Game Programming: Exercise 2: C++ Foundation

<table>
<tr><td>Learning objectives</td><td>Use basic C++ language features (functions, classes, loops, conditionals, variables) to solve simple programming challenges
Use classes of the STL library to store data
Use C++ string objects
Handle input and output of command line programs
Use preprocessor macros</td></tr>
<tr><td>Exercise 1</td><td>Write a program that prints the date and time of which the program was compiled and the current time and date. Hint: Use C++ preprocessor macros and <ctime> header.</td></tr>
<tr><td>Exercise 2</td><td>One classic method for composing secret messages is called a square code. The spaces are removed from the English text and the characters are written into a square. For example, the sentence "If man was meant to stay on the ground god would have given us roots" is 54 characters long, so it is written into a rectangle with 8 rows (the last row is empty) and 8 columns (in total 64 fields). The size of the square is the minimum that can contain the sentence.
<table>
<tr><td>i</td><td>f</td><td>m</td><td>a</td><td>n</td><td>w</td><td>a</td><td>s</td></tr>
<tr><td>m</td><td>e</td><td>a</td><td>n</td><td>t</td><td>t</td><td>o</td><td>s</td></tr>
<tr><td>t</td><td>a</td><td>y</td><td>o</td><td>n</td><td>t</td><td>h</td><td>e</td></tr>
<tr><td>g</td><td>r</td><td>o</td><td>u</td><td>n</td><td>d</td><td>g</td><td>o</td></tr>
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The coded message is obtained by reading down the columns going left to right and skipping empty fields. For example, the message above is coded as:

imtgdvs fearwer mayoogo anouuio ntnnlvt wttddes aohghn sseoau

In your program, have the user enter a message in English with no spaces between the words. Display the encoded message. Find more examples words and their encryption in the source code.</td></tr>
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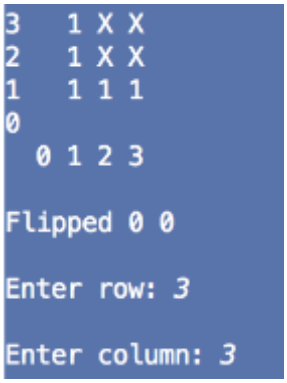
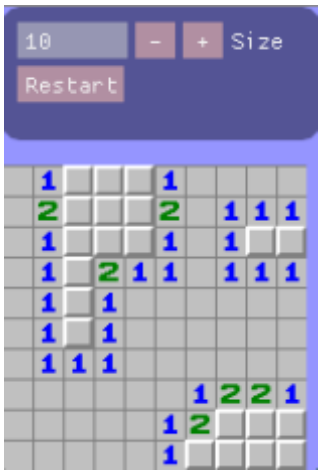
<td>Exercise 3

Console version

GUI version</td>
<td>Extend the code in exercise3/ to contain a full minesweeper game. The game must include the following features:
• Custom game size (up to 10x10)
• Choose an appropriate number of randomly positioned bombs.
• If the selected field is empty when surrounding empty fields should be uncovered
• If the user selects a bomb, then the game ends and user loose.
• If remaining hidden fields all contain bombs, then the user wins.

Hint: You can use nested vectors to store a dynamic two-dimensional array.

You only need to modify MineSweeper.cpp and MineSweeper.hpp. Existing member functions in the header must not be changed, but you should add additional member functions and fields.

You must create a CMake script for two different configurations of the game:
• Console version (uses the main.cpp and MineSweeper.cpp)
• GUI version (uses main_gui.cpp and MineSweeper.cpp). This version must link to dependent libraries in SimpleRenderEngineProject (use existing project files as inspiration)

The result should be similar to this:
https://www.itu.dk/~mnob/minesweeper/MineSweeperGUI.html</td>
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<td>Exercise 4
(Optional)</td>
<td>Extend the MineSweeper gui game in the following ways:

• When the user hit a mine, all mine should be displayed
• Right-click flags elements as potential mines. This should prevent the user from selecting the elements until the flag is removed by another right-click.

This requires that modifications to main_gui.cpp</td>
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