North South University

Fall 2017

CSE 425: Principles of Programming Language

Assignment 1: Multithreaded Producer Consumer

A classic case for multi-threaded programming is the producer consumer problem. In this case there is a producer that generates stuff to be consumed by the consumer, however the rate of production and the rate of consumption vary. This calls the need for having the producer and consumer run off different threads have co-ordinate them through a shared buffer or queue.

```
char Buff [20]
```

In this assignment, assume that the shared buffer is an array of characters of sized 20. Also assume that, there are 4 producers and 4 consumers each. Name the threads as Producer1, Producer 2…, Consumer 1, Consumer 2, ….. .. . These 4 producers can produce items concurrently. The consumers can also try to consume concurrently. If they produce or consume from the same location, then we must take measures so that only one thread become successful.

Producer insert a character (produce data) in an empty slot in the buffer. Consumer retrieve one character (consume data) from the buffer. As a result of the consume operation. The consumed information is removed from the buffer.

```
void produce(char value){
      ……..
      Buff[ind] = value;
      // here ind represent the location of the buffer information is
      insert into
}

char consume(){
     ……..
      return Buff[ind];

      // here ind represent the location of the buffer information is
      insert into
}
```

Use the above mentioned skeleton of producer/consumer code, rewrite them to implement a scenario where there will be produce and consume operation by all the threads. Based on the location of buffer accessed and state of the buffer, the *produce* and *consume* operation may have to wait. Whenever a thread produces or consumes something, print the following line:

Producer_id/Consumer_id produces/consumes element: X

Run the program for 30 seconds and print the outputs in a file. Submit the program and the output file to the email: nsu.teaching@gmail.com. The subject should only contain: Assignment 1