

## MULTIPLE PRODUCER-CONSUMER PROBLEM

### *Lab5 - Q2.2*

If I start the consumer threads, but put all the producer threads to sleep for some time (in this case - 5 seconds), the output of the program does not change.

The image below is the output of the program without the sleep call for the producer threads for 4 producers with 2 producer capacity and 2 consumers with 3 consumer capacity :

```
saksham@ss in ~/Documents/CS3500_OS/Lab5/Q2 via C v12.2.0-gcc took 76ms
λ ./multi_pc -p 4 -pc 2 -c 2 -cc 3
Producer 0 produced 590
Producer 0 produced 138
Consumer 0 consumed 138
Consumer 0 consumed 590
Producer 1 produced 719
Producer 1 produced 799
Consumer 0 consumed 799
Consumer 1 consumed 719
Producer 2 produced 418
Producer 2 produced 39
Consumer 1 consumed 39
Consumer 1 consumed 418
Producer 3 produced 728
Producer 3 produced 680
```

And the image below is the output on the same input with the producer threads being made to sleep for 5 seconds:

```
saksham@ss in ~/Documents/CS3500_OS/Lab5/Q2 via C v12.2.0-gcc took 94ms
λ ./multi_pc -p 4 -pc 2 -c 2 -cc 3
Producer 0 produced 783
Producer 0 produced 488
Producer 2 produced 910
Consumer 0 consumed 910
Consumer 0 consumed 488
Producer 1 produced 505
Producer 1 produced 736
Consumer 0 consumed 736
Consumer 1 consumed 505
Consumer 1 consumed 783
Producer 2 produced 999
Producer 3 produced 646
Producer 3 produced 658
Consumer 1 consumed 658
```

So, we can see from this that delaying the producer threads does not change the output of the program. This is because I have implemented the producer and consumer threads using semaphores for synchronization. So, even though the producer threads are delayed by 5 seconds, it does not affect the execution of the program because the consumer threads can't begin their execution until they receive the signal for accessing the stack and the signal for the stack being non-empty. These signals are set by the producer threads after their execution. Therefore, the consumer threads can't do anything to change the execution of the program despite the 5 second delay to the producer threads because of the semaphores involved. Hence, the delay to the producer threads does not impact the program output.