```
1   #include <stdio.h>
2   #include <string.h>
3   #include <errno.h>
4   #include <pthread.h>
5   #include <semaphore.h>
6   #define N 10
7   #define BUFSIZE 3
8   static int buffer[BUFSIZE];
9   static int bufin = 0, bufout = 0;

10  static sem_t empty, full;
11  static pthread_mutex_t  buffer_lock = PTHREAD_MUTEX_INITIALIZER;

12  static void *producer(void *arg1) {
13     int i, item;

14     for (i = 0; i < N; i++) {
15        sem_wait(&empty);
16        item = i*i;
17        pthread_mutex_lock(&buffer_lock);
18        buffer[bufin] = item;
19        bufin = (bufin + 1) % BUFSIZE;
20        pthread_mutex_unlock(&buffer_lock);
21        printf("p: put item %d\n", item);
22        sem_post(&full);
23     }
24     return NULL;
25  }

26  static void *consumer(void *arg2) {
27     int i, item;

28     for (i = 0; i < N; i++) {
29        sem_wait(&full);
30        pthread_mutex_lock(&buffer_lock);
31        item = buffer[bufout];
32        bufout = (bufout + 1) % BUFSIZE;
33        pthread_mutex_unlock(&buffer_lock);
34        printf("c: get item %d\n",item);
35        sem_post(&empty);
36     }
37     return NULL;
38  }
39
40  void main(void) {
41     pthread_t prodtid, constid;
42     sem_init(&full, 0, 0);
43     sem_init(&empty, 0, BUFSIZE);
44     pthread_create(&prodtid, NULL, producer, NULL);
45     pthread_create(&constid, NULL, consumer, NULL);
46     pthread_exit(0);
47  }
```