CS303 | Assignment-3 | Due 24/Oct/2021 11:59 PM | 100 points

- Important instructions for code submissions are here: https://goo.gl/IMWvdF
- Grading scheme to be followed is available here: https://goo.gl/52D82g
- Assignment description may be underspecified to allow some room for exploration and creativity.
- Your submission should be packaged as a zip file named **exactly** in this format: CS303-[your entry no.]-[assignment no.].zip.

We need to develop a program in the C programming language to simulate the following scenario. Our objective is to investigate the relative effectiveness of the first-fit, best-fit, and next-fit algorithms for dynamic partitioning based memory placement. Your program should measure the following performance metrics for the above mentioned placement algorithms:

a) Memory utilization (%age of the total physical memory actually used)
b) Average turnaround time. The turnaround time is the time it takes for successfully allocating the requested amount of memory to a process.

Assume that the system has a physical memory of **`p MB`**, of which **`q MB`** (**`q < 0.2p`**) is reserved for the operating system. Process arrival rate, **`r`**, is a random number between **`(0.1n, 1.2n)`** per second. The size **`s`** of the processes are random between **`(0.5m, 3.0m)MB`** in multiples of **`10MB`**, and the durations **`d`** range from **`(0.5t, 6.0t)`** minutes in multiples of 5 seconds. Here, **`p, q, n, m, t`** are constants and should be taken as command line input to the program. Total duration, T, in minutes for which your simulation will run should also be taken as a command line input.

Your program should simulate each algorithm (i.e., first-fit, best-fit, and so on) over a long enough running time (T) to achieve steady-state operation. Perform the simulation for the following values of the parameters {**p, q, n, m, t**}:

Case 1: Base setup = {1000, 200, 10, 10, 10}
Case 2: Vary **`p`** from 1000 to 8000 in steps of 1000, keeping other parameters constant.
Case 3: Vary **`n`** from 10 to 20 in steps of 2, keeping other parameters constant.
Case 4: Vary **`m`** from 10 to 20 in steps of 2, keeping other parameters constant.
Case 5: Vary **`t`** from 10 to 20 in steps of 2, keeping other parameters constant.

For each of your simulations, assume that the time it takes to make the memory placement decision is negligible.

Observed metrics tables should be reported in the following format. Here it shows the values for Case-1, other cases should also be reported in similar tables.

p	q	n	m	t	Memory utilization	Avg. turnaround time (s)
1000	200	10	10	10		
2000	200	10	10	10		
3000	200	10	10	10		
4000	200	10	10	10		
5000	200	10	10	10		
6000	200	10	10	10		
7000	200	10	10	10		
8000	200	10	10	10		

Based on your observations, suggest which strategy you would choose.