

```

#include <stdio.h>
#include <pthread.h>
#include <semaphore.h>
#include <unistd.h>
#include <sys/types.h>

#define BUFFER_SIZE 20

void *producer(void *arg);
void *consumer(void *arg);

typedef struct
{
    int buffer[BUFFER_SIZE];
    sem_t full, empty;
} shared;

shared sh;
int item;
int in = 0, out = 0;
sem_t mutex;

int main()
{
    pthread_t ptid1, ptid2, ctid1;
    sem_init(&sh.empty, 0, BUFFER_SIZE);
    sem_init(&sh.full, 0, 0);
    sem_init(&mutex, 0, 1);

    pthread_create(&ptid1, NULL, producer, NULL);
    pthread_create(&ptid2, NULL, producer, NULL);
    pthread_create(&ctid1, NULL, consumer, NULL);

    pthread_join(ptid1, NULL);
    pthread_join(ptid2, NULL);
    pthread_join(ctid1, NULL);
    return 0;
}

void *producer(void *arg)
{
    while (1)
    {
        item = in;
        sem_wait(&sh.empty);
        sem_wait(&mutex);

        sh.buffer[in++] = item;

        printf("PRODUCER Thread id = %ld and Producer Item = %d \n", (long)pthread_self(), item);

        sem_post(&mutex);
        sem_post(&sh.full);
        sleep(3);
    }
}

void *consumer(void *arg)
{

```

```

while (out < BUFFER_SIZE)
{
sem_wait(&sh.full);
sem_wait(&mutex);

item = sh.buffer[out++];
printf("\tCONSUMER Thread id = %ld and Consumer Item = %d \n", (long)pthread_self(),
item);

sem_post(&mutex);
sem_post(&sh.empty);
sleep(1);
}
}

```

```

cd "/home/sapatevaibhav/Documents/OSL/" && g++ -o pr4A pr4A.cpp -lGL -lGLU -lglut && ./pr4A /home/sapatevaibhav
sapatevaibhav@sapatevaibhav-mint ~-> cd "/home/sapatevaibhav/Documents/OSL/" && g++ -o pr4A pr4A.cpp -lGL -lGLU -
lglut && ./pr4A
PRODUCER Thread id = 140348792583744 and Producer Item = 0
PRODUCER Thread id = 140348784191040 and Producer Item = 1
    CONSUMER Thread id = 140348775798336 and Consumer Item = 0
    CONSUMER Thread id = 140348775798336 and Consumer Item = 1
PRODUCER Thread id = 140348784191040 and Producer Item = 2
PRODUCER Thread id = 140348792583744 and Producer Item = 3
    CONSUMER Thread id = 140348775798336 and Consumer Item = 2
    CONSUMER Thread id = 140348775798336 and Consumer Item = 3
PRODUCER Thread id = 140348784191040 and Producer Item = 4
    CONSUMER Thread id = 140348775798336 and Consumer Item = 4
PRODUCER Thread id = 140348792583744 and Producer Item = 5
    CONSUMER Thread id = 140348775798336 and Consumer Item = 5
PRODUCER Thread id = 140348784191040 and Producer Item = 6
    CONSUMER Thread id = 140348775798336 and Consumer Item = 6
PRODUCER Thread id = 140348792583744 and Producer Item = 6
    CONSUMER Thread id = 140348775798336 and Consumer Item = 6
PRODUCER Thread id = 140348784191040 and Producer Item = 8
    CONSUMER Thread id = 140348775798336 and Consumer Item = 8
PRODUCER Thread id = 140348792583744 and Producer Item = 9
    CONSUMER Thread id = 140348775798336 and Consumer Item = 9
PRODUCER Thread id = 140348784191040 and Producer Item = 10
    CONSUMER Thread id = 140348775798336 and Consumer Item = 10
PRODUCER Thread id = 140348792583744 and Producer Item = 11
    CONSUMER Thread id = 140348775798336 and Consumer Item = 11
PRODUCER Thread id = 140348784191040 and Producer Item = 12
    CONSUMER Thread id = 140348775798336 and Consumer Item = 12
PRODUCER Thread id = 140348792583744 and Producer Item = 13
    CONSUMER Thread id = 140348775798336 and Consumer Item = 13

```