National Textile University

Department of Computer Science

Subject

Operating system

Submitted to:

Sir Nasir Mehmood

Submitted by:

Hussain Naweed

Registration Number

23-NTU-CS-1165

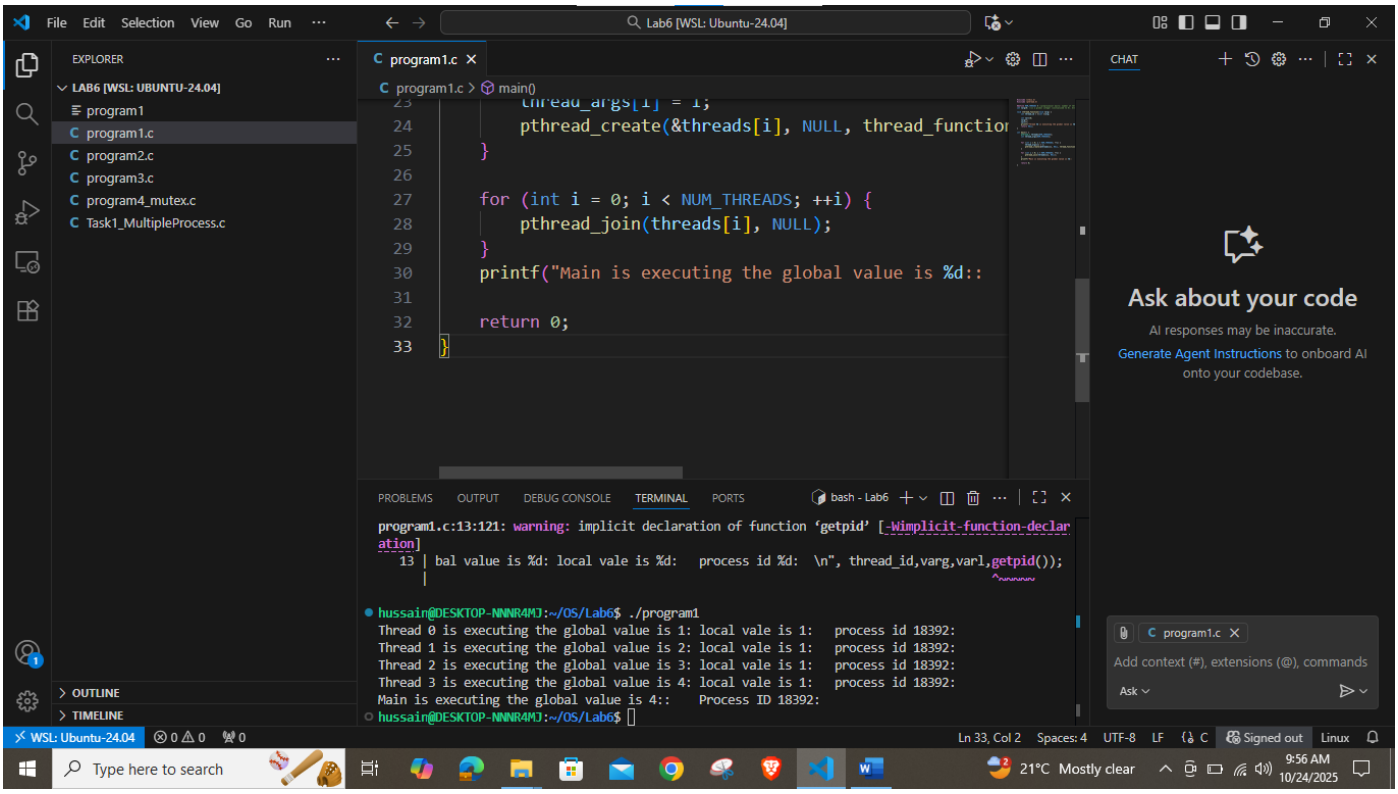
Lab No.

06

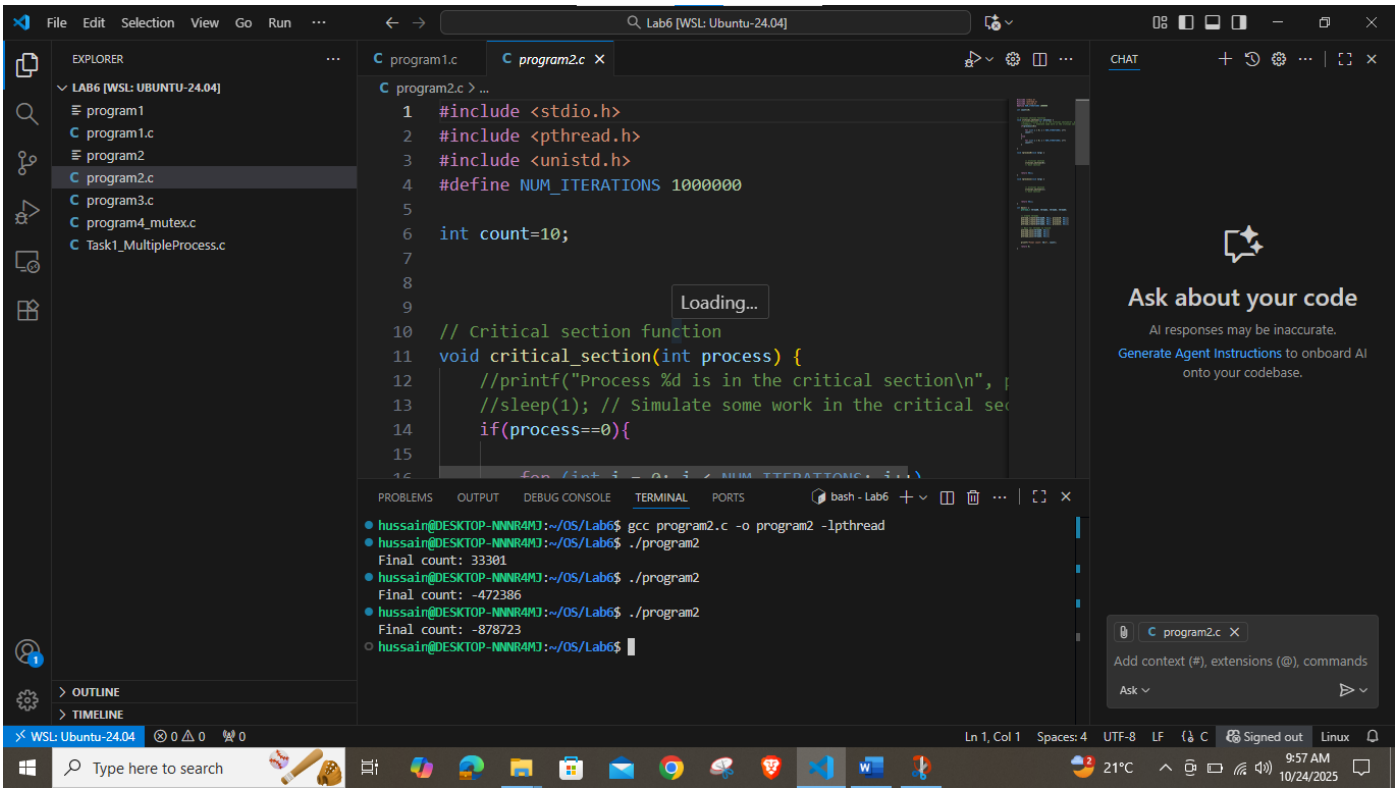
Semester

5th

Program1


File Edit Selection View Go Run
Lab6 [WSL: Ubuntu-24.04]
EXPLORER
LAB6 [WSL: UBUNTU-24.04]
program1
program1.c
program2.c
program3.c
program4_mutex.c
Task1_MultipleProcess.c
program1.c
program1.c > main()
pthread_create(&threads[i], NULL, thread_functio
}
for (int i = 0; i < NUM_THREADS; ++i) {
pthread_join(threads[i], NULL);
}
printf("Main is executing the global value is %d::
return 0;
}
CHAT
Ask about your code
AI responses may be inaccurate.
Generate Agent Instructions to onboard AI onto your codebase.
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
bash - Lab6
program1.c:13:121: warning: implicit declaration of function 'getpid' [-Wimplicit-function-declaration]
13 | bal value is %d: local vale is %d: process id %d: \n", thread_id,varg,varl,getpid());
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program1
Thread 0 is executing the global value is 1: local vale is 1: process id 18392:
Thread 1 is executing the global value is 2: local vale is 1: process id 18392:
Thread 2 is executing the global value is 3: local vale is 1: process id 18392:
Thread 3 is executing the global value is 4: local vale is 1: process id 18392:
Main is executing the global value is 4:: Process ID 18392:
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$
program1.c
Add context (#), extensions (@), commands
Ask
OUTLINE
TIMELINE
WSL: Ubuntu-24.04
Ln 33, Col 2 Spaces: 4 UTF-8 LF C Signed out Linux
Type here to search
21°C Mostly clear
9:56 AM
10/24/2025

Program 2


File Edit Selection View Go Run
Lab6 [WSL: Ubuntu-24.04]
EXPLORER
LAB6 [WSL: UBUNTU-24.04]
program1
program1.c
program2
program2.c
program3.c
program4_mutex.c
Task1_MultipleProcess.c
program1.c
program2.c
program2.c > ...
#include <stdio.h>
#include <pthread.h>
#include <unistd.h>
#define NUM_ITERATIONS 1000000
int count=10;
Loading...
// Critical section function
void critical_section(int process) {
//printf("Process %d is in the critical section\n",
//sleep(1); // Simulate some work in the critical se
if(process==0){
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
bash - Lab6
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ gcc program2.c -o program2 -lpthread
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program2
Final count: 33301
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program2
Final count: -472386
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program2
Final count: -878723
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$
CHAT
Ask about your code
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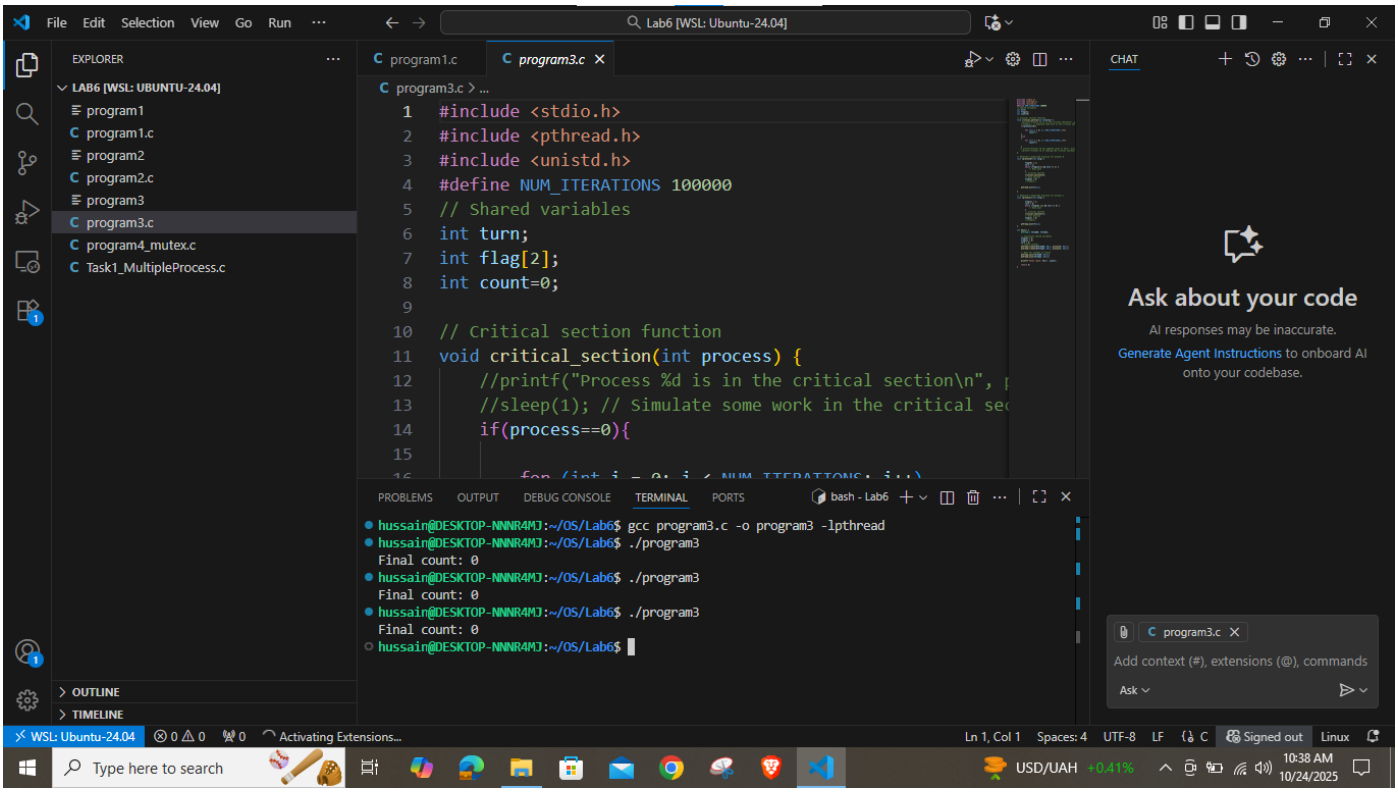
program2.c
Add context (#), extensions (@), commands
Ask
OUTLINE
TIMELINE
WSL: Ubuntu-24.04
Ln 1, Col 1 Spaces: 4 UTF-8 LF C Signed out Linux
Type here to search
21°C
9:57 AM
10/24/2025

Program3:


File Edit Selection View Go Run
Lab6 [WSL: Ubuntu-24.04]
EXPLORER
LAB6 [WSL: UBUNTU-24.04]
program1
program1.c
program2
program2.c
program3
program3.c
program4_mutex.c
Task1_MultipleProcess.c
program1.c
program3.c
program3.c > ...
#include <stdio.h>
#include <pthread.h>
#include <unistd.h>
#define NUM_ITERATIONS 100000
// Shared variables
int turn;
int flag[2];
int count=0;
// Critical section function
void critical_section(int process) {
//printf("Process %d is in the critical section\n",
//sleep(1); // Simulate some work in the critical sec
if(process==0){
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
bash - Lab6
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ gcc program3.c -o program3 -lpthread
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program3
Final count: 0
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program3
Final count: 0
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program3
Final count: 0
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$
CHAT
Ask about your code
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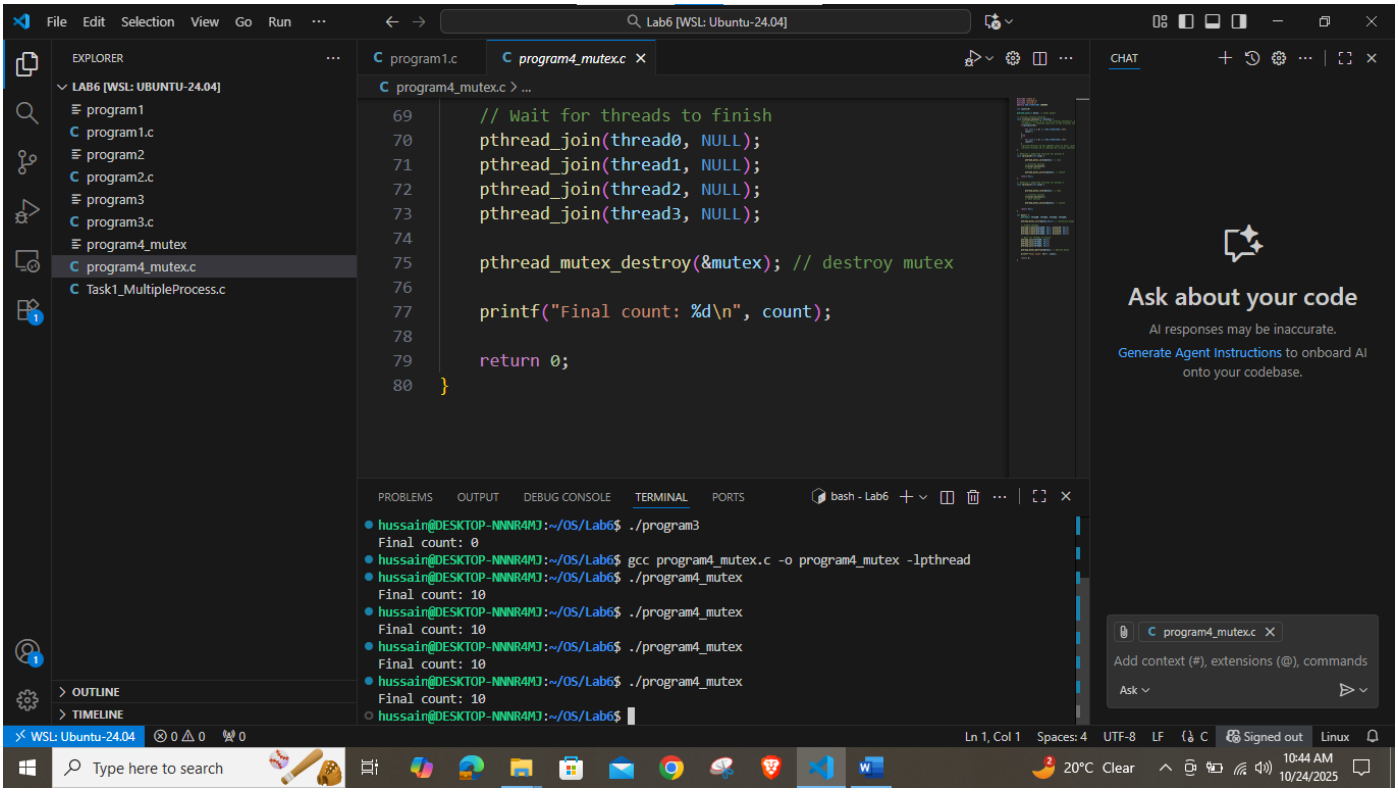
program3.c
Add context (#), extensions (@), commands
Ask
OUTLINE
TIMELINE
WSL: Ubuntu-24.04
Activating Extensions...
Ln 1, Col 1 Spaces: 4 UTF-8 LF C Signed out Linux
Type here to search
USD/UAH +0.41%
10:38 AM
10/24/2025

Program4:


File Edit Selection View Go Run
Lab6 [WSL: Ubuntu-24.04]
EXPLORER
LAB6 [WSL: UBUNTU-24.04]
program1
program1.c
program2
program2.c
program3
program3.c
program4_mutex
program4_mutex.c
Task1_MultipleProcess.c
program1.c
program4_mutex.c
program4_mutex.c > ...
69 // Wait for threads to finish
70 pthread_join(thread0, NULL);
71 pthread_join(thread1, NULL);
72 pthread_join(thread2, NULL);
73 pthread_join(thread3, NULL);
74
75 pthread_mutex_destroy(&mutex); // destroy mutex
76
77 printf("Final count: %d\n", count);
78
79 return 0;
80 }
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
bash - Lab6
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program3
Final count: 0
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ gcc program4_mutex.c -o program4_mutex -lpthread
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program4_mutex
Final count: 10
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program4_mutex
Final count: 10
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program4_mutex
Final count: 10
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./program4_mutex
Final count: 10
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$
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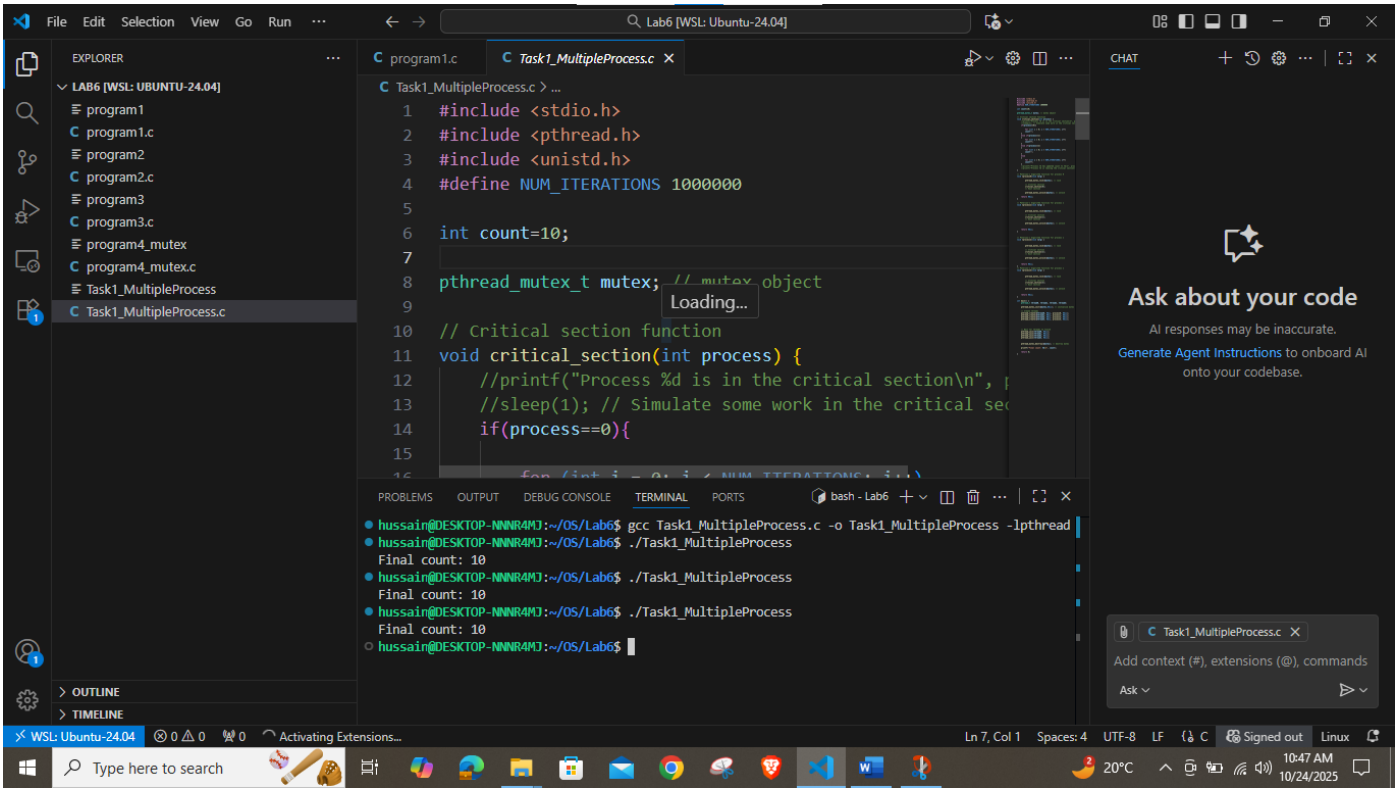
program4_mutex.c
Add context (#), extensions (@), commands
Ask
OUTLINE
TIMELINE
WSL: Ubuntu-24.04
Ln 1, Col 1 Spaces: 4 UTF-8 LF C Signed out Linux
Type here to search
20°C Clear
10:44 AM
10/24/2025

task1:


File Edit Selection View Go Run
Lab6 [WSL: Ubuntu-24.04]
EXPLORER
LAB6 [WSL: UBUNTU-24.04]
program1
program1.c
program2
program2.c
program3
program3.c
program4_mutex
program4_mutex.c
Task1_MultipleProcess
Task1_MultipleProcess.c
program1.c
Task1_MultipleProcess.c
Task1_MultipleProcess.c > ...
#include <stdio.h>
#include <pthread.h>
#include <unistd.h>
#define NUM_ITERATIONS 1000000
int count=10;
pthread_mutex_t mutex; // mutex object
Loading...
// Critical section function
void critical_section(int process) {
//printf("Process %d is in the critical section\n",
//sleep(1); // Simulate some work in the critical sec
if(process==0){
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
bash - Lab6
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ gcc Task1_MultipleProcess.c -o Task1_MultipleProcess -lpthread
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./Task1_MultipleProcess
Final count: 10
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./Task1_MultipleProcess
Final count: 10
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$ ./Task1_MultipleProcess
Final count: 10
hussain@DESKTOP-NNNR4MJ:~/OS/Lab6$
OUTLINE
TIMELINE
CHAT
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Task1_MultipleProcess.c
Add context (#), extensions (@), commands
Ask
WSL: Ubuntu-24.04
Activating Extensions...
Ln 7, Col 1 Spaces: 4 UTF-8 LF C Signed out Linux
Type here to search
20°C
10:47 AM
10/24/2025

Output:

Analysis of Peterson Algorithms and Mutex Based Code:

Peterson's Algorithm:	**Mutex Based Code**
Uses two shared variables: flag[] (interest) and turn (whose turn it is) to enforce mutual exclusion.	Uses pthread_mutex_lock() and pthread_mutex_unlock() — system calls that block or wake threads safely.
Only supports 2 processes (threads). Hard to extend to 3+ safely.	Supports any number of threads/processes with minimal code change.
Controlled by flag and turn variables manually coded.	Controlled by pthread_mutex_lock() internally in the OS.
Must manually reset flags and turn.	Simply call pthread_mutex_unlock().
Works only with strict memory ordering may fail on modern multi-core systems.	Uses kernel-level atomic operations and hardware-supported locking.