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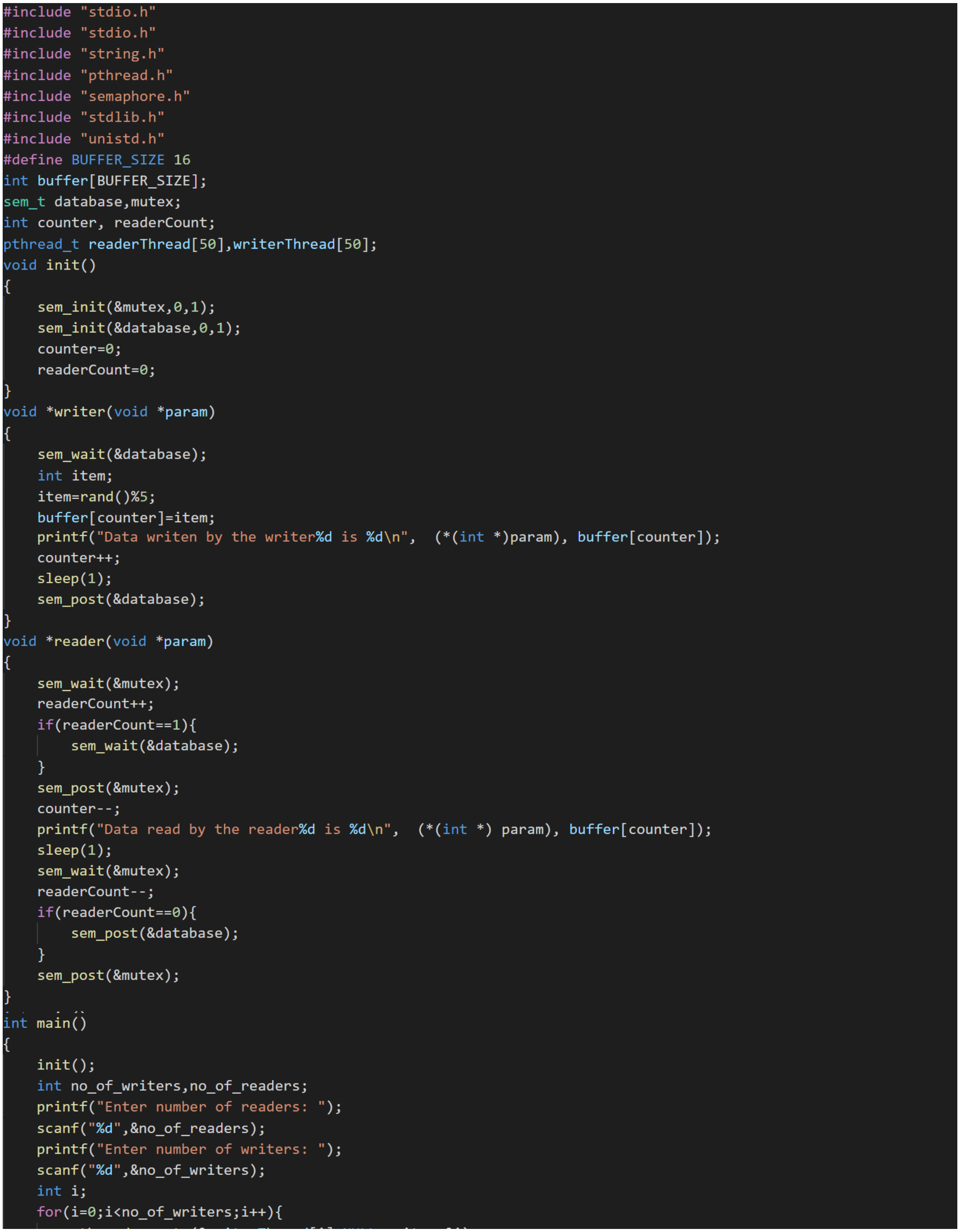
Lab 9

Ques1: Implement the reader writer problem using semaphores.

Source Code



```c
#include "stdio.h"
#include "stdio.h"
#include "string.h"
#include "pthread.h"
#include "semaphore.h"
#include "stdlib.h"
#include "unistd.h"
#define BUFFER_SIZE 16
int buffer[BUFFER_SIZE];
sem_t database,mutex;
int counter, readerCount;
pthread_t readerThread[50],writerThread[50];
void init()
{
    sem_init(&mutex,0,1);
    sem_init(&database,0,1);
    counter=0;
    readerCount=0;
}
void *writer(void *param)
{
    sem_wait(&database);
    int item;
    item=rand()%5;
    buffer[counter]=item;
    printf("Data writen by the writer%d is %d\n",  (*(int *)param), buffer[counter]);
    counter++;
    sleep(1);
    sem_post(&database);
}
void *reader(void *param)
{
    sem_wait(&mutex);
    readerCount++;
    if(readerCount==1){
        sem_wait(&database);
    }
    sem_post(&mutex);
    counter--;
    printf("Data read by the reader%d is %d\n",  (*(int *) param), buffer[counter]);
    sleep(1);
    sem_wait(&mutex);
    readerCount--;
    if(readerCount==0){
        sem_post(&database);
    }
    sem_post(&mutex);
}
int main()
{
    init();
    int no_of_writers,no_of_readers;
    printf("Enter number of readers: ");
    scanf("%d",&no_of_readers);
    printf("Enter number of writers: ");
    scanf("%d",&no_of_writers);
    int i;
    for(i=0;i<no_of_writers;i++){
```

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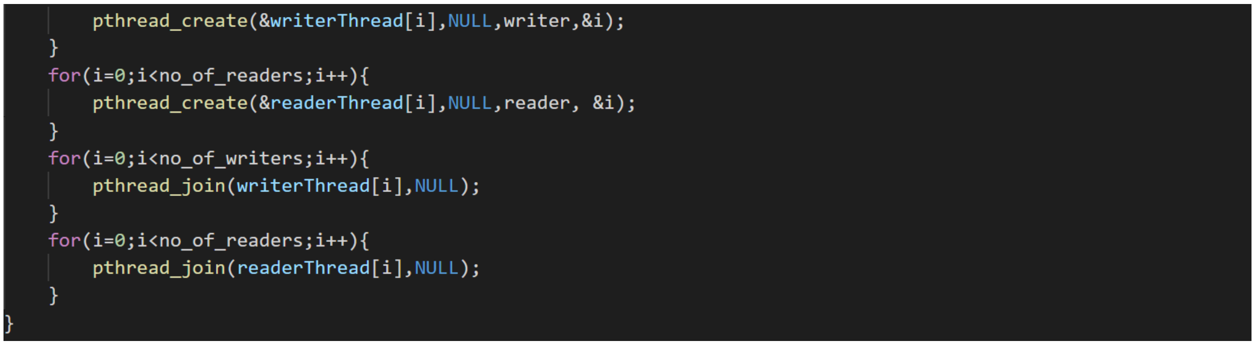
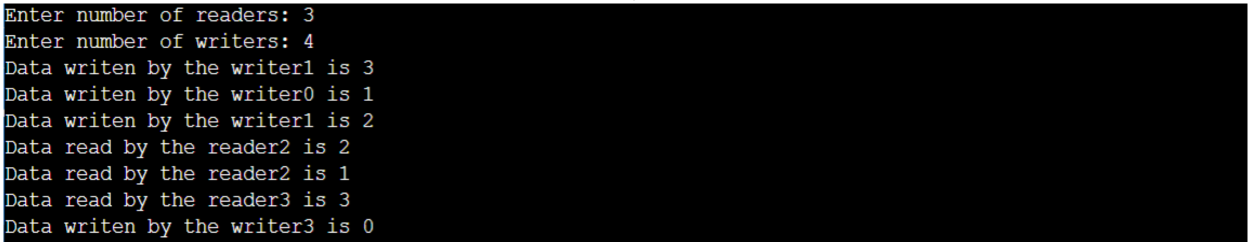


```
        pthread_create(&writerThread[i],NULL,writer,&i);
    }
    for(i=0;i<no_of_readers;i++){
        pthread_create(&readerThread[i],NULL,reader, &i);
    }
    for(i=0;i<no_of_writers;i++){
        pthread_join(writerThread[i],NULL);
    }
    for(i=0;i<no_of_readers;i++){
        pthread_join(readerThread[i],NULL);
    }
}
```

Output



```
Enter number of readers: 3
Enter number of writers: 4
Data writen by the writer1 is 3
Data writen by the writer0 is 1
Data writen by the writer1 is 2
Data read by the reader2 is 2
Data read by the reader2 is 1
Data read by the reader3 is 3
Data writen by the writer3 is 0
```