

Gebze Technical University
Department of Computer Engineering
CSE 241/505
Object Oriented Programming
Fall 2019
Homework # 7
Inheritance in Java
Due date Jan 15th 2020

In this homework, you will implement a class hierarchy in Java very similar to HW5. You will design and implement a Java class hierarchy for the Board class of the NPuzzle problem. You will also write static methods to use these classes.

Your **AbstractBoard** class represents the board configuration as you did in the previous homework assignments.

| method Name | Explanation |
|-----------------------|---|
| toString | produces the board as string |
| readFromFile | Reads the board from the file given as function parameter. The file format is defined as in HW2. |
| writeToFile | Writes the board to the file given as function parameter |
| reset | Resets the board to the solution. |
| setSize | Sets the board size to given values. The values are given as parameters and there are no restrictions on the board size. The board is reset after this operation. |
| move | Makes a move according to the given char parameter. If the parameter is 'L' then the blank tiles moves left, ..., etc, as defined in HW1. |
| isSolved | Returns true if the board is a solution |
| cell | Takes two indexes and returns the corresponding cell content. Terminates program if the indexes are not valid. |
| Equals | Two boards are equal, if the boards are the same. This operator does not consider last move or the number of steps |
| NumberOfBoards | Returns the number of Board objects created so far. |
| lastMove | Returns the last move, if there is no last move, returns 'S' |
| numberOfMoves | Returns the number of steps (moves) this board made |

Many of the methods above cannot be implemented because you do not know how the board is represented in this abstract base class. You will extend 3 new concrete classes from this class that represents the boards in different ways:

- **BoardArray1D**: The Board is represented using a one dimensional Java array.
- **BoardArray2D**: The Board is represented using a two dimensional Java array.

Write a static method that takes an array of **AbstractBoard** references and returns true if the array contains a valid sequence of moves for a solution (same question of the midterm exam).

Notes:

- Use appropriate comments for JavaDoc and submit your documentation files.
- Test each method of each class at least once by writing driver code.
- Test the static method at least 5 times with different number of types of boards.
- You should submit your work to the moodle page and follow all the submission rules that will be posted.