

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.