# SPA homework 02 **(LO2 - 2 points - 1 point for minimum level, 1 point for desired level)**

The aim of this homework is to strengthen the student's knowledge of working with linear lists.

## Introduction

Game of Life is a 0-player game devised by British mathematician John Horton Conway in 1970:

• http://en.wikipedia.org/wiki/Conway's\_Game\_of\_Life

• https://www.youtube.com/watch?v=CgOcEZinQ2I

This game consists of a series of organisms that live in their own cells in a two-dimensional world. The configuration of organisms changes in discrete moments of time, with each cell matrix it can be empty (dead) or busy (alive). A new generation of organisms in cells is formed on the basis of old generations of organisms depending on the content of eight adjacent cells of each individual cell (all outside matrices are considered dead organisms). The rules for the formation of a new generation of organisms are as follows:

1. A living organism in a cell survives in the next generation if the number of its neighbors is two or three.

2. A living organism in a cell dies in the next generation if the number of its neighbors is less than two (due to loneliness) or greater than three (due to overcrowding).

3. A new organism is born in an empty cell if there are living organisms in exactly three of its neighboring cells.

The game of life starts from the given initial configuration. In discrete moments, the next configurations of organisms are created, simultaneously applying the above rules to all previous cells configurations. This means that the transition to the next generation consists of two steps:

1. Calculate what will happen to each cell based on the above rules.

2. Apply calculated to all cells.

The game has no end.

## Your task

Your task is to make the implementation of the Game of Life. You have several options at your disposal which you need to choose one:

a) Take the finished files **program.cpp** and **game\_of\_life.h** from the attachments and build a game based on them(implement **game\_of\_life.cpp**), where you can change class members as needed. This approach uses a two-dimensional field, i.e. a field whose each element stores a new field (http://www.cplusplus.com/doc/tutorial/arrays/).

b) Like a), just delete the two-dimensional field and use the regular field instead, array <T, N> or vector <T>. In the container of the first N elements, you consider the data on the first line, the next N elements of the second line data, etc.

c) Implement the game in SFML with continuous refresh every 2 seconds. As a foundation take the project **https://github.com/gdambic/gdambic-rvs19-spa-dz-02** and the procedure is the same as on the first homework.

When initializing the game, there is a 25% chance that there will be a living organism in the cell.

Attachments:

* Executable file **Game\_of\_Life.exe** with ready-made solution (for illustration only).
* If you cannot run the executable file, **Screenshots.docx** contains several screenshots for illustration.
* **Option a - files\game\_of\_life.h**
* **Option a - files\program.cpp**

## Scoring

This homework carries a maximum of **2 points** (**1 point for minimum level, 1 point for desired level**) from learning outcome 2. A fully functional game will carry 2 points, whichever design option is chosen.

## Submission of the solution

When you’re done, put the solution on your GitHub and email your assistant with a link.