Operating Systems Assignment

Submitted to: Nikumani Choudhury Sir
Submitted by:
Samarth Dariya(2018B4A20827P)
A Rameshwar(2018B2AA0772H)
Kandibanda Sainath(2018B2A40535H)
K Gowtham Kumar(2018AAPS0392H)
Chilukuri Vasu Sri Ram(2017A3TS0328H)

INTRODUCTION

The Round Robin (RR) CPU scheduling algorithm is a fair scheduling mechanism that ensures that all processes have the same amount of time. The time quantum is important since it impacts the algorithm's performance.
The proposed algorithm is an improved version of round robin algorithm
It has 2 major advantages

1) The quantum is calculated dynamically to suit the current requirements
2) If a process is left with a very few burst time with respect to current quantum it does not need to wait for all the processes.

INTRODUCTION TO THE ALGORITHM

- The proposed CPU scheduling algorithm assumes a queue called the Buffer queue which holds processes according to their arrival times while there are other processes in the ready queue (here Ready) waiting for CPU allocation.
- The algorithm takes to the Ready queue, the first process that enters the Buffer queue, and allocates the CPU to it for the period of its burst time .Processes that arrive while the CPU is executing this process will be added to the Buffer queue according to arrival time.
- After execution of the process, all the processes in the Buffer queue will be moved to the Ready queue and arranged in ascending order of burst times. The algorithm takes the ceiling of the average of burst times of the processes in the Ready queue as the time

quantum and allocates the CPU to the first process in Ready queue for the period of the determined time quantum.

- When the time quantum for the process expires, the algorithm checks the remaining CPU burst time of the currently running process. If the remaining CPU burst time is less than or equal to a predetermined checker (here greatest integer smaller than or equal to ((quantum/2) + 1)) , the CPU will again be allocated to the currently running process for the remaining CPU burst time.
- In this case, this process will finish its execution and will be removed from the Ready queue. Otherwise, if the remaining CPU burst time of the currently running process is longer than the checker, the process will be moved to the Buffer queue. The CPU scheduler will then proceed to the next process in the Ready queue.
- During the execution of the processes in the Ready queue, any process that arrives at the system will be placed in the Buffer queue. These activities continue until no process is available in the Ready queue.
- After execution of the processes in the Ready queue, the transferred processes from the Ready queue to the Buffer queue in the previous execution cycle and the newly arrived processes in the Buffer queue will be moved to the Ready queue in ascending order of burst times and a new time quantum will be calculated (i.e. the ceiling of the average of burst times of the processes).
- The CPU will be allocated to the processes in the Ready queue as usual using the determined time quantum. These activities continue until no process is available in the Ready and Buffer queues

Results

- We have achieved the following results when we gave

PID	Arrival	Burst time
1	0	23
2	0	75
3	0	93
4	0	48
5	0	2

Quantum for round robin was taken as 50.

- Here we can see that the standard deviation of waiting time is the lowest for our algorithm with these inputs when compared to other algorithms.
- Even when we compare average waiting time and average turnaround time , our algorithm stands superior.

```
average waiting time for FCFS: 110.2
average turnaround time for FCFS :158.4
the square of standard deviation of turnaround time :7272.6396
the square of standard deviation of waiting time :8602.96

Average waiting time for SJF with preemption = 49.6
Average turn around time for SJF with preemption = 97.8
the square of standard deviation of turnaround time :7623.7593
the square of standard deviation of waiting time :3112.2402

Average waiting time for SJF without premption = 49.6
Average turn around time for SJF without premption = 97.8
the square of standard deviation of turnaround time :7623.7593
the square of standard deviation of waiting time :3112.2402

Average waiting time for Round Robin with quantum 50 = 78.0
Average turn around time for Round Robin with quantum 50 = 126.2
the square of standard deviation of turnaround time :3445.36
the square of standard deviation of waiting time :3961.6

Average waiting time of our proposed algorithm is = 53.8
Average turn around time of our proposed algorithm is = 102.0
the square of standard deviation of turnaround time :6889.6
the square of standard deviation of waiting time :2782.96
```

CODE DETAILS

Java is used as a programming language for this assignment

All scheduling algorithms have a separate class for themselves and to run each algorithm an object is created.

All classes are part of Package OSAssignment.

Main function lies in a class called Scheduling.

The proposed algorithm lies in a class called CpuRr.