KARACHI INSTITUTE OF ECONOMICS & TECHNOLOGY

PAF KIET

Bonus Assignment

Type: Group Assignment (3 or 4 members per team)

Course: Operating Systems

Instructor: Dr. Ayaz ul Hassan Khan

Objective

In this assignment, we will practice threads and synchronizations. This assignment has several Tasks, with 100 points in total.

Problem Statement

This Assignment will implement the "Dinging Philosophers" problem with multithreading. The "Dining Philosophers" problem is invented by E. W. Dijkstra. Imagine that five philosophers who spend their lives just thinking and easting, without anything else. They will sit on a circular table with five chairs. The table has a big plate of spaghetti. However, there are only five chopsticks available, as shown in the figure 1.

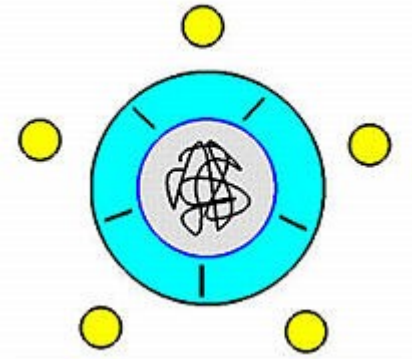

Figure 1

Task 1: (30 marks: Code Implementation = 25 marks, Report = 5 marks)

Create a main program that takes a single command line parameter, the number of threads ("nthreads") that is going to be created. You will finish this Task in several steps:

1. Interpret the parameter in order to get "nthreads". **(5 marks)**
2. Print your name and the "nthreads" in the same statement, e.g. "Ali, the input is 5 threads". **(5 marks)**
3. The main function will invoke a function void creatPhilosophers(int threadindex).
   The "nthreads" is actually the number of threads that you are going to create in your program. For each thread, creatPhilosophers() will pass the **index** of each thread to the thread function "PhilosopherThread". For instance, if you are creating 5 threads, and the thread index will be from 0 to 4. **(5 marks)**

4. After the creation, every PhilosopherThread simply prints a sentence like "This is philosopher X", where X is the actual index passed by the creatPhilosophers(). After do this, the PhilosopherThreads just return NULL. **(5 marks)**
5. After the creation, the main thread will wait for the finish of all philosopher threads using pthread_join() API. After all threads have been joined successfully, the function will print a sentence like "N threads have been joined successfully now". **(5 marks)**