# Report of Assignment 4

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**Course: CS433 Operating Systems**

**Assignment: 4 Producer-Consumer Problem**

**Description:**

This project is a program which using semaphores and mutex lock to solve the producer-consumer problem. It will create multiple producer and consumer threads which share the bounded buffer. It will also keep track and print out the content of the shared buffer during the execution of the threads when an item is added or consumed.

**Implementation:**

Buffer:

This project creates a circular buffer with size 5, which will circular add or consumer an item in/from the buffer during the runtime.

Variable "count" to count the number of items in the buffer and compare it with the BUFFER_SIZE to check if a buffer is full.

Variable "front" is to mark the first position of the buffer and "next" is to mark the next available position of the buffer where new item will be added.

Producer –Consumer

In the main drive file, two semaphores "full" and "empty" and a mutex lock are used to synchronize access to the bounded buffer.

To add an item into the buffer, the producer thread first wakes up and waits for the signal of empty semaphore. If the buffer is available, producer will lock the mutex lock to avoid race condition. Then it will add the item and print the buffer. After executing its critical section, producer will release the mutex lock and give a full signal.

To remove an item from the buffer, the consumer thread first wakes up and waits for the signal of full semaphore. If the buffer is available, consumer will lock the mutex lock to avoid race condition. Then it will remove the item and print the buffer. After finishing execution its critical section, consumer will release the mutex lock and give an empty signal.

**Included Files:**

Header:

- buffer.h

Implementation:

- buffer.cpp

- main.cpp

Makefile:

- Makefile

Using "make all" command to execute Makefile and then run the command

"./test  <sleeptime>  <number of producer threads>  <number of consumer>"