Ex. No.: 8
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PRODUCER CONSUMER USING SEMAPHORES

Aim: To write a program to implement solution to producer consumer problem using semaphores.

Algorithm:

1. Initialize semaphore empty, full and mutex.
2. Create two threads- producer thread and consumer thread.
3. Wait for target thread termination.
4. Call sem_wait on empty semaphore followed by mutex semaphore before entry into critical section.
5. Produce Consume the item in critical section.
6. Call sem_post on mutex semaphore followed by full semaphore
7. before exiting critical section.
8. Allow the other thread to enter its critical section.
9. Terminate after looping ten times in producer and consumer Threads each.

Program Code:

```
#include<stdio.h>
#include<semaphore.h>
#define BUFFER_SIZE 5
int buffer[BUFFER_SIZE];
int in=0, out=0;
int item=1;
int empty = BUFFER_SIZE;
int full=0;
void producer(){
    if(empty==0){
        printf("Buffer is full cannot produce.\n");
        return;
    }
    buffer[in]=item;
    printf("Producer produced: %d\n", item)
    item++;
    in = (in+1) % BUFFER_SIZE;
    empty--;
    full++;
}
```

```
void consumer(){
    if(full==0){
        printf("Buffer is empty! cannot consume\n");
        return;
    }
    int consumed_item = buffer[out];
    printf("consumer consumed :%d\n", consumed_item);
    out = (out+1) % Buffer_size;
    full--;
    empty++;
}
int main(){
    int choice;
    while(1){
        print("\n1. Produce item\n2. Consume item\n
                3. Exit\n Enter choice:");
        Scanf("%d", &choice);
        switch(choice){
            case 1:
                producer();
                break;
            case 2:
                consumer();
                break;
            case 3:
                printf("Exiting program\n");
                return 0;
            default:
                printf("Invalid choice\n");
        }
    }
    return 0;
}
```

Sample Output:

1. Producer
2.Consumer
3.Exit
Enter your choice:1
Producer produces the item 1
Enter your choice:2
Consumer consumes item
1 Enter your choice:2
Buffer is empty!!
Enter your choice:1
Producer produces the item 1
Enter your choice:1
Producer produces the item 2
Enter your choice:1
Producer produces the item 3
Enter your choice:1
Buffer is full!!
Enter your choice:3

1. Produce item
2. consume item
3. Exit
Enter choice:1
Producer Produced:1
Enter choice:1
Producer Produced:2
Enter choice:2
Consumer consumed:1
Enterchoice:3
Exiting Program

Result:

A c program for producer-consumer using semaphore is implemented successfully.