National Textile University

Department of Computer Science

Subject:

Operating Systems

Submitted To:

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Registration No:

23-NTU-CS-1135

Lab No:

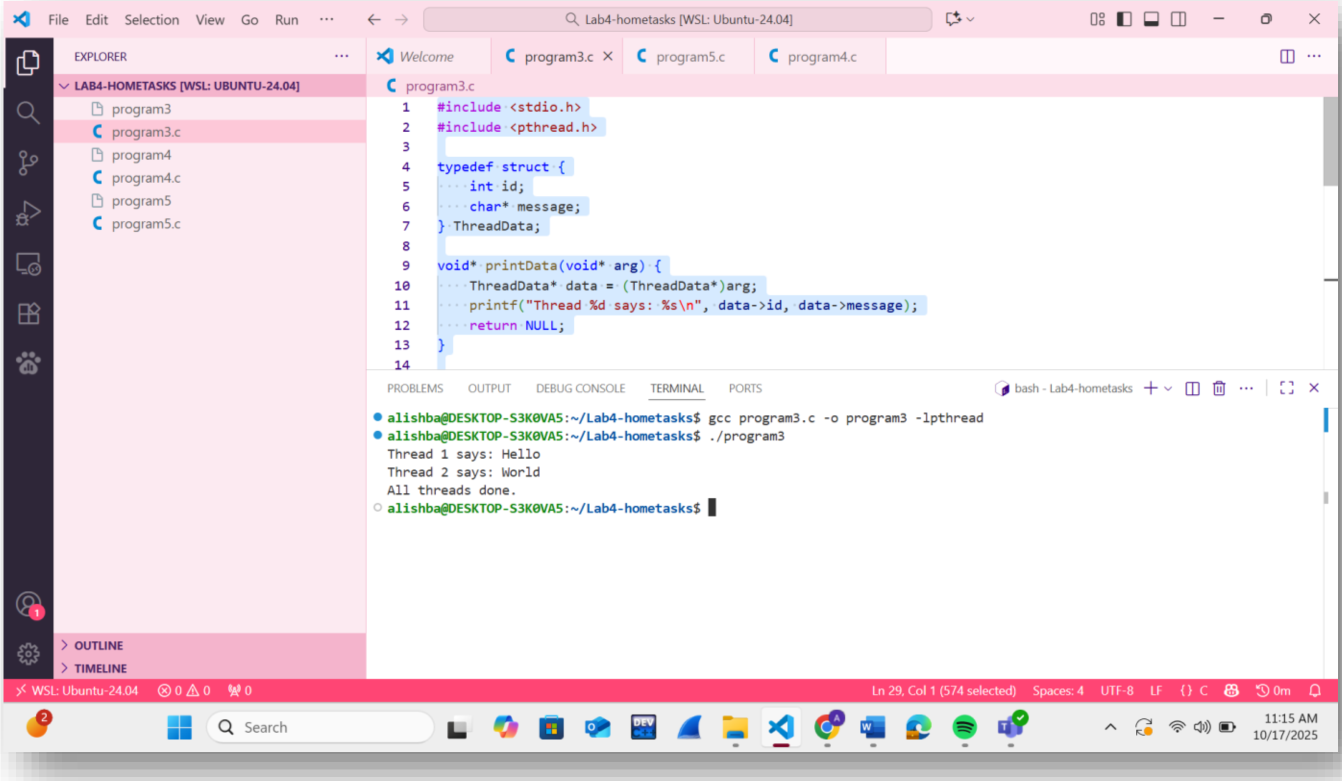
4-Hometasks

Semester:

5th

3. C Programs with Threads

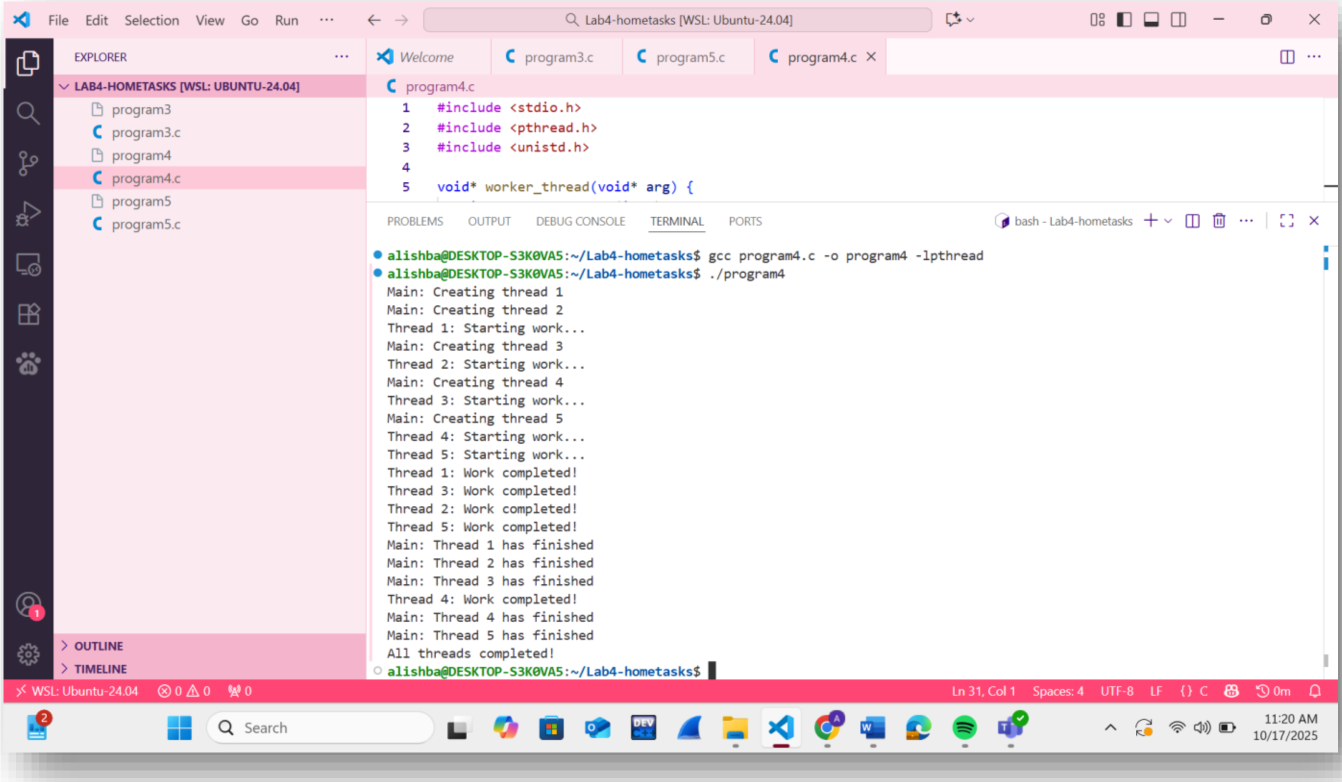
Program 3: Passing Multiple Data



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

typedef struct {
    int id;
    char* message;
} ThreadData;

void* printData(void* arg) {
    ThreadData* data = (ThreadData*)arg;
    printf("Thread %d says: %s\n", data->id, data->message);
    return NULL;
}

```

```
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ gcc program3.c -o program3 -lpthread
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ ./program3
Thread 1 says: Hello
Thread 2 says: World
All threads done.
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ 
```

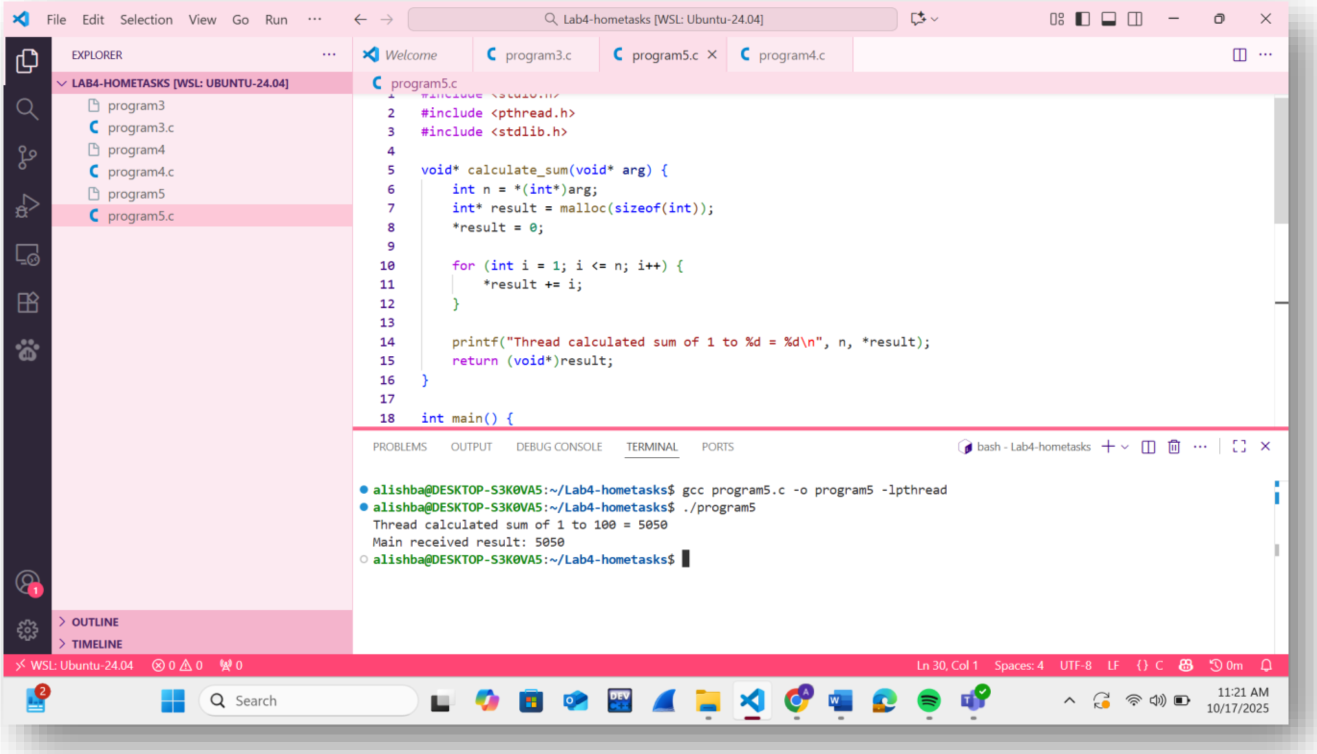
Program 4: Multiple threads



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

void* worker_thread(void* arg) {
```

```
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ gcc program4.c -o program4 -lpthread
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ ./program4
Main: Creating thread 1
Main: Creating thread 2
Thread 1: Starting work...
Main: Creating thread 3
Thread 2: Starting work...
Main: Creating thread 4
Thread 3: Starting work...
Main: Creating thread 5
Thread 4: Starting work...
Thread 5: Starting work...
Thread 1: Work completed!
Thread 3: Work completed!
Thread 2: Work completed!
Thread 5: Work completed!
Main: Thread 1 has finished
Main: Thread 2 has finished
Main: Thread 3 has finished
Thread 4: Work completed!
Main: Thread 4 has finished
Main: Thread 5 has finished
All threads completed!
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$
```

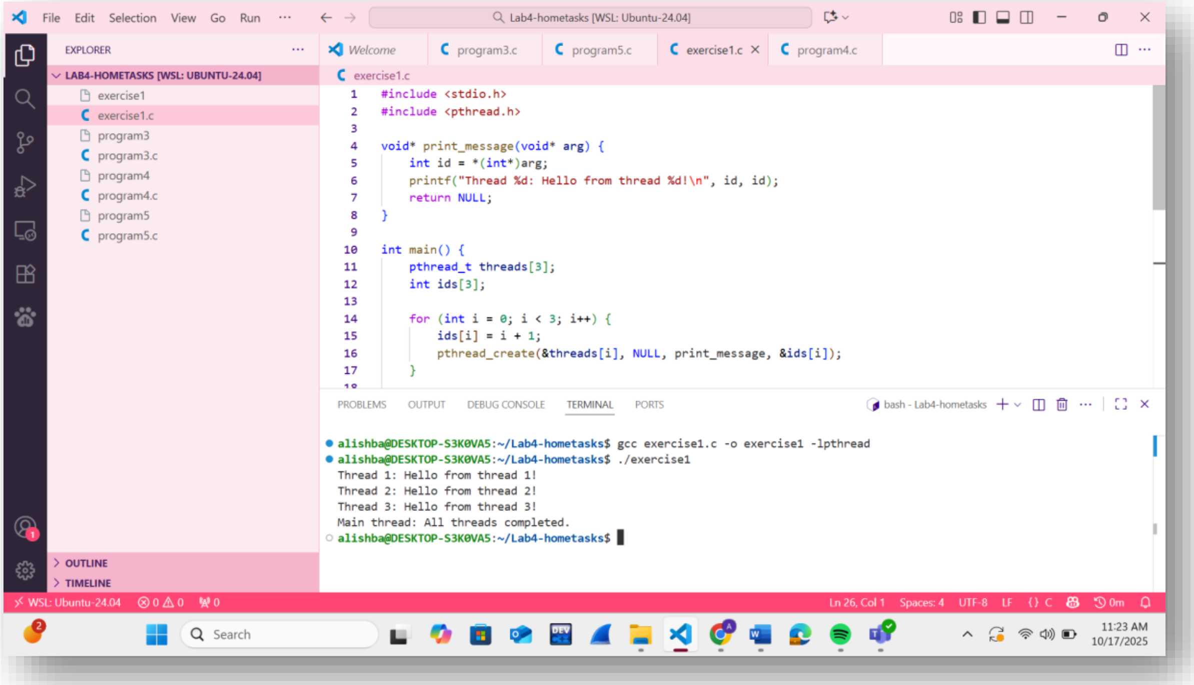
Program 5: Thread Return Values



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

void* calculate_sum(void* arg) {
    int n = *(int*)arg;
    int* result = malloc(sizeof(int));
    *result = 0;

    for (int i = 1; i <= n; i++) {
        *result += i;
    }

    printf("Thread calculated sum of 1 to %d = %d\n", n, *result);
    return (void*)result;
}

int main() {
```

```
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ gcc program5.c -o program5 -lpthread
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ ./program5
Thread calculated sum of 1 to 100 = 5050
Main received result: 5050
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$
```

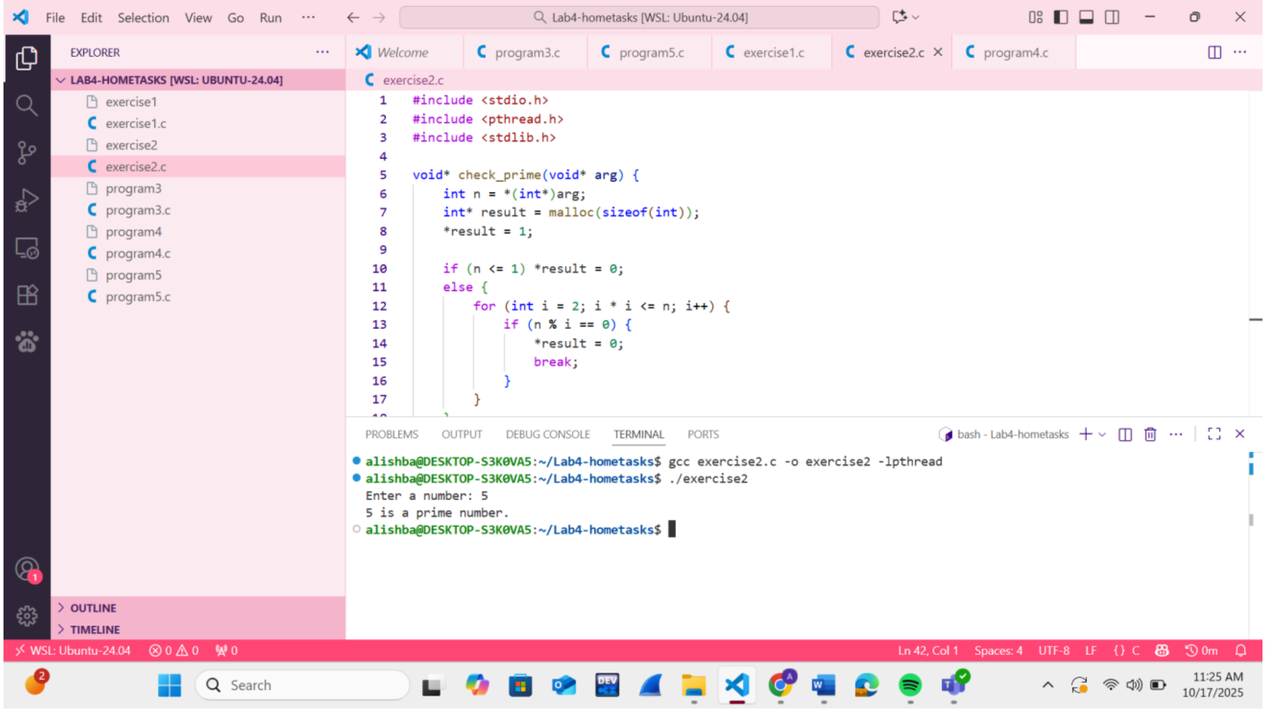
Exercise 1:



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

void* print_message(void* arg) {
    int id = *(int*)arg;
    printf("Thread %d: Hello from thread %d!\n", id, id);
    return NULL;
}

int main() {
    pthread_t threads[3];
    int ids[3];

    for (int i = 0; i < 3; i++) {
        ids[i] = i + 1;
        pthread_create(&threads[i], NULL, print_message, &ids[i]);
    }
```

```
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ gcc exercise1.c -o exercise1 -lpthread
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ ./exercise1
Thread 1: Hello from thread 1!
Thread 2: Hello from thread 2!
Thread 3: Hello from thread 3!
Main thread: All threads completed.
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ 
```

Exercise 2:



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

void* check_prime(void* arg) {
    int n = *(int*)arg;
    int* result = malloc(sizeof(int));
    *result = 1;

    if (n <= 1) *result = 0;
    else {
        for (int i = 2; i * i <= n; i++) {
            if (n % i == 0) {
                *result = 0;
                break;
            }
        }
```

```
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ gcc exercise2.c -o exercise2 -lpthread
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ ./exercise2
Enter a number: 5
5 is a prime number.
alishba@DESKTOP-S3K0VA5:~/Lab4-hometasks$ 
```