

Practice/Real-Life Applications of Computational Algorithms, Spring 2021

Homework 1: Solving Sudoku by SAT

Due: 2021/03/29

1. Goal

In this homework, you will use a SAT solver to solve Sudoku.

- (1) Read a Sudoku puzzle from the input
- (2) Encode into CNF
- (3) Use MiniSat to find an assignment to CNF (if satisfiable)
- (4) Output solution from the assignment
- (5) Or print “NO” (if the puzzle is not solvable)

2. Input / Output

Each input file contains a puzzle that

- (1) has a size $N \times N$, and
- (2) is prefilled with numbers 0 to N , where 0 represents the square is empty.

Sample Input	Sample Output
0 6 0 1 0 4 0 5 0	9 6 3 1 7 4 2 5 8
0 0 8 3 0 5 6 0 0	1 7 8 3 2 5 6 4 9
2 0 0 0 0 0 0 0 1	2 5 4 6 8 9 7 3 1
8 0 0 4 0 7 0 0 6	8 2 1 4 3 7 5 9 6
0 0 6 0 0 0 3 0 0	4 9 6 8 5 2 3 1 7
7 0 0 9 0 1 0 0 4	7 3 5 9 6 1 8 2 4
5 0 0 0 0 0 0 0 2	5 8 9 7 1 3 4 6 2
0 0 7 2 0 6 9 0 0	3 1 7 2 4 6 9 8 5
0 4 0 5 0 8 0 7 0	6 4 2 5 9 8 1 7 3

3. Command line

Your Sudoku solver should take three arguments:

`./solver [Input Puzzle Filename] [Output Puzzle Filename] [MiniSatExe]`

where MiniSatExe is the filename of the MiniSat executable.

4. Hand in your assignment

Please upload the following files in a zip, specifying your ID (e.g., Student_ID.zip) to E3 by the deadline.

(1) Source code

(2) A report that introduces your implementation

5. Platform

Linux

6. Q&A

For any questions regarding homework 1, please contact Ning-Chi Huang (blackitty321@gmail.com)