Programming Assignment 2

CSC 4320/6320 - Operating Systems

Spring 2018

Due Date: Feb. 19 (Mon.), 11:59pm

Purpose of This Project

To provide experience with pthreads in UNIX

Problem Statement:

Read through the programming project –**Sudoku Solution Validator** from page 197 to 199 in the textbook, and finish it using pthreads under UNIX. Your project must meet the following requirements for full credit:

1. The input will be a txt file whose name is given on the command line. This file contains digits 0-9 in a 9x9 grid. There will be a space between each digit so that you may read in the data either as integers or as characters. **Sample txt files (t1.txt, t2.txt) are provided in iCollege under Homework2 folder.**

2. Create the threads in the following way: one thread for the first three rows, one for the middle three rows, one for the last three rows, one for the first three columns, one for the middle three columns, one for the last three columns, one for the top three subgrids, one for the middle three subgrids, and one for the bottom three subgrids. The total number of threads is 9 (without including the parent thread).

3. The output of the program should be displayed to the screen with a message stating whether the Sudoku solution is valid or not. (That is to say whether the 9x9 grid in the txt file is a valid Sudoku or not).

Design Notes

1. Program in c in the Linux Virtual Machine environment. A skeleton of *Sudoku.c can be downloaded from iCollege.*

2. Appropriate error checking of the command line and the file open should be completed.

3. Since the grid is shared between threads, it should be declared in the global data space before the main program. This also would be the case for any other data being shared between threads.

Assignment:

1. **(20 points)** Implementation of this project individually. Programs should exhibit a modular or object-oriented design. Poor design will not earn full credit.
   Using **gcc -pthread -o Sudoku Sudoku.c** to compile**,** and then an executable file **Sudoku** would be generated. Use **./Sudoku** to execute the program.

2. **(5 points).** Provide a high-level description of the program describing the functionality of the major components (including data structures) of the program and how they interact with each other to achieve the task.

3. **(5 points)**. Discuss the advantages and disadvantages of using 9 threads to solve this problem vs. using 3 threads (one to do all the rows, one to do all the columns, one to do all the 3x3 subgrids) vs. using 1 thread to do all the checking.

What to submit (submit through iCollege):

1) Upload file *Sudoku.c* and a project report (named as "*HW2.pdf*" or "*HW2.doc*") to D2L. The project report should include 1). The source code of *Sudoku.c*; 2) a screenshot of the output; 3) Description for question 2 (see above); 4) discussion for question 3 (see above).