Reader Writer Problem

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

sem_t rw_mutex;
sem_t mutex;
int read_count = 0;

void* reader(void* arg) {
    int reader_id = *((int*)arg);

    sem_wait(&mutex);
    read_count++;
    if (read_count == 1)
        sem_wait(&rw_mutex);
    sem_post(&mutex);

    printf("Reader %d is reading\n", reader_id);
    sleep(1);
    printf("Reader %d finished reading\n", reader_id);

    sem_wait(&mutex);
    read_count--;
    if (read_count == 0)
        sem_post(&rw_mutex);
    sem_post(&mutex);

    pthread_exit(NULL);
}

void* writer(void* arg) {
    int writer_id = *((int*)arg);

    sem_wait(&rw_mutex);

    printf("Writer %d is writing\n", writer_id);
    sleep(1);
    printf("Writer %d finished writing\n", writer_id);

    sem_post(&rw_mutex);

    pthread_exit(NULL);
```

```c
}

int main() {
    int num_readers, num_writers;

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

    pthread_t readers[num_readers], writers[num_writers];
    int reader_ids[num_readers], writer_ids[num_writers];

    sem_init(&rw_mutex, 0, 1);
    sem_init(&mutex, 0, 1);

    for (int i = 0; i < num_readers; i++) {
        reader_ids[i] = i + 1;
        pthread_create(&readers[i], NULL, reader, &reader_ids[i]);
    }

    for (int i = 0; i < num_writers; i++) {
        writer_ids[i] = i + 1;
        pthread_create(&writers[i], NULL, writer, &writer_ids[i]);
    }

    for (int i = 0; i < num_readers; i++) {
        pthread_join(readers[i], NULL);
    }

    for (int i = 0; i < num_writers; i++) {
        pthread_join(writers[i], NULL);
    }

    sem_destroy(&rw_mutex);
    sem_destroy(&mutex);

    return 0;
}
```

```
Output :

Enter the number of readers: 4
Enter the number of writers: 5
Reader 1 is reading
Reader 2 is reading
Reader 3 is reading
Reader 4 is reading
Reader 1 finished reading
Reader 3 finished reading
Reader 2 finished reading
Reader 4 finished reading
Writer 1 is writing
Writer 1 finished writing
Writer 2 is writing
Writer 2 finished writing
Writer 3 is writing
Writer 3 finished writing
Writer 4 is writing
Writer 4 finished writing
Writer 5 is writing
Writer 5 finished writing
```