
LAB 10

CS 361: Systems Programming / Spring 2023

Description

In this lab session, you will explore how to create threads, join threads, and pass arguments to threads.

Guide

1. Accept the invitation for Lab 10 on Github classroom: <https://classroom.github.com/a/nsPZsk>
2. Import the Github repository created to your machine using vscode, as explained in Assignment 0
3. Make sure that you can launch a terminal inside vscode via menus: Terminal > New Terminal
4. Read this guide and answer the questions as they appear. You should answer a total of 9 questions.

Functions `pthread_create` and `pthread_join`

Please open the slides for Lecture 18 about `pthread_create` and `pthread_join`.

Question 1: What are all the arguments that function `pthread_create` accepts?

Question 2: What is the signature of the function accepted by function `pthread_create` ?

Question 3: Open file `lab10-1.c` and inspect its contents. What does it do?

Question 4: Change file `lab10-1.c` so that it launches `n` threads on the first for loop using function `pthread_create`, each running function `f`. Run the program with `n=5` multiple times (at least 10). Does it always print "Hello" the same number of times? Does it always print "Finished" at the end?

Question 5: Change file `lab10-1.c` to wait for all the threads to finish on the second for loop. Which function did you use?

Question 6: Inspect file `lab10-2.c` and uncomment lines 7 and 24. Which compilation errors do you get?

Question 7: Fix the compilation errors by converting from `void*` to `int` and from `int` to `void*` as needed. You may have to use `long` as an intermediate type (e.g., `void* -> long -> int` and `int -> long -> void*`). You can refer to Lab 5 if you don't remember how to cast types.

Question 8: Change the first loop to create threads, passing the loop index as the argument (similar to Q4). Run the program with `n=5` multiple times (at least 10). Does it always print "Hello" the same number of times? Does it always print "Finished" at the end?

Question 9: Change file lab10-2.c to wait for all the threads to finish on the second for loop. When running with a large n (e.g., 100), do the threads run in the same order that you created them? (i.e., are the numbers printed in order?)

Extra / Optional

The threads in this assignment always return NULL. How can you change the code so that they return a number, and so that the main thread can then read that number?

Grading

Show your UIC card to the TA when you enter the lab, or type your UIN on the chat when joining remotely. Stay in the session until you show your work, or until the TA announces that the lab is over.

- You have to remain present for the whole lab to get attendance, which you can then use to resubmit Assignment 5.
- You can leave early after showing your work to the TA (answers to all questions). In this case, you will get a 5% bonus in Assignment 5.