OPERATING SYSTEM - CS23431

EXP 8

PRODUCER CONSUMER PROBLEM USING SEMAPHORES

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PROGRAM:

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

#define SIZE 10

int buffer[SIZE], count = 0;
sem_t empty, full, mutex;

void* producer(void* arg) {
   for (int i = 0; i < 10; i++) {
      int val;
      sem_getvalue(&empty, &val);
      if (val == 0)
         printf("Buffer is full. Producer waiting...\n");
      sem_wait(&empty);
      sem_wait(&mutex);

      if (count < SIZE) {
         buffer[count++] = i;
         printf("Producer produces item: %d\n", i);
      }

      sem_post(&mutex);
      sem_post(&full);
      sleep(1);
   }
```

```
    return NULL;
}

void* consumer(void* arg) {
    for (int i = 0; i < 10; i++) {
        int val;
        sem_getvalue(&full, &val);
        if (val == 0)
            printf("Buffer is empty. Consumer waiting...\n");

        sem_wait(&full);
        sem_wait(&mutex);

        if (count > 0) {
            printf("Consumer consumes item: %d\n", buffer[--count]);
        }

        sem_post(&mutex);
        sem_post(&empty);
        sleep(1);
    }
    return NULL;
}

int main() {
    pthread_t p, c;
    int choice;

    sem_init(&empty, 0, SIZE);
    sem_init(&full, 0, 0);
    sem_init(&mutex, 0, 1);

    while (1) {
        printf("1. Producer\n");
        printf("2. Consumer\n");
        printf("3. Exit\n");
```

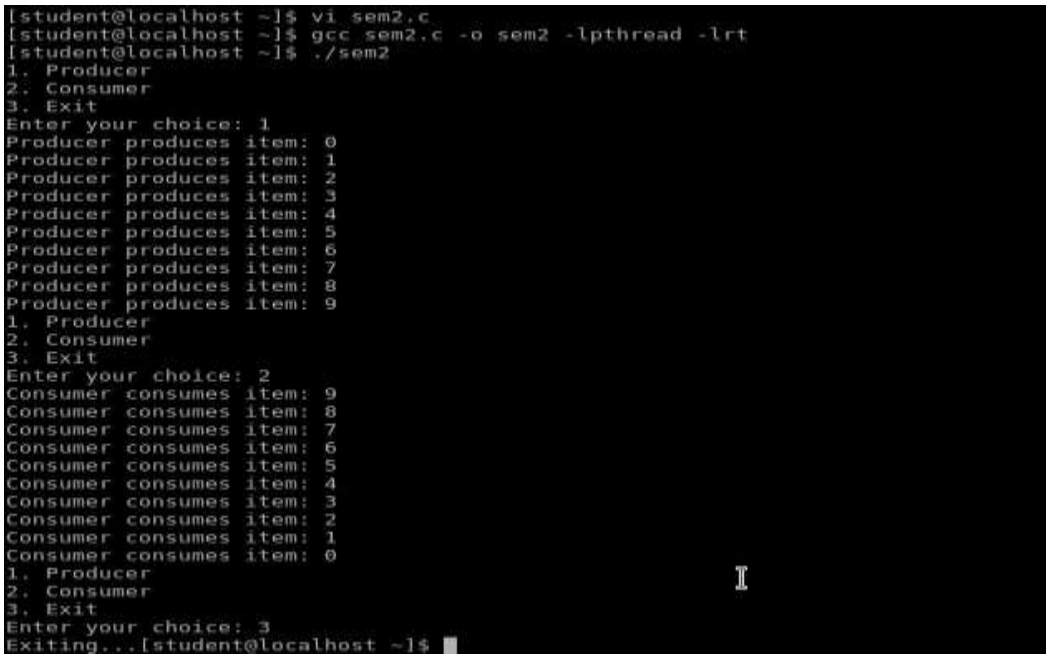
```
        printf("Enter your choice: ");
        scanf("%d", &choice);

        switch (choice) {
            case 1:
                pthread_create(&p, NULL, producer, NULL);
                pthread_join(p, NULL);
                break;
            case 2:
                pthread_create(&c, NULL, consumer, NULL);
                pthread_join(c, NULL);
                break;
            case 3:
                printf("Exiting...");
                exit(0);
            default:
                printf("Invalid choice!! Please try again.\n");
                break;
        }
    }

    sem_destroy(&empty);
    sem_destroy(&full);
    sem_destroy(&mutex);

    return 0;
}
```

OUTPUT:


[student@localhost ~]$ vi sem2.c
[student@localhost ~]$ gcc sem2.c -o sem2 -lpthread -lrt
[student@localhost ~]$ ./sem2
1. Producer
2. Consumer
3. Exit
Enter your choice: 1
Producer produces item: 0
Producer produces item: 1
Producer produces item: 2
Producer produces item: 3
Producer produces item: 4
Producer produces item: 5
Producer produces item: 6
Producer produces item: 7
Producer produces item: 8
Producer produces item: 9
1. Producer
2. Consumer
3. Exit
Enter your choice: 2
Consumer consumes item: 9
Consumer consumes item: 8
Consumer consumes item: 7
Consumer consumes item: 6
Consumer consumes item: 5
Consumer consumes item: 4
Consumer consumes item: 3
Consumer consumes item: 2
Consumer consumes item: 1
Consumer consumes item: 0
1. Producer
2. Consumer
3. Exit
Enter your choice: 3
Exiting...[student@localhost ~]$