CS446 Assignment 2

Operating Systems, Winter 2022

Question [10 points]: Producer and Consumer Problem:

Design a programming solution in C using Pthreads to the bounded-buffer problem using the producer and consumer processes.

The solution presented in the textbook Chapter 7, Section 7.1.1, and the lecture notes of chapters 6 & 7 (6.39 – 6.43) use three semaphores: empty and full, which count the number of empty and full slots in the buffer, and mutex, which is a binary (or mutual exclusion) semaphore that protects the actual insertion or removal of items in the buffer.

For this question, you will use **standard counting semaphores for empty and full and a mutex lock**, rather than a binary semaphore, to represent mutex. The producer and consumer—running as separate threads—will move items to and from a buffer that is synchronized with the empty, full, and mutex structures.

Note:

- **You should implement the shared bounded buffer as a circular array (you can refer to textbook Chapter 3, Section 3.5 in the textbook and lecture notes (3.37 – 3.41)).**

Deliverables:

- **assignment2.c - You are to provide a C file named assignment2.c that contains the entire solution for the assignment question.**
- **output.txt - You are also to provide a text file called output.txt that contains two test cases (of your choice) and your solution's output for these test cases.**