LAB 05

Course: CT-353-Operating Systems

Department: BCIT (Specialisation in Data Science)

Instructor's Name: Muhammad Muhashir Khan

Student Name: Maryam Ashraff (DT-22050)

1) Implement the above code and paste the screen shot of the output.

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

sem_t x, y;
int readercount = 0;

void *reader(void* param) {
    sem_wait(&x);
    readercount++;

    if (readercount == 1)
        sem_wait(&y);  // First reader blocks writers

    sem_post(&x);

    printf("%d reader is inside\n", readercount);
    sleep(3);

    sem_wait(&x);
    readercount--;

    if (readercount == 0)
        sem_post(&y);  // Last reader unblocks writers

    sem_post(&x);

    printf("%d Reader is leaving\n", readercount + 1);
    return NULL;
}

void *writer(void* param) {
    printf("Writer is trying to enter\n");
    sem_wait(&y);  // Only one writer allowed
    printf("Writer has entered\n");
    sleep(3);
    printf("Writer is leaving\n");
    sem_post(&y);
    return NULL;
}
```

```c
int main() {
    int nReaders, nWriters, i;

    printf("Enter the number of readers: ");
    scanf("%d", &nReaders);

    printf("Enter the number of writers: ");
    scanf("%d", &nWriters);

    pthread_t readerthreads[nReaders], writerthreads[nWriters];

    sem_init(&x, 0, 1);
    sem_init(&y, 0, 1);

    for (i = 0; i < nReaders; i++)
        pthread_create(&readerthreads[i], NULL, reader, NULL);

    for (i = 0; i < nWriters; i++)
        pthread_create(&writerthreads[i], NULL, writer, NULL);

    for (i = 0; i < nReaders; i++)
        pthread_join(readerthreads[i], NULL);

    for (i = 0; i < nWriters; i++)
        pthread_join(writerthreads[i], NULL);

    sem_destroy(&x);
    sem_destroy(&y);

    return 0;
}
```

```
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Enter the number of readers: 2
Enter the number of writers: 3
Writer is trying to enter
Writer is trying to enter
1 reader is inside
2 reader is inside
Writer is trying to enter
2 Reader is leaving
1 Reader is leaving
Writer has entered
Writer is leaving
Writer has entered
Writer is leaving
Writer has entered
Writer is leaving

-----------------------------------
Process exited after 16.77 seconds with return value 0
Press any key to continue . . . |
```