National Textile University

Department of Computer Science

Subject: Operating System

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Lab no.: lab4(hometask)

Semester:5th

5. Hands-on Practice Exercises

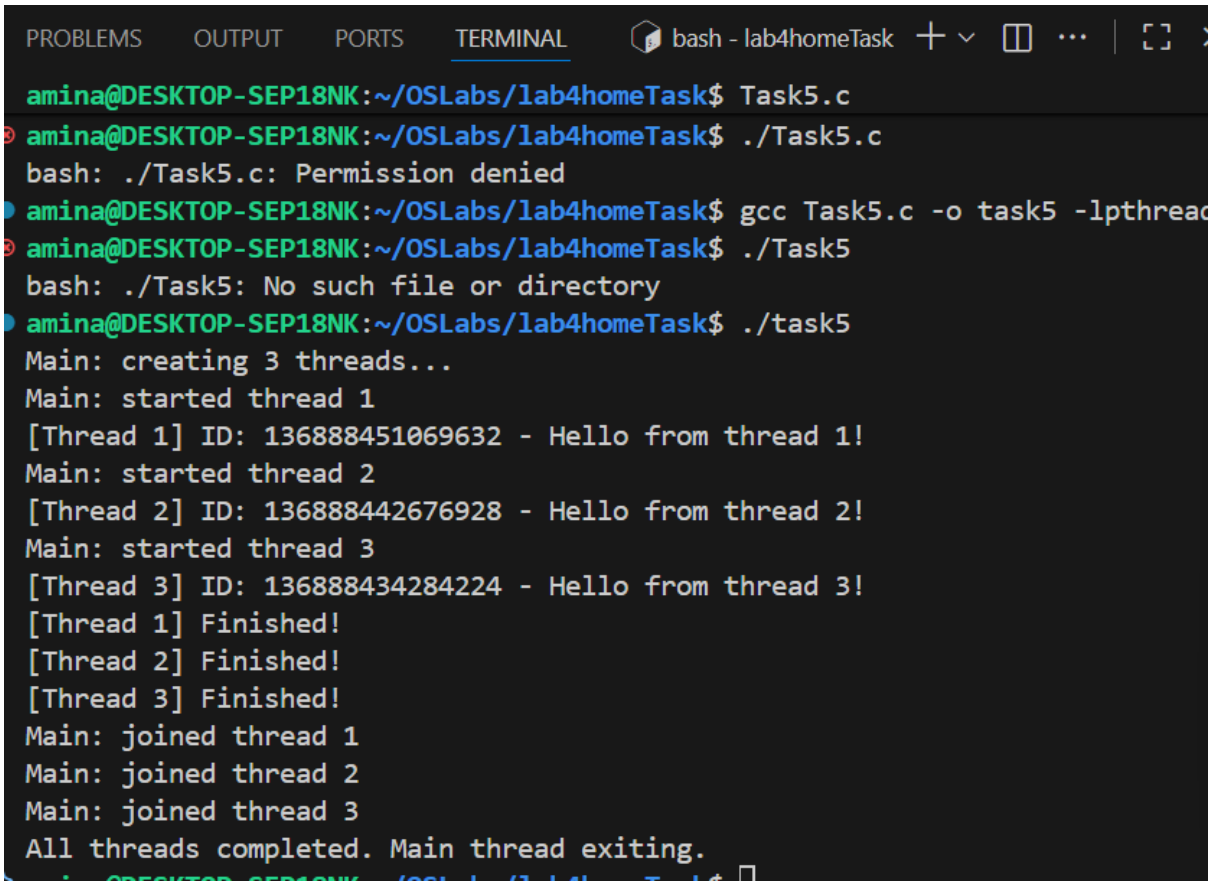
Exercise 1: Thread Basics

Write a program that:

1. Creates 3 threads
2. Each thread prints its thread ID and a unique message
3. Main thread waits for all threads to complete

```
#include <stdio.h>
#include <pthread.h>
#include <unistd.h>

void* print_message(void* arg) {
    int thread_num = *(int*)arg;
    pthread_t tid = pthread_self();

    printf("[Thread %d] ID: %lu - Hello from thread %d!\n", thread_num, tid, thread_num);

    sleep(1);
    printf("[Thread %d] Finished!\n", thread_num);
    return NULL;
}

int main() {
    pthread_t threads[3];
    int thread_nums[3] = {1, 2, 3};

    printf("Main: creating 3 threads...\n");
```

```
    for (int i = 0; i < 3; i++) {
        pthread_create(&threads[i], NULL, print_message, &thread_nums[i]);
        printf("Main: started thread %d\n", i + 1);
    }

    for (int i = 0; i < 3; i++) {
        pthread_join(threads[i], NULL);
        printf("Main: joined thread %d\n", i + 1);
    }

    printf("All threads completed. Main thread exiting.\n");
    return 0;
}
```



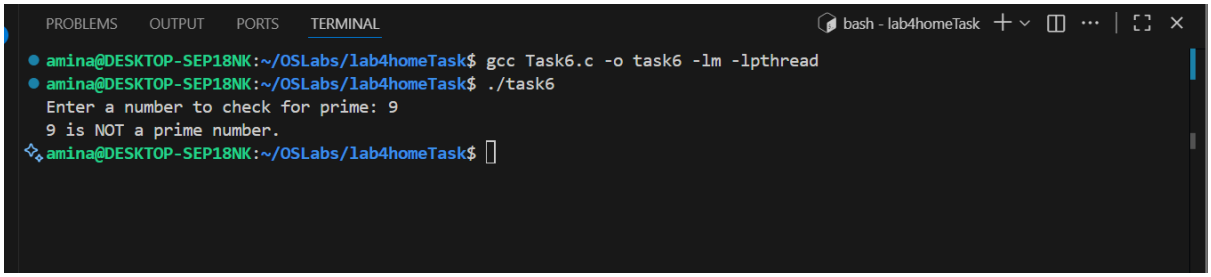
Exercise 2: Prime Number Checker

Write a program that:

1. Takes a number as input
2. Creates a thread that checks if the number is prime
3. Returns the result to the main thread
4. Main thread prints whether the number is prime or not

```
#include <stdio.h>
#include <pthread.h>
#include <stdbool.h>
#include <math.h>

typedef struct {
    int number;
    bool is_prime;
} PrimeData;

void* check_prime(void* arg) {
    PrimeData* data = (PrimeData*)arg;
    int n = data->number;

    if (n <= 1) {
        data->is_prime = false;
        return NULL;
    }

    data->is_prime = true;
    for (int i = 2; i <= sqrt(n); i++) {
```

```
        if (n % i == 0) {
            data->is_prime = false;
            break;
        }
    }

    return NULL;
}

int main() {
    PrimeData data;
    pthread_t thread;

    printf("Enter a number to check for prime: ");
    scanf("%d", &data.number);

    pthread_create(&thread, NULL, check_prime, &data);
    pthread_join(thread, NULL);

    if (data.is_prime)
        printf("%d is a prime number.\n", data.number);
    else
        printf("%d is NOT a prime number.\n", data.number);

    return 0;
}
```


PROBLEMS
OUTPUT
PORTS
TERMINAL
bash - lab4homeTask
amina@DESKTOP-SEP18NK:~/OSLabs/lab4homeTask$ gcc Task6.c -o task6 -lm -lpthread
amina@DESKTOP-SEP18NK:~/OSLabs/lab4homeTask$ ./task6
Enter a number to check for prime: 9
9 is NOT a prime number.
amina@DESKTOP-SEP18NK:~/OSLabs/lab4homeTask$