

Lab Assignment No: 03

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ROLLNO: 77

CLASS: C

BRANCH: ENTC

BATCH: 3

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Function

Code:

```
#include<pthread.h>
#include<stdio.h>
#include<semaphore.h>
#include<unistd.h>
void *fun1();
void *fun2();
int shared=1; //shared variable
sem_t s; //semaphore variable

int main()
{
    sem_init(&s,0,1); //initialize semaphore variable - 1st argument is address of variable, 2nd is number of
    processes sharing semaphore, 3rd argument is the initial value of semaphore variable
    pthread_t thread1, thread2;
    pthread_create(&thread1, NULL, fun1, NULL);
    pthread_create(&thread2, NULL, fun2, NULL);
    pthread_join(thread1, NULL);
    pthread_join(thread2, NULL);
    printf("Final value of shared is %d\n", shared); //prints the last updated value of shared variable
}

void *fun1()
{
    int x;
    sem_wait(&s); //executes wait operation on s
    x=shared; //thread1 reads value of shared variable
    printf("Thread1 reads the value as %d\n", x);
    x++; //thread1 increments its value
    printf("Local updation by Thread1: %d\n", x);
    sleep(1); //thread1 is preempted by thread 2
    shared=x; //thread one updates the value of shared variable
```

```

        printf("Value of shared variable updated by Thread1 is: %d\n", shared);
        sem_post(&s);
    }

void *fun2()
{
    int y;
    sem_wait(&s);
    y=shared;//thread2 reads value of shared variable
    printf("Thread2 reads the value as %d\n",y);
    y--; //thread2 increments its value
    printf("Local updation by Thread2: %d\n",y);
    sleep(1); //thread2 is preempted by thread 1
    shared=y; //thread2 updates the value of shared variable
    printf("Value of shared variable updated by Thread2 is: %d\n",shared);
    sem_post(&s);
}

```

Output:

```

vivek@vivek:~/Documents$ ls -lrt
total 84
-rw-rw-r-- 1 vivek vivek  960 Sep 14 13:15 lab1.txt
-rw-rw-r-- 1 vivek vivek 10390 Sep 14 13:22 ourdate
-rw-rw-r-- 1 vivek vivek   74 Sep 23 14:22 deno11.txt
-rwxrwxr-- 1 vivek vivek  382 Sep 23 14:41 l2q11.txt
-rw-rw-r-- 1 vivek vivek 1525 Sep 23 17:35 reader_writer.c
-rwxrwxr-x 1 vivek vivek 17448 Sep 23 17:36 outfile
-rwxrwxr-x 1 vivek vivek 17140 Sep 23 17:40 outputFun
drwxrwxr-x 3 vivek vivek 4096 Oct  1 12:48 'OS Labs'
-rw-rw-r-- 1 vivek vivek 1592 Oct  2 12:19 fun.c
vivek@vivek:~/Documents$ ./outputFun
Thread1 reads the value as 1
Local updation by Thread1: 2
Value of shared variable updated by Thread1 is: 2
Thread2 reads the value as 2
Local updation by Thread2: 1
Value of shared variable updated by Thread2 is: 1
Final value of shared is 1
vivek@vivek:~/Documents$

```

Reader Writer

Code:

```

#include <pthread.h>
#include <semaphore.h>
#include <stdio.h>

sem_t wrt;
pthread_mutex_t mutex;
int cnt = 1;
int numreader = 0;

void *writer(void *wno)
{
    sem_wait(&wrt);
    cnt = cnt*2;
    printf("Writer %d modified cnt to %d\n",*((int *)wno),cnt);
    sem_post(&wrt);
}

void *reader(void *rno)
{
    // Reader acquire the lock before modifying numreader
    pthread_mutex_lock(&mutex);
    numreader++;
    if(numreader == 1) {
        sem_wait(&wrt); // If this id the first reader, then it will block the writer
    }
    pthread_mutex_unlock(&mutex);
    // Reading Section
    printf("Reader %d: read cnt as %d\n",*((int *)rno),cnt);

    // Reader acquire the lock before modifying numreader
    pthread_mutex_lock(&mutex);
    numreader--;
    if(numreader == 0) {
        sem_post(&wrt); // If this is the last reader, it will wake up the writer.
    }
    pthread_mutex_unlock(&mutex);
}

int main()
{
    pthread_t read[10],write[5];
    pthread_mutex_init(&mutex, NULL);
    sem_init(&wrt,0,1);

```

```

int a[10] = {1,2,3,4,5,6,7,8,9,10};

for(int i = 0; i < 10; i++) {
pthread_create(&read[i], NULL, (void *)reader, (void *)&a[i]);
}
for(int i = 0; i < 5; i++) {
pthread_create(&write[i], NULL, (void *)writer, (void *)&a[i]);
}

for(int i = 0; i < 10; i++) {
pthread_join(read[i], NULL);
}
for(int i = 0; i < 5; i++) {
pthread_join(write[i], NULL);
}

pthread_mutex_destroy(&mutex);
sem_destroy(&wrt);

return 0;
}

```

Output:

```

vivek@vivek:~/Documents$ ls -lrt
total 84
-rw-rw-r-- 1 vivek vivek 960 Sep 14 13:15 lab1.txt
-rw-rw-r-- 1 vivek vivek 16398 Sep 14 13:22 ourdate
-rw-rw-r-- 1 vivek vivek 74 Sep 23 14:22 demo11.txt
-rwxr-xr-x 1 vivek vivek 382 Sep 23 14:41 lab1.txt
-rw-rw-r-- 1 vivek vivek 1525 Sep 23 17:35 reader_writer.c
-rwxrwxr-x 1 vivek vivek 17448 Sep 23 17:36 outFile
-rwxrwxr-x 1 vivek vivek 17144 Sep 23 17:48 outpufun
drwxrwxr-x 3 vivek vivek 4096 Oct 1 12:48 'Os Labs'
-rw-rw-r-- 1 vivek vivek 1592 Oct 2 12:19 fun.c
vivek@vivek:~/Documents$ ./outFile
Reader 1: read cnt as 1
Reader 2: read cnt as 1
Reader 4: read cnt as 1
Reader 5: read cnt as 1
Reader 3: read cnt as 1
Reader 0: read cnt as 1
Reader 7: read cnt as 1
Reader 9: read cnt as 1
Reader 6: read cnt as 1
Reader 10: read cnt as 1
Writer 1 modified cnt to 2
Writer 3 modified cnt to 4
Writer 2 modified cnt to 8
Writer 4 modified cnt to 16
Writer 5 modified cnt to 32
vivek@vivek:~/Documents$

```