TE IT

Name   : Omkar Gurav

Roll no : 8048

Thread synchronization and mutual exclusion using mutex. Application to demonstrate: Reader-Writer problem with reader priority.


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

int data=0;
pthread_mutex_t mutex;
sem_t wrt;
int readcount=0;

void *reader(void *rno)
{
  int rn=*(int *)rno;
  //printf("\nReader %d is arrived",rn);
  int limit=1;
  do
  {
    pthread_mutex_lock(&mutex);
    readcount++;
    if(readcount==1)
    {
      sem_wait(&wrt);
    }
    pthread_mutex_unlock(&mutex);

    printf("\nReader %d is reading %d",rn,data);
```

```c
    pthread_mutex_lock(&mutex);
    readcount--;
    if(readcount==0)
    {
     sem_post(&wrt);
    }
    pthread_mutex_unlock(&mutex);
    sleep(2);
    limit++;
  } while(limit<3);
}

void *writer(void *wno)
{
  int wn=*(int *)wno;
  int limit1;
  do
  {
   // printf("\nWriter %d is arrived",wn);
    sem_wait(&wrt);
    printf("\nWriter %d is Entering in critical section",wn);
    data++;
    printf("\nWriter %d is writing %d",wn,data);
    printf("\nWriter %d is Leaving from critical section",wn);
    sem_post(&wrt);
    sleep(2);
    limit1++;
  } while(limit1<3);
}

void main()
{
 pthread_t rd[3];
 pthread_t wr[3];
```

```c
char buff[20];
int i;

pthread_mutex_init(&mutex,NULL);
sem_init(&wrt,0,1);


for(i=0;i<3;i++)
{
  pthread_create(&wr[i],NULL,writer,&i);
  pthread_create(&rd[i],NULL,reader,&i);
}

for(i=0;i<3;i++)
{
  pthread_join(wr[i],NULL);
  pthread_join(rd[i],NULL);
}

}
```

Output:

Writer 1 is Entering in critical section

Writer 1 is writing 1

Writer 1 is Leaving from critical section

Reader 1 is reading 1

Reader 2 is reading 1

Reader 0 is reading 1

Writer 1 is Entering in critical section

Writer 1 is writing 2

Writer 1 is Leaving from critical section

Writer 2 is Entering in critical section

Writer 2 is writing 3

Writer 2 is Leaving from critical section

Reader 2 is reading 3

Reader 1 is reading 3

Reader 0 is reading 3

Writer 1 is Entering in critical section

Writer 1 is writing 4

Writer 1 is Leaving from critical section

Writer 1 is Entering in critical section

Writer 1 is writing 5

Writer 1 is Leaving from critical section

Writer 2 is Entering in critical section

Writer 2 is writing 6

Writer 2 is Leaving from critical section

Writer 1 is Entering in critical section

Writer 1 is writing 7

Writer 1 is Leaving from critical section

Writer 1 is Entering in critical section

Writer 1 is writing 8

Writer 1 is Leaving from critical section

Writer 2 is Entering in critical section

Writer 2 is writing 9