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CS 460 Project #2
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This program was a bounded-buffer problem that uses 3 semaphores: empty, full, and mutex. It also took 3 parameters the time, number of producers, and number of consumers. Mutex is a semaphore that protects the insertion and removal of items in the buffer. The producer and consumer are separate threads that will be running and will move items to and from a buffer. In the main method of the code all the threads and thread attributes were initialized for the producer and consumer. There is also a pthread_join for terminating the thread. The insert will insert into the buffer and remove will remove an item from the buffer. The producer thread will alternate between sleeping for a random period of time and inserting a random integer into the buffer. The consumer will also sleep for a random period of time and, upon awakening, will attempt to remove an item from the buffer. To kill the program simply type CRTL-c and in the consumer method it will break out of the for loop and kill the program in the time that was entered through the command line.

Output using the command 'Producer-Consumer 1 10 10' :

```
report error condition
producer produced 1505795335
consumer consumed 1505795335
producer produced 1954899097
producer produced 1580723810
consumer consumed 1580723810
^C received SIGINT and going to finish in the time entered!
consumer consumed 1954899097
producer produced 1624379149
producer produced 784558821
consumer consumed 784558821
consumer consumed 1624379149
producer produced 2110010672
producer produced 1551901393
consumer consumed 1551901393
producer produced 156091745
producer produced 1899894091
producer produced 585640194
consumer consumed 585640194
consumer consumed 1899894091
producer produced 1025921153
producer produced 510616708
consumer consumed 510616708
```

In this output, it shows the producer and consumer inserting/removing an item. Then when CTRL-c was entered it finished off with the producers and consumers and exited.