

National Textile University

Department of Computer Science

Name

Gulam Rasool

Reg No:

23-NTU-CS-FL-1159

Semester:

5th

Lab:

06

Submitted to:

Sir Nasir Mehmood

LAB-06

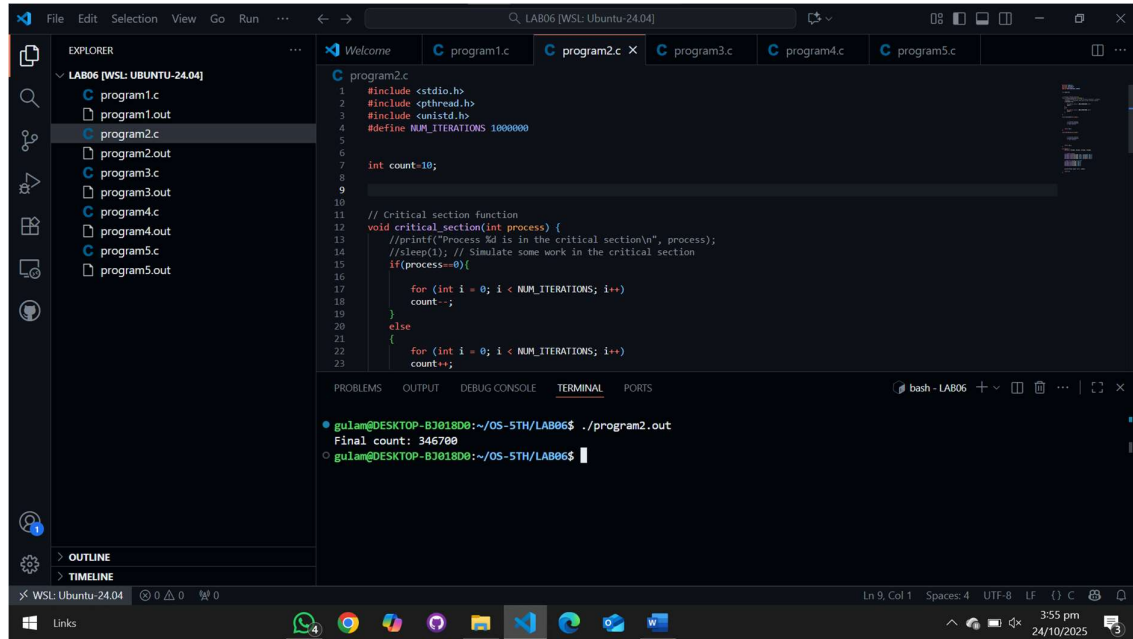
In this LAB we discuss some programs about synchronous using Peterson and Mutex Algorithm

PeterSon Algorithm	Mutex Algorithm
<ul style="list-style-type: none">• In this we use While Loop for the iteration and check the Synchronization.• In this we write all code by hand• The steps include<ul style="list-style-type: none">○ Flag [2]○ Turn○ While loop	<ul style="list-style-type: none">• In this we use a built-In Function Pthread_mutex_t object• In this all computation will be by the Built-in Function• The function we use are<ul style="list-style-type: none">○ Pthread_mutex_t○ Pthread_mutex_init○ Pthread_mutex_destroy

Program1-Multi-Threading

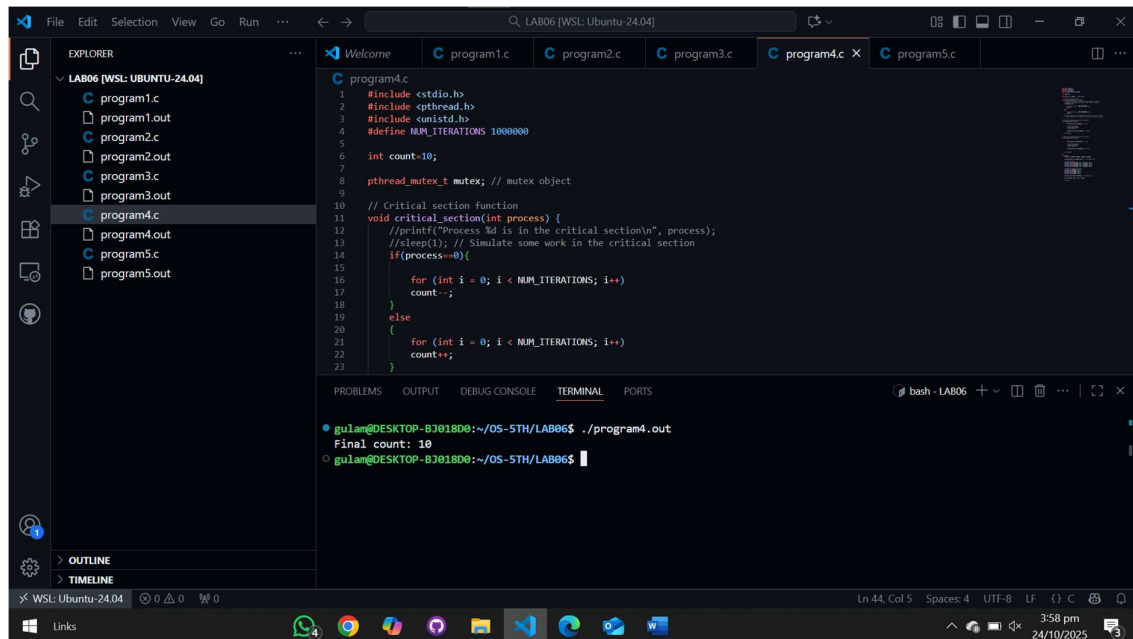
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File Edit Selection View Go Run ... < -> LAB06 [WSL: Ubuntu-24.04]
EXPLORER
  LAB06 [WSL: UBUNTU-24.04]
    program1.c
    program1.out
    program2.c
    program2.out
    program3.c
    program3.out
    program4.c
    program4.out
    program5.c
    program5.out
  program1.c
    1 #include <stdio.h>
    2 #include <pthread.h>
    3
    4 #define NUM_THREADS 4
    5 int var1=0;
    6
    7 void *thread_function(void *arg) {
    8     int thread_id = *(int *)arg;
    9
    10    int var1=0;
    11    var1++;
    12    printf("Thread %d is executing the global value is %d: local vale is %d: process id %d: \n", thread_id,var1,getpid())
    13    return NULL;
    14 }
    15
    16 int main() {
    17     pthread_t threads[NUM_THREADS];
    18     int thread_args[NUM_THREADS];
    19
    20     for (int i = 0; i < NUM_THREADS; ++i) {
    21         thread_args[i] = i;
    22         pthread_create(&threads[i], NULL, thread_function, &thread_args[i]);
    23     }
    24
    25     for (int i = 0; i < NUM_THREADS; ++i) {
    26         pthread_join(threads[i], NULL);
    27     }
    28
    29     printf("Main is executing the global value is %d: \n", var1);
    30     return 0;
    31 }
  program1.out
    guilam@DESKTOP-BJ018D0:~/OS-5TH/LAB06$ ./program1.out
    Thread 0 is executing the global value is 1: local vale is 1: process id 14716:
    Thread 1 is executing the global value is 2: local vale is 1: process id 14716:
    Thread 2 is executing the global value is 3: local vale is 1: process id 14716:
    Thread 3 is executing the global value is 4: local vale is 1: process id 14716:
    Main is executing the global value is 4:
    guilam@DESKTOP-BJ018D0:~/OS-5TH/LAB06$
```

Program2 – Multi_Processing without synchronization



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File Edit Selection View Go Run ... LAB06 [WSL: Ubuntu-24.04]
EXPLORER
  LAB06 [WSL: UBUNTU-24.04]
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    program2.c
    program2.out
    program3.c
    program3.out
    program4.c
    program4.out
    program5.c
    program5.out
C program2.c
1 #include <stdio.h>
2 #include <pthread.h>
3 #include <unistd.h>
4 #define NUM_ITERATIONS 1000000
5
6
7 int count=0;
8
9
10
11 // Critical section function
12 void critical_section(int process) {
13     //printf("Process %d is in the critical section\n", process);
14     //sleep(1); // Simulate some work in the critical section
15     if(process==0){
16         for (int i = 0; i < NUM_ITERATIONS; i++)
17             count--;
18     }
19     else
20     {
21         for (int i = 0; i < NUM_ITERATIONS; i++)
22             count++;
23     }
24 }
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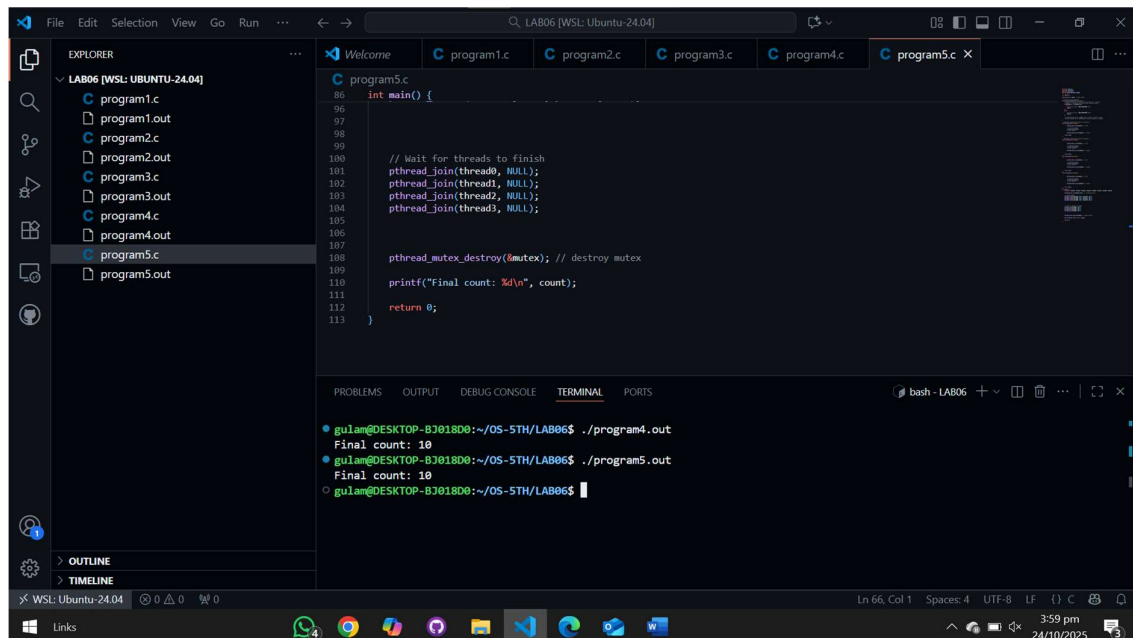
Program 4 – Multiprocessing with Mutex



```
1 #include <stdio.h>
2 #include <pthread.h>
3 #include <unistd.h>
4 #define NUM_ITERATIONS 1000000
5
6 int count=10;
7
8 pthread_mutex_t mutex; // mutex object
9
10 // Critical section function
11 void critical_section(int process) {
12     //printf("Process %d is in the critical section\n", process);
13     //sleep(1); // Simulate some work in the critical section
14     if(process==0){
15         for (int i = 0; i < NUM_ITERATIONS; i++)
16             count--;
17     }
18     else
19     {
20         for (int i = 0; i < NUM_ITERATIONS; i++)
21             count++;
22     }
23 }
```

gulam@DESKTOP-BJ018D0:~/OS-5TH/LAB06\$./program4.out
Final count: 10
gulam@DESKTOP-BJ018D0:~/OS-5TH/LAB06\$

Program 5 – Multiprocessing (4 process) with mutex



```
86 int main() {
87
88     // Create 4 threads
89     pthread_t thread1, thread2, thread3, thread4;
90
91     // Create mutex
92     pthread_mutex_t mutex = PTHREAD_MUTEX_INITIALIZER;
93
94     // Create threads
95     pthread_create(&thread1, NULL, critical_section, 0);
96     pthread_create(&thread2, NULL, critical_section, 1);
97     pthread_create(&thread3, NULL, critical_section, 2);
98     pthread_create(&thread4, NULL, critical_section, 3);
99
100     // Wait for threads to finish
101     pthread_join(thread1, NULL);
102     pthread_join(thread2, NULL);
103     pthread_join(thread3, NULL);
104     pthread_join(thread4, NULL);
105
106     pthread_mutex_destroy(&mutex); // destroy mutex
107
108     printf("Final count: %d\n", count);
109
110     return 0;
111 }
112
113 }
```

gulam@DESKTOP-BJ018D0:~/OS-5TH/LAB06\$./program4.out
Final count: 10
gulam@DESKTOP-BJ018D0:~/OS-5TH/LAB06\$./program5.out
Final count: 10
gulam@DESKTOP-BJ018D0:~/OS-5TH/LAB06\$