Programming Assignment 4

The Jurassic Park Problem

Submission Date: 8th March 2023

Problem Statement: Jurassic Park consists of a dinosaur museum and a park for safari riding. There are m passengers and n single-passenger cars. Passengers wander around the museum for a while, then line up to take a ride in a safari car. When a car is available, it loads the one passenger it can hold and rides around the park for a random amount of time. If the n cars are all out riding passengers around, then a passenger who wants to ride waits; if a car is ready to load, but there are no waiting passengers, then the car waits. Use semaphores to synchronize the m-passenger processes and the n-car processes.

Input: The input to the program will be a file named, inp-params.txt, consisting of the following parameters: P, the number of passengers threads; C, the number of car threads; λ_P, the parameter for the exponential wait between 2 successive ride requests made by the passenger, λ_C, the parameter for the exponential wait between 2 successive ride request accepted by a car and k, the number of ride request made by each passenger.
Your program will terminate after each passenger thread has successfully ridden around the park for k times.

Output: You have to generate one output file containing the log for all the rides made by the passengers and all the rides taken by the cars.
A sample output is as follows:

Passenger 1 enters the museum at 12:00
Passenger 2 enters the museum at 12:01
Passenger 1 made a ride request at 12:01
Car 1 accepts passenger 1's request
Passenger 1 started riding at 12:02
Car 1 is riding Passenger 1
Car 1 has finished Passenger 1's tour
Passenger 1 finished riding at 12:04

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Passenger 1 exit the museum at 12:10

Report: You must provide a report as part of this assignment that analyses the output of your programme and describes its low-level design. As part of your analysis, you must produce two graphs along with appropriate justifications for the inclusion of the curves in the graphs.

- **Plot 1:** The x-axis should contain the number of passengers varying from 10 to 50 with an increment of 5. The y-axis represents the average time taken by the passengers to complete their tour. The number of cars and K should be fixed to 25 & 5 respectively.

- **Plot 2:** The x-axis should contain the number of cars varying from 5 to 25 with an increment of 5. The y-axis represents the average time taken by the cars to complete its tour. The number of passengers and K should be fixed to 50 & 3 respectively.

Deliverables: You have to submit the following:

- Source files: The source file containing the actual program to execute. Name it as Assgn4-Src-⟨rollno⟩.cpp

- Readme: A readme.txt that explains how to execute the program. Please name the files as: Assgn4-Readme-⟨RollNo⟩.txt.

- Report: The report as explained above. Please name it as Assgn4-Report-⟨RollNo⟩.txt

Zip all the three files and name it as ProgAssgn4-⟨rollno⟩.zip. Then upload it on the google classroom page of this course by above mentioned deadline.
We have the following grading policy:

1. Design as described in the report and analysis of the results: 50

2. Execution of the programs based on the description in the readme: 40

3. Code documentation and indentation: 10

As mentioned before, all assignments for this course have the late submission policy of a penalty of 10% each day after the deadline. We will consider a late assignment for a maximum of 6 days. Any submission beyond that will not be considered. **Kindly remember that all submissions are subjected to plagiarism checks.**