P20-0107
BCS - 4A

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```c
#include <unistd.h>
#include <sys/types.h>
#include <errno.h>
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
#include <string.h>
#include <semaphore.h>

#define NUM_RUNS 10000000

void handler(void *ptr);

int counter;
sem_t mutex;

int main()
{
        sem_init(&mutex, 0, 1);
        int i[2];
        pthread_t thread_a;
        pthread_t thread_b;
        i[0] = 0;
        i[1] = 1;
        pthread_create(&thread_a, NULL, (void *)&handler, (void *)&i[0]);
        pthread_create(&thread_b, NULL, (void *)&handler, (void *)&i[1]);
        pthread_join(thread_a, NULL);
        pthread_join(thread_b, NULL);
        printf("------------------------------------------------------------------\n");
        printf("Final counter value: %d\n", counter);
        printf("Error :            %d\n", (NUM_RUNS * 2 - counter));
        sem_destroy(&mutex);
```

```
        pthread_t thread_a;
        pthread_t thread_b;
        i[0] = 0;
        i[1] = 1;
        pthread_create(&thread_a, NULL, (void *)&handler, (void *)&i[0]);
        pthread_create(&thread_b, NULL, (void *)&handler, (void *)&i[1]);
        pthread_join(thread_a, NULL);
        pthread_join(thread_b, NULL);
        printf("------------------------------------------------------------------\n");
        printf("Final counter value: %d\n", counter);
        printf("Error :            %d\n", (NUM_RUNS * 2 - counter));
        sem_destroy(&mutex);
        exit(0);
}
void handler(void *ptr)
{
        sem_wait(&mutex);
        int iter = 0;
        int thread_num;
        thread_num = *((int *)ptr);
        printf("Starting thread: %d\n", thread_num);

        while (iter < NUM_RUNS)
        {
                counter++;
                iter += 1;
        }

        printf("Thread %d,counter = %d\n", thread_num, counter);
        sem_post(&mutex);
        pthread_exit(0);
}
```

```
(anaconda3)aetooc@neo:~/1-FAST-NUCES/Semester-IV/OS/Assignment/a05$ ./P20_0107
Starting thread: 0
Thread 0,counter = 10000000
Starting thread: 1
Thread 1,counter = 20000000
------------------------------------------------------------------
Final counter value: 20000000
Error :            0
(anaconda3)aetooc@neo:~/1-FAST-NUCES/Semester-IV/OS/Assignment/a05$
```