OPERATING SYSTEM - CS23431
EXP 8
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.");
            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 ~]$
```