

CS F372 Operating Systems
Second Semester 2021-22

Assignment 1

Important guidelines:

- The assignment is to be done in groups of 8
- All members of the group must contribute to the assignment. A demo-cum-viva session will be scheduled during which it will be ascertained that all members have contributed. If any member does not contribute, the member will be awarded 0 in the assignment
- All submissions will be passed through a code-similarity checker. If the codes of two or more groups match then all the group members will be summarily awarded 0 in the assignment. This is irrespective of if only one member of a group is the offender. There is no partial penalty for dishonesty. Lifting code from the Internet also constitutes cheating
- Honest but incorrect submissions will be awarded partial credit through the demo-cum-viva session
- Discussion is encouraged between groups, copying is strictly prohibited. Use Piazza for discussion. What is the difference? Check the last part of this page:
<https://www.cse.iitd.ac.in/~mausam/courses/col772/spring2019/>

Problem Statement:

- Write a C program to solve an NxN sudoku puzzle by brute force. The program should be compatible on an Ubuntu machine running 18.04 or 20.04
 - $0 < N \leq 36$, N is a perfect square. The value of N will be supplied as a command line argument.
 - The grid to be solved will be supplied as a text file as a command line argument. Empty cells in the grid have 0. Numbers greater than 9 will be represented by the number itself. Example of a 9x9 grid:
<https://drive.google.com/file/d/1zfhPVD80gyxCbGYnvhFfrr3j7X1LFcqu/view?usp=sharing>
- Example of a 25x25 grid:
<https://drive.google.com/file/d/15rSuXJbEtJroHia0D1tNQVz8L-kkxN6O/view?usp=sharing>
 - So, your program should run as : `./sudoku.out N input.txt`
 - The program should print the solved grid on the standard output in a tab separated format, similar to the input.
 - A skeleton code has been provided here. Please keep the skeleton intact to ensure compatibility. Incompatible codes will be treated as incorrect. Skeleton:
<https://drive.google.com/file/d/1XR37jXw-oAqozUrmjTmpluXOP1yn7daT/view?usp=sharing>
 - Please note that there is an extra tab before the newline at the end of each line. This is essential to include for compatibility

- Your program should take advantage of parallelism offered by the Linux `fork()`, IPC and `pthread` libraries. It is compulsory to use either `fork()` or `pthread` or both. Your program should spawn multiple (as many as required) child processes and/or threads to divide and conquer the problem in parallel.

How and What to submit:

- Phase 1:
 - Weight: 10% (7% for implementation + 3% for demo and viva)
 - In this phase your code will be checked for correctness and that all the guidelines are followed
 - Submission will be through CMS
 - Deadline for Phase 1: 25th February 23:59 hours
- Phase 2:
 - Weight: 5%
 - Groups which submit a correct solution in Phase 1 are eligible
 - In this phase a leaderboard will be set up to rank the solutions by execution time, for a given fixed grid. The link to view the leaderboard will be shared. The leaderboard will be updated at a fixed interval everyday
 - Scoring will be based on the rank of a group on the leaderboard at the end of Phase 2
 - Submission will be through scp-ing the code to a server. Credentials will be shared with the groups.
 - Deadline: 28th February 22:00 hours
- File Naming Convention:
 - `groupX_assignment1.c` [Where X is the group no.]
- Late Day rules apply only to Phase 1, not Phase 2. Phase 2 starts and ends on the given dates.