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Synergy of Scheduling Algorithms Using Multiple Queues (SSAM)

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Abstract: *A processor is an electronic circuit which helps us to gain our desired output based on given instructions by performing some arithmetic, logical operations and it also controls the input and output operations. The performance of a system depends on the throughput of the cpu. Scheduling algorithms are the conditions which are imposed on cpu in order to use it in an efficient manner. In SSAM mainly focused on reducing the AWT and context switches by combining the concepts of FCFS, SJF and RR and multi-level queue scheduling.*

Keywords: *AWT-Average waiting time, ATAT-Average turnaround time, SSAM-Synergy of scheduling algorithms using multiple queues*

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I. Introduction

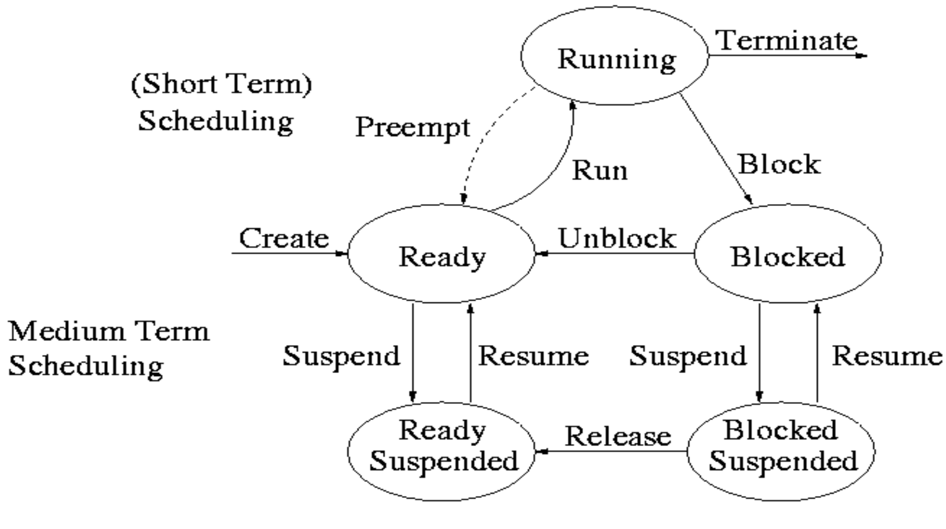

Fig-1: Process states

Computer system consists of Operating system, Hardware, Application Programs and Users. [1] Operating system is a set of instructions which coordinates the system's hardware and software and gives control to user [1].CPU belongs to the category of hardware. CPU should be used in efficient way in order to improve the system performance[4].Scheduling is the fundamental function of the operating system which is done by schedulers[1].Scheduler is the one ,which takes the decision when there are several jobs are there to run in the ready queue. There are 3 types of schedulers. They are (i)Long term scheduler: it decides which process is to be taken from start to Ready state,(ii)Medium term Scheduler: it decides which process is to be taken from Wait to Ready or Running to Wait states, and (iii)Short term scheduler: it decides which process is to be taken from Ready to Running queue[13].

Use of an efficient scheduling algorithm will increase the throughput of cpu. Scheduling algorithms are the conditions which are imposed on CPU in order to use it in an efficient manner. Some basic types of scheduling algorithms are First Come First Serve (FCFS), Shortest Job First (SJF), Shortest Job Remaining Time First (SRTF), Priority RoundRobin(RR),Multilevel Queues. There are two subdivisions in scheduling algorithms:

Preemptive: In preemptive type of scheduling the process will be forcefully removed from the running state before its completion and gives chance to another process.
Ex: RR, SRTF, Priority scheduling algorithms.
Non-Preemptive: In non-preemptive type of scheduling the process will be completed till the end and would be removed from the running state only when it is completely executed.
EX: SJF, FCFS, Priority scheduling algorithms.
In SSAM, the algorithms which are used are (i)First Come First Serve(FCFS),(ii)Shortest Job First(SJF),(iii)Round Robin(RR). The three algorithms are combined in a way such that produce a minimum AWT, and ATAT. In FCFS, starvation occurs when the highest burst time process enters the cpu in initial stages, then the process which comes after that process suffers from starvation. This is because of the non-preemptive property of the FCFS. In RR, the AWT depends on the time quantum. If time quantum is larger than needed, then it behaves like FCFS or if it is smaller, then the number of context switches will be increased. In SJF, larger process will have more waiting time which results in starvation of that process. In SSAM, we are trying to overcome all these bottlenecks.

II. Literature Analysis

In Traditional Round Robin one desired time slice is fixed for all the processes. This algorithm' efficiency totally depends on the time quantum which is selected. If the time slice is small, then context switches increases which results in too much of overhead. If the time slice is too large, then average waiting and turnaround time increases. In The simulation of round robin and priority scheduling algorithm [4], the author assigned some priorities for processes, to get optimal solution. If more than one process are there then this algorithm will help us to get optimal solution. In An Efficient Dynamic Round Robin Algorithm for CPU Scheduling [9], the author have taken 0.8th fraction of highest burst time as time quantum and run the processes accordingly. In this paper, the author have not discussed about the priorities for the given processes. In A Task set Based Adaptive Round-robin scheduling algorithm for improving performance [5], the author have focused mainly on task sets. Task sets are formed based on the arrival times of processes and every task set has its own quantum. But in this paper, if the time quantum is small, then the context switches will be increased. If the time quantum is too large, then the algorithm behaves as FCFS. In this algorithm, the time quantum plays an important role. The paper An Improved Dynamic Round Robin Scheduling Algorithm Based on a Variant Quantum Time [7] is based on an variant time quantum. The author have taken the difference between average of first &second highest burst times and first least& second least arrival times, as time quantum. In first phase and second phases respectively. The time quantum will be the average of first time quantum and highest remaining time of the processes. In Queuing Theory Study of Round-robin versus Priority Dynamic Quantum Time Round Robin Scheduling Algorithms [6], the time quantum will be dynamic and is dependent on priority levels. In Prioritized Fair Round Robin Algorithm with Variant Time Quantum[8],the author have used variable time quantum based on burst time and priorities in each round which results in decrement of average waiting time, average turnaround time and number of context switches. In An enhanced method to improve the performance of CPU scheduling using Sort-Split Round-robin Technique for load balancing[11],the processes were initially sorted and then a process have to be selected with minimum load and run in round-robin fashion. In Improved Round Robin CPU Scheduling Algorithm [10], processes would be taken along with priorities. The author has allocated the time quantum statically because dynamic time quantum may increase the number of context switches. This algorithm can be operated within an algorithm of selecting best scheduling algorithm dynamically. In Implementation of Alternating Median Based Round-robin Scheduling Algorithm [12], the author have used two quantum which are used alternatively in cycles of scheduling. The first one is the median of processes and the next one is the difference between highest value and median. Both the time quantum are calculated at the beginning and are not recalculated again throughout the process.

Proposed Work

1. If ready queue contains single process then
i. run it until next process arrives
ii. place the process(remaining time) in queue2 in ascending order according to the burst times
2. Elseif ready queue contains more than 1 process then

- take the lowest burst time processes which are in ready queue as time quantum
- If new process enters into ready queue then
- compare the burst time of new process with time quantum

  ii. Fix the lowest value as time quantum

- Run the processes which are in ready queue based on the time quantum.

  iv. send the incomplete processes(remaining time) into queue2 in ascending order according to the burst times

3. Else if ready queue is empty then
- take the lowest burst time process from queue2 and run it completely.

Flowchart:

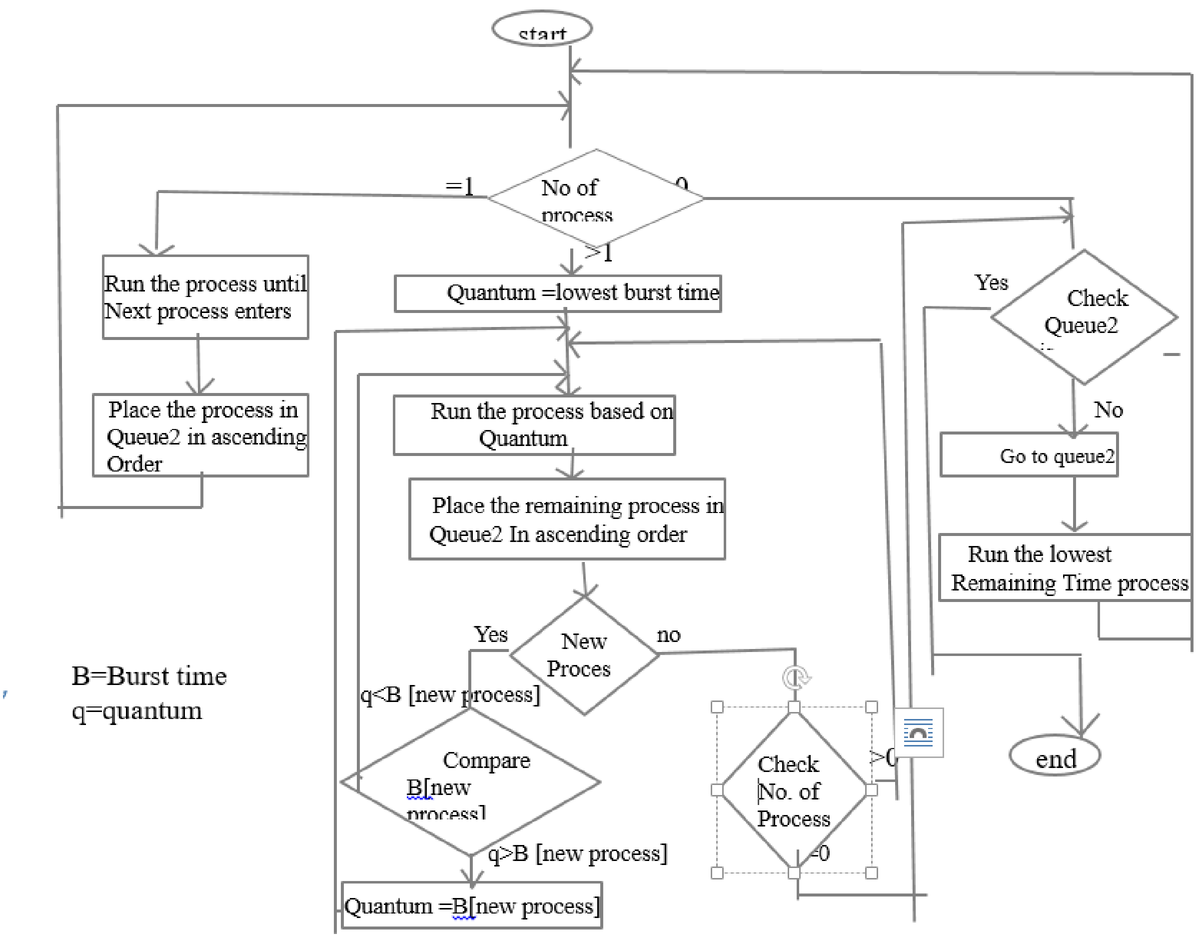

Fig: Flowchart

Example

Here we are compared SSAM with TARR and TRR

Table 1:

Process ID	Arrival Time	Burst Time
P1	27	17
P2	23	84
P3	48	88
P4	0	42
P5	45	11

Gantt chart

P4	P2	P1	P4	P5	P3	P3	P2

Temporary Queue

P4=19	P2=80	P3=77

Comparison of SSAM with TRR and TARR

Algorithm	AWT	ATAT
TRR	71.2	119.8
TARR	64.4	112.8
SSAM	40	88.4

EX 2:

Here compared SSAM with TRR and ERR.

Table 2:

Process ID	Arrival Time	Burst Time
P1	0	34
P2	0	26
P3	0	20
P4	0	12
P5	0	5

Gantt chart

P5	P4	P3	P2	P1	P4	P3	P2	P1

Temporary Queue

P4=7	P3=15	P2=21	P1=29

Comparison of SSAM with TRR and ERR:

Algorithm	AWT	ATAT
TRR	58	77
ERR	46.4	65.8
SSAM	34.4	53.8

III. Conclusion

The proposed algorithm SSAM is compared with TARR, TRR and ERR. From the results it is cleared that SSAM is better than TARR, TRR and ERR. We have reduced AWT and ATAT.SSAM improves cpu throughput.

Future work: The algorithm can be considered for the processes with different priorities.

References

[1]. Silberschatz, A., Peterson, J. L., and Galvin, P.B.*Operating System Concepts*, Addison Wesley, 7th Edition, 2006.

[2]. Andrew S. Tanenbaum , and Albert S. Woodfhull , Operating Systems Design and Implementation, Second Edition,2005

[3]. William Stallings, Operating Systems Internal and Design Principles, 5th Edition ,2006

[4]. Alban Karapici ,Enri Feka ,Igli Tafa ,Alban Allkoçi : "The simulation of round robin and priority scheduling algorithm"-07113570

[5]. Neeraj Kumar Rajput ,Ashwani Kumar :"A Task set Based Adaptive Round-robin scheduling algorithm for improving performance"-07155018

[6]. Maysoon A. Mohammed, Mazlina AbdulMajid Balsam A. Mustafa,Rana Fareed Ghani :"Queuing Theory Study od Round-robin versus Priority Dynamic Quantum Time Round Robin Scheduling Algorithms"-07333108

[7]. Ahmed Alsheikhy, Reda Ammar1 and Raafat Elfouly:"An Improved Dynamic Round Robin Scheduling Algorithm Based on a Variant Quantum Time"-07416332

[8]. Arfa Yasin,Ahmed faraz,Saad Reh man:"Prioritized Fair Round Robin Algorithm with Variant Time Quantum"-07421020

[9]. Muhammad Umar Farooq, Aamna Shakoor, Abu Bakar Siddique :"An Efficient Dynamic Round Robin Algorithm for CPU Scheduling"-07918936

[10]. Harshal Bharatkumar Parekh, Sheetal Chaudhari :"Improved Round Robin CPU Scheduling Algorithm"-07955294.

[11]. Padmashree M G, Savita Shridharamuthyb:"An enhanced method to improve the performance of CPU scheduling using Sort-Split Round-robin Technique for load balancing"-07912119.

[12]. Salman Arif,Naveed Ghaffar,Ali Javed :"Implementation of Alternating Median Based Round-robin Scheduling Algorithm"-07876331.

[13]. Opearting system concepts 8th edition by Silberschatz,Galvin,Gangne

N.Srilatha "Synergy of Scheduling Algorithms Using Multiple Queues (SSAM)." IOSR Journal of Computer Engineering (IOSR-JCE) 20.1 (2018): 63-66.