Advanced Software Technology **ST 2015**

Prof. Gerhard Kraetzschmar Exercise Sheet 6

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$\boxed{10}$ **Exercise 10: Representing solutions for the Tiler Robot Problem I**

For this exercise, you have to write a Java class for representing solutions of the aforementioned problem.

1. Write a Java class that allows to represent solutions as MxN grid of Boolean values. We will limit M and N to 10^6 each.
2. The class should have two constructors: one for constructing MxN grids for arbitrary M and N, while the default constructor would construct 10×10 grids as in the previous exercise.
3. The constructors should initialize all tiles to be white.
4. Define methods that allow to set single tiles to black or white.
5. Define methods that check for each black block of tiles, whether it is a block according to specifications, i.e. it does not touch another block of black tiles.
6. Define methods that return the number of black tiles in rows and columns, and the overall grid.
7. Define methods that allow to check whether a rectangle blocks of tiles, minimum size 2×2, could be set to black, without overriding already black tiles, and without violating the bordering constraints.
8. Define methods that allow to set rectangle blocks of tiles, minimum size 2×2, to be black.

$\boxed{10}$ **Exercise 11: Representing solutions for the Tiler Robot Problem II**

In this exercise, we extend the capabilities for the Tiler Robot Problem. Write a Java class that allows to represent a search node. The class should have the following capabilities:

1. In an appropriately named attribute, it stores in instance of the class defined in the previous exercise.
2. It allows to store the row and column constraints.
3. It implements functionality to check the rectangle block constraints.
4. It implements functionality for checking the non-touching blocks constraints.
5. **Note:** the previous functionality should make appropriate use of the functionality implemented for the previous class.
6. The class implements functionality to check whether the constraints hold and stores the results in appropriate fields.

$\boxed{20}$ **Exercise 12: Solving the Tiler Robot Problem**

You can now write a class that implements a solver for the Tiler Robot Problem.