When a process makes an input -outputrequest or swapped out,its PCB is removed from ready queue to blocked/swapped outlist

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 readyqueue.

1.3 Improvised Round Robin SchedulingAlgorithm:

The proposed algorithm will help to minimize a number of performance parameters such as average waiting time and average turnaround time. The algorithm performs following steps as:

1. Allocate process to CPU which has arrived first giving a initial time quantum(say kunits).
2. After the completion of first process inital execution the scheduler will check the queue for processes which have arrived by the time of completion of first process execution with initial timequantum.
3. Next among the multiple proceses that have arrived in the queue by the k units of time ,the process with the minimum burst time is allocated to the CPU.If the first process has completed its execution its removed from the queue or again a chance is provided toit.
4. For the complete execution of all the processes we have to repeat thesame.

1.4Gantt Chart

1.4.1 RoundRobin

Processes	Arrival Time	Burst Time
P1	3	2
P2	8	1
P3	2	6
P4	5	5
P5	4	3
P6	2	4

TQ:2

	P3	P6	P1	P5	P3	P4	P6	P2	P5	P3	P4

Turn Around time :

P1:5

P2:8-17=9

p3:2-4+4-12+12-20=2+8+8=18 p4:5-14+14-23=9+9=18

p5:4-10+10-18=6+8=14 p6=2-6+6-16=4+10=14

ATAT=(5+9+18+18+14+14)/6=13msec

1.4.2 Improvised RoundRobin

	P3	p1	p3	p6	p2	p3	p5	p6	p4	p5	p4	p4

Turn Around time :

p1:(3-6)=3

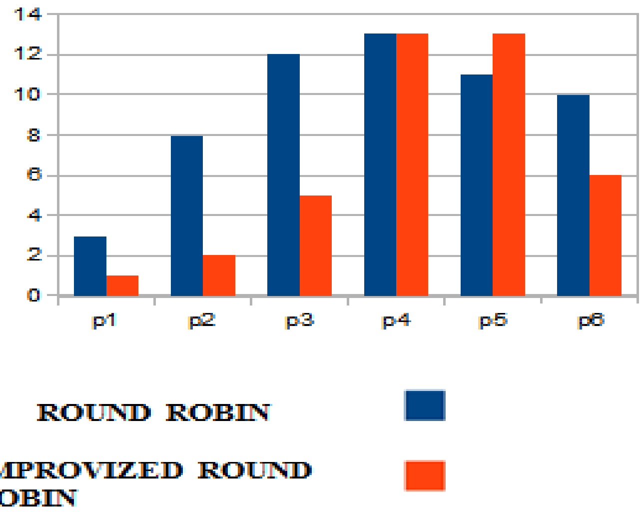
p2:(8-11)=3

p3:(2-4)+(4-8)+(8-13)=2+4+5=11 p4:(5-19)+(19-23)=14+5=19 p5:(4-15)+(15-20)=11+5=16 p6:(2-10)+(10-17)=8+7=15 **ATAT:**

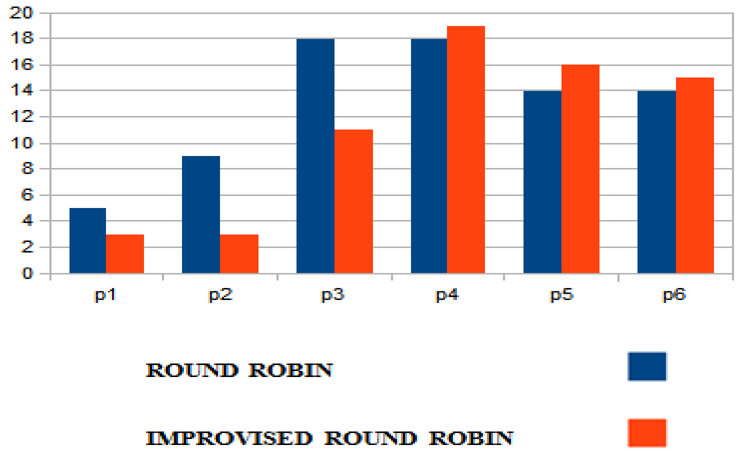
(3+3+11+19+16+15)/6=11.16 msec

II. Comparison of Waiting Times and TurnaroundTimes

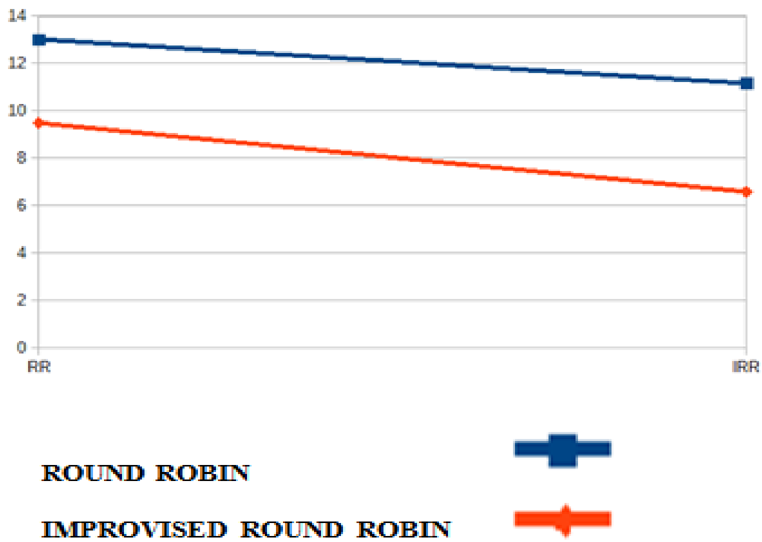
WAITING TIME GRAPH



TURN AROUND TIME GRAPH



AVERAGE TURNAROUND TIME ANDWAITING TIME GRAPH



III. Conclusion

From the comparison it's been deliberated that scheduling is one of the utmost significant responsibilities of the operating system. Depending upon the type and requirements to make the most appropriate system a good scheduling algorithm must be chosen. All the necessary factors i.e. waiting time, response time, turnaround time must be considered to make that decision. And with this algorithm both average waiting time and turn around times have beenreduced.

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