4. **Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.**

Algorithm:

1. The Semaphore mutex, full & empty are initialized.

2. In the case of producer process

   i) Produce an item in to temporary variable.

   ii) If there is empty space in the buffer check the mutex value for enter into the critical section.

   iii) If the mutex value is 0, allow the producer to add value in the temporary variable to the buffer.

3. In the case of consumer process

i) It should wait if the buffer is empty

ii) If there is any item in the buffer check for mutex value, if the mutex==0, remove item from buffer

iii) Signal the mutex value and reduce the empty value by 1.

iv) Consume the item.

4. Print the result

Code:

```
# define BUFFERSIZE 10;
int mutex, n, empty, full=0,item, item1;
int   buffer[20];
int in=0,out=0,mutex=1;
void wait(int s)
{
     while(s<0)
     {
          printf("\ Cannot add an item \n");
          exit(0);
     }
     s--;
}
void signal(int s)
{
```

```
    s++;
}
void producer()
{
    do{
        wait ( empty );
        wait ( mutex );
        printf("\n Producer produces an item:");
        scanf("%d", &item);
        buffer[in]=item;
        in=in+1;
        signal(mutex);
        signal(full);
    }
    while(in<n);
}
```

```
void cosumer()
{
    do{
        wait(full);
        wait(mutex);
        item1=buffer[out];
        printf("\n Consumed item = %d",item1);
        out = out+1;
        signal(mutex);
        signal(mutex);
    }
    while(out<n);
}
void main(){
    printf("\n Enter the value of n :");
    scanf("%d",&n)    ;
```

```
    empty = n;
    while(in<n)

    producer();
    while(in!=out)
    cosumer();

}
```

Output:

```
Enter the value of n :5
 Producer produces an item:67
 Producer produces an item:87
 Producer produces an item:54
 Producer produces an item:32
 Producer produces an item:2

 Consumed item = 67
```

```
 Consumed item = 87
 Consumed item = 54
 Consumed item = 32
 Consumed item = 2
--------------------------------
Process exited after 13.22 seconds with return value 5
Press any key to continue . . .
```