CPSC 503 / CPEG 308 **Summer 2024**
Assignment 3 **University of Bridgeport**

As discussed in class you can either compare First Fit, Best Fit and Worst Fit with an appropriately scaled down version of the following problem OR, you can attempt Compaction/Defragmentation using different values of the Compaction thresholds with an appropriately scaled down version of the following problem OR, you can implement one of the fitting algorithms with CPU Scheduling with an appropriately scaled down version of the following problem.

PART ONE

Implement a Memory Manager within an Operating System satisfying the following requirements:

- A **contiguous memory allocation** scheme is used.
- The PCB's are to be executed based on a round robin mechanism.
- The main memory size is 32MB.
- The jobs sizes vary between 20KB -> 2MB. (Uniform Random Distribution can be used with multiple of 20KB).
- The Disc capacity is 500MB, initially 50% full with jobs.
- Use First Fit, Best Fit, and Worst Fit techniques (should be a variable).
- Do compaction when fragmentation is more than 6% and holes are 50KB or less (Assume memory access time = 14 x 10^{-9} seconds).
- Use a varying time slot (a variable parameter, multiple of 1ms).
- Disc access time = 1ms + (jobsize (in bytes)/500000) ms
- Job execution times range between 2ms to 10ms (multiple of 1ms)

PART TWO

Very important:

After completing the implementation and doing a few sample runs, start thinking of this problem an algorithmic design point of view. The algorithm/hardware implementation of the memory manager involves many parameters, some of them include:

- Memory Size
- Disc access time (transfer time only, for the purpose of this assignment)
- Time slot for RR
- Compaction thresholds (percentage and hole size)
- RAM access time
- Fitting algorithm

The eventual goal could be to optimize several (or some) performance measures (criteria) such as:

- Average waiting time, Maximum wait time
- Average turnaround time, Maximum turnaround time
- CPU utilization, CPU throughput
- Memory fragmentation percentage over time

Out: Tue June 4, 2024
Due: Mon June 10, 2024 with demo during Tue class time as per assigned slots

Perform several test runs and write a summation indicating how sensitive are some of the performance measures to some of the above parameters (or a combination of the above parameters). Include some of the results (time lines and/or graphs) with your observations and conclusions regarding the effect of changing the values of different parameters on the performance measures.

Bonus Opportunities Available (*if interested* 😊)

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