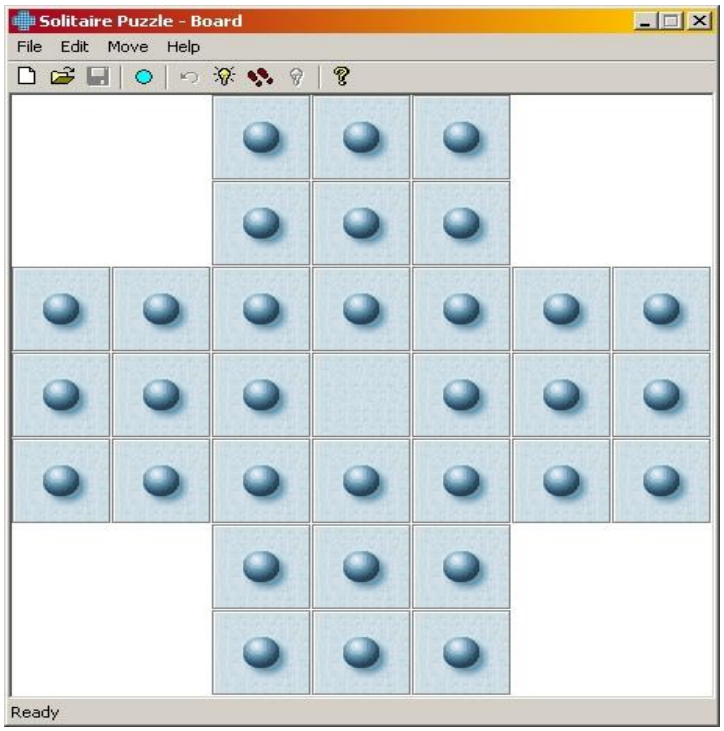
COSC 2007 –Data Structures II

Assignment #1

Due:

Using recursion and backtracking algorithm

Introduction: The following game is actually a puzzle where the board has the form of a cross. It consists of 32 fields. 31 of these fields contain a peg. The single field in the middle of the board is empty. (We mark a peg with X and an empty field with O in the following examples)

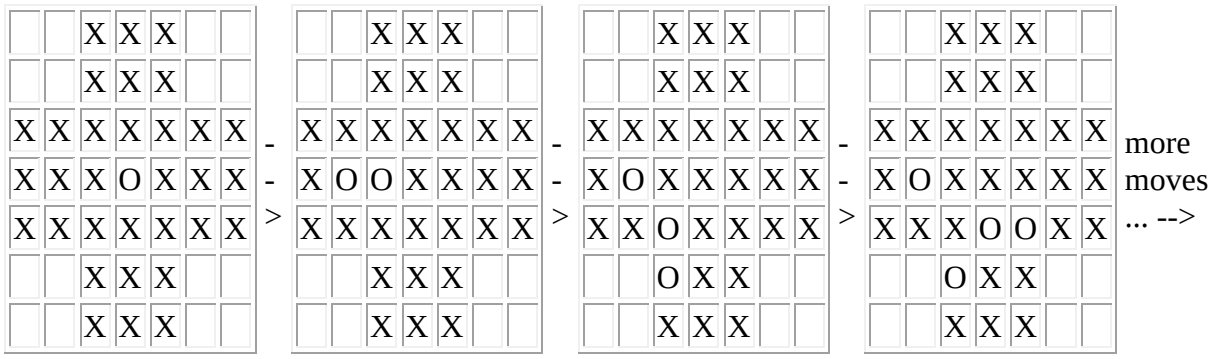


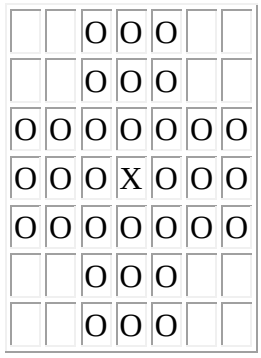
The rules of this game are simple:

- you can take a peg and jump over another neighboring peg
- the peg you jumped over is removed from the board
- you solved the puzzle if at the end only on peg exists and is located in the middle of the board

At the start there are only a few possible moves, but the choices are increasing during the game.

The following tables give the initial position of the pegs and subsequent moves.





Requirements:

Implement a recursive backtracking algorithm in Java, that finds a solution to this puzzle. The solution can be stored as a sequence of boards: one for each move. The board should be implemented as a Java class with an internal 7x7 matrix (two dimensional array). In the backtracking algorithm you must compute all possible jumps for a given situation.

Your program might include a class called Puzzle which includes the following methods:

1. findSolution (int move): Backtracking algorithm to solve the puzzle. move - current number of move, first move must be 1
2. main ():Starts the backtracking algorithm and prints out the solution as the sequence of all resulting intermediate board situation.
3. print (): print current situation of the board.
4. constructor : creates a new puzzle instance with empty solution and initial start position of all pegs.

Submission:

- Hand in your complete Java source code; and a copy of the results produced
- Upload your source code to CMS
- Demonstrate your program to TA before/on the due day

Submission:

- Hand in your complete Java source code; and a copy of the results after running your program on given file
- Upload your source code/result to CMS