2005025_Hitu raj

KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY (KIIT)

Deemed to be University U/S 3 of UGC Act, 1956

OS LAB -8&9

- Name :HITU RAJ
- Roll no. :2005025
- Branch :CSE

Q1-PRODUCER CONSUMER

```c
#include <stdio.h>
#include <stdlib.h>
int mutex = 1, full = 0, empty = 3, x = 0;
int wait(int s) { return (--s); }
int signal(int s) { return (++s); }
void producer()
{
    mutex = wait(mutex);
    full = signal(full);
    empty = wait(empty);
    x++;
    printf("\nProducer produces the item %d", x);
    mutex = signal(mutex);
}
void consumer()
{
    mutex = wait(mutex);
    full = wait(full);
```

```
    empty = signal(empty);
    printf("\nConsumer consumes item %d", x);
    x--;
    mutex = signal(mutex);
}
int main()
{
    int n;
    printf("1.Producer\n2.Consumer\n3.Exit");
    while (1)
    {
        printf("\nEnter your choice : ");
        scanf("%d", &n);
        switch (n)
        {
        case 1:
            if ((mutex == 1) && (empty != 0))
                producer();
            else
                printf("Buffer is full!!");
            break;
        case 2:
            if ((mutex == 1) && (full != 0))
                consumer();
            else
                printf("Buffer is empty!!");
            break;
        case 3:
            exit(0);
            break;
        }
    }
    return 0;
}
```

OUTPUT-1

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! http
s://aka.ms/PSWindows

PS D:\my codes\OSLAB\lab8&9 synchronization> cd "d:\my codes\OSLAB\la
b8&9 synchronization\" ; if ($?) { gcc q1_producer_consumer.c -o q1_p
roducer_consumer } ; if ($?) { .\q1_producer_consumer }
1.Producer
2.Consumer
3.Exit
Enter your choice : 1

Producer produces the item 1
Enter your choice : 1

Producer produces the item 2
Enter your choice : 2

Consumer consumes item 2
Enter your choice : 2

Consumer consumes item 1
Enter your choice : 2
Buffer is empty!!
Enter your choice : 3
PS D:\my codes\OSLAB\lab8&9 synchronization>
```

Q2-READER WRITER PROBLEM

```c
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
#include <semaphore.h>
#include <unistd.h>
sem_t x, y;
pthread_t tid;
pthread_t writerthreads[100], readerthreads[100];
int readercount = 0;
void *reader(void *param)
{
    sem_wait(&x);
    readercount++;
    if (readercount == 1)
        sem_wait(&y);
    sem_post(&x);
    printf("%d Reader is inside\n", readercount);
    usleep(3);
    sem_wait(&x);
    readercount--;
    if (readercount == 0)
    {
```

```
        sem_post(&y);
    }
    sem_post(&x);
    printf("Total readers : %d, reader is leaving\n", readercount + 1);
    return NULL;
}
void *writer(void *param)
{
    printf("Writer is trying to enter\n");
    sem_wait(&y);
    printf("Writer has entered\n");
    sem_post(&y);
    printf("Writer is leaving\n");
    return NULL;
}
int main()
{
    int n2;
    printf("Enter the number of readers/writers : ");
    scanf("%d", &n2);
    printf("\n");
    int n1[n2];
    sem_init(&x, 0, 1);
    sem_init(&y, 0, 1);
    for (int i = 0; i < n2; i++)
    {
        pthread_create(&writerthreads[i], NULL, reader, NULL);
        pthread_create(&readerthreads[i], NULL, writer, NULL);
    }
    for (int i = 0; i < n2; i++)
    {
        pthread_join(writerthreads[i], NULL);
        pthread_join(readerthreads[i], NULL);
    }
    return 0;
}
```

OUTPUT-2

```
kiit@BT1000099566:/mnt/d/my codes/OSLAB/lab8&9 synchronization$
 ./reader_writer
Enter the number of readers/writers : 4

1 Reader is inside
Writer is trying to enter
2 Reader is inside
Writer is trying to enter
Total readers : 2, reader is leaving
Total readers : 1, reader is leaving
Writer has entered
Writer is leaving
Writer has entered
Writer is leaving
1 Reader is inside
Writer is trying to enter
2 Reader is inside
Writer is trying to enter
Total readers : 2, reader is leaving
Total readers : 1, reader is leaving
Writer has entered
Writer is leaving
Writer has entered
Writer is leaving
kiit@BT1000099566:/mnt/d/my codes/OSLAB/lab8&9 synchronization$
```

Q3-DINING PROBLEM

```c
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
#include <semaphore.h>
#include <unistd.h>
sem_t room;
sem_t chopstick[5];
void eat(int phil) { printf("Philosopher %d is eating\n", phil); }
void *philosopher(void *num)
{
    int phil = *(int *)num;
    sem_wait(&room);
    printf("Philosopher %d has entered thinking\n", phil);
    sem_wait(&chopstick[phil]);
    sem_wait(&chopstick[(phil + 1) % 5]);
    eat(phil);
    sleep(2);
    printf("Philosopher %d has finished eating\n", phil);
    sem_post(&chopstick[(phil + 1) % 5]);
    sem_post(&chopstick[phil]);
    sem_post(&room);
}
int main()
{
```

```
    int i, a[5];
    pthread_t tid[5];
    sem_init(&room, 0, 4);
    printf("\n");
    for (i = 0; i < 5; i++)
        sem_init(&chopstick[i], 0, 1);
    for (i = 0; i < 5; i++)
    {
        a[i] = i;
        pthread_create(&tid[i], NULL, philosopher, (void *)&a[i]);
    }
    for (i = 0; i < 5; i++)
        pthread_join(tid[i], NULL);
}
```

OUTPUT -3

```
kiit@BT1000099566:/mnt/d/my codes/OSLAB/lab8&9 synchronization$ ./reader_writer
Enter the number of readers/writers : 4

Writer is trying to enter
2 Reader is inside
Writer is trying to enter
1 Reader is inside
Writer is trying to enter
Writer is trying to enter
Total readers : 4, reader is leaving
4 Reader is inside
Total readers : 2, reader is leaving
3 Reader is inside
Total readers : 3, reader is leaving
Total readers : 1, reader is leaving
Writer has entered
Writer is leaving
Writer has entered
Writer is leaving
Writer has entered
Writer is leaving
Writer has entered
Writer is leaving
kiit@BT1000099566:/mnt/d/my codes/OSLAB/lab8&9 synchronization$
```

2005025_Hitu raj