



Problem Set: Quiz 01
Points: 5
Date Set: See Slate
Course: CS220 Operating Systems

Semester: Spring 2020
Due Date: See Slate
Instructor: Dr. Nauman

1 Instructions

1. Please read through this document in full before starting the tasks.
2. Note that this is an open book quiz. That means the questions are intentionally ambiguous and would require you to think hard about what the actual problem is. The answers themselves should be short, concise and very to-the-point.
3. Do not consult with your peers taking the same quiz. You are free to consult any other resource. However, after consultation, your answers need to come from your own thinking.

2 Problem Description

Consider a queue implemented using an array of size 10. You have two threads that want to insert data into this queue *concurrently*. Assume the queue operations are *not* thread safe.

Thread 1 will try to insert the characters of your FIRST NAME into the thread and Thread 2 will try to insert characters of your LAST NAME into the same queue at the same time. For instance, if your name is *Nazo Gula*. T1 will insert *Nazo* and T2 will insert *Gula*.

1. You need to write a sequence of operations that leads to data *inconsistency* in the queue. Depict the sequence somehow so that it is clear which thread is performing which exact operation. Your syntax should also make it clear how the sequence of operations is leading to data inconsistency.
(No need to write an explanation of your syntax or justify your answer. Just provide a self-evident syntax.)
2. If we were to solve this issue, which locking mechanism do you think would be the *best suited*? Note that in the lecture, we discussed *one* solution; that may not be the *best* one for the given situation. What is the rationale for picking this mechanism?
(No more than one paragraph of at max 5 lines.)
3. If the mechanism you suggested above is *not* acceptable, what would be your second choice and why?
(No more than one paragraph.)
4. Why do you think the mechanism you gave in Q2 above is better than the one you proposed in Q3?
(No more than one paragraph.)
5. Identify the assumptions you are making about the threads and the execution. (What must happen for the execution to go as you have described and what change will make your answers to questions 2, 3 and 4 incorrect?)
(No more than one paragraph.)

3 Submission

1. Write your answers on a sheet of paper. After completing all problems, scan the page(s) into a *single PDF*. Submit the PDF on SLATE.
2. After the submission, please be sure to submit feedback for the course on the link given on the description page for this assignment on SLATE. It is NOT mandatory but I would highly appreciate it if you take 5 minutes to provide this feedback.