Project 2 – Multi-core scheduling

A computer equipped with N CPUs can execute multiple interactive processes. New processes are generated every T seconds, and each process has a total duration of D seconds. The total duration is composed of three phases: 1) initial processing phase, 2) I/O operation phase, and 3) final processing phase. T and D are RVs to be described later.
A process is classified as *CPU bound* with probability p or *I/O bound* with probability $1 - p$. In a CPU bound process the I/O phase takes 20% of the total duration D, whereas in an I/O bound process the latter case the I/O phase takes 80% of the total duration D. Assume that phase 1 and 3 of the same process have the same duration, and that the I/O phase duration is deterministic.
Whenever one of the CPUs becomes idle, the operating system's scheduler selects the next process to be run by such CPU from the list of "ready" processes. When the selected process reaches its I/O operation phase, the CPU is revoked and assigned to another "ready" process. When a process terminates its I/O operation phase, it becomes "ready" to be scheduled again. A process leaves the system when it terminates all its three execution phases.

Measure at least the turn-around time of the processes for various values of N and p, in case the scheduler follows the following policies:

a. First Come First Served (FCFS)
b. Shortest Job First (SJF). In this case, the scheduler considers the time until the process' I/O phase or termination.

At least the following scenario must be evaluated:

- exponential distribution of both T and D

In all cases, it is up to the team to calibrate the scenarios so that meaningful results are obtained.

Project deliverables:

a) Documentation (according to the standards set during the lectures)
b) Simulator code
c) Presentation (up to 10 slides maximum)