PRODUCER_CONSUMER PROBLEM

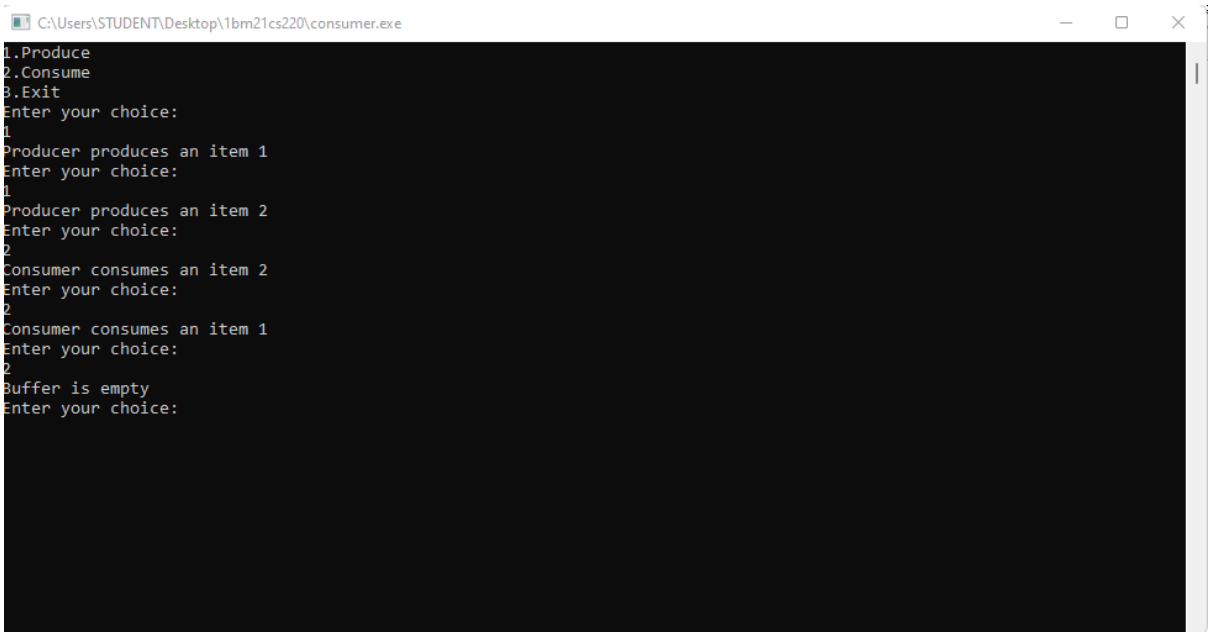
```
#include<stdio.h>
#include<conio.h>
int mutex=1;
int full=0;
int empty=10;
int cnt=0;
int wait(int s)
{
while(s<=0);
s--;
return s;
}
int signal(int s)
{
s++;
return s;
}
void producer()
{
empty=wait(empty);
mutex=wait(mutex);
cnt++;
printf("Producer produces an item %d\n",cnt);
mutex=signal(mutex);
full=signal(full);
}
void consumer()
{

full=wait(full);
```

```
mutex=wait(mutex);
printf("Consumer consumes an item %d\n",cnt);
cnt--;
   mutex=signal(mutex);
empty=signal(empty);
}
void main()
{
int choice;
printf("1.Produce\n2.Consume\n3.Exit\n");
while(1)
{
printf("Enter your choice:\n");
scanf("%d",&choice);
switch(choice)
{
case 1:if(empty==0)
{
printf("Buffer is full\n");
}
else{
producer();
}
break;
case 2:if(full==0)
{
printf("Buffer is empty\n");
}
else{
consumer();
}
```

```
break;
case 3:exit(0);
    break;
default:printf("Invalid choice\n");
}
}
getch();

}
```



DINING PHILOSOPHER

```
#include <pthread.h>
#include <semaphore.h>
#include <stdio.h>

#define N 5
#define THINKING 2
#define HUNGRY 1
#define EATING 0
#define LEFT (phnum + 4) % N
#define RIGHT (phnum + 1) % N

int state[N];
int phil[N] = { 0, 1, 2, 3, 4 };

sem_t mutex;
sem_t S[N];

void test(int phnum)
{
        if (state[phnum] == HUNGRY
                && state[LEFT] != EATING
                && state[RIGHT] != EATING) {
                // state that eating
                state[phnum] = EATING;

                sleep(2);

                printf("Philosopher %d takes fork %d and %d\n",
                                        phnum + 1, LEFT + 1, phnum + 1);
```

```
                printf("Philosopher %d is Eating\n", phnum + 1);

                // sem_post(&S[phnum]) has no effect
                // during takefork
                // used to wake up hungry philosophers
                // during putfork
                sem_post(&S[phnum]);
        }
}

// take up chopsticks
void take_fork(int phnum)
{

        sem_wait(&mutex);

        // state that hungry
        state[phnum] = HUNGRY;

        printf("Philosopher %d is Hungry\n", phnum + 1);

        // eat if neighbours are not eating
        test(phnum);

        sem_post(&mutex);

        // if unable to eat wait to be signalled
        sem_wait(&S[phnum]);

        sleep(1);
```

```
}

// put down chopsticks
void put_fork(int phnum)
{

        sem_wait(&mutex);

        // state that thinking
        state[phnum] = THINKING;

        printf("Philosopher %d putting fork %d and %d down\n",
                phnum + 1, LEFT + 1, phnum + 1);
        printf("Philosopher %d is thinking\n", phnum + 1);

        test(LEFT);
        test(RIGHT);

        sem_post(&mutex);
}

void* philosopher(void* num)
{

        while (1) {

                int* i = num;

                sleep(1);

                take_fork(*i);
```

```
            sleep(0);

            put_fork(*i);
        }
}

int main()
{

        int i;
        pthread_t thread_id[N];

        // initialize the semaphores
        sem_init(&mutex, 0, 1);

        for (i = 0; i < N; i++)

            sem_init(&S[i], 0, 0);

        for (i = 0; i < N; i++) {

            // create philosopher processes
            pthread_create(&thread_id[i], NULL,
                                philosopher, &phil[i]);

            printf("Philosopher %d is thinking\n", i + 1);
        }

        for (i = 0; i < N; i++)
```

```
        pthread_join(thread_id[i], NULL);
}
```