Sudoku solver

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1 Algorithm

In the beginning program asks for name of a file that contains sudoku grid. Program searches for files in subdirectories. Program copies sudoku table as follows:

- if field is empty program creates set of values from 1 to 9
- if field has value program creates one element set.

When program copy all the data it starts to delete values in sets, which are incorrect and checks if field is empty. In case of empty field program aborts solving the sudoku grid and goes to the next one.

2 Input data

In the beginning program asks for name of a file in which is sudoku. If the name is not given program searches for ”nierozwiazane-sudoku”.
Program requires file that contains sudoku grid in exact format: only empty lines and pairs of number and commas. Program reads only 18 first characters and checks if they are similar to pattern. For example:

```
1,2,3,0,0,0,5,0,0,1,2,3,4,5,

7,
```

What is equivalent of:

1	2	3				5		
7								

3 Class and methods

Program uses class sudoku_board which contains methods and objects as follows:

- board_sudoku(std::string)
  Constructor creates the class object depending on path given to file as argument.

- int counter()
  Returns sum of numbers in std::set's in m_board. It is being used to check if sudoku has only one solution.

- void solve()
  Sudoku's solving method.

- void print()
  Prints actual sudoku

- bool issolved()
  Checks if sudoku is arleady solved

- void clearRows(size_t column, size_t row)
  Clears values in map that can't occur in the specific sudoku's row.

- void clearColumns(size_t column, size_t row)
  Clears values in map that can't occur in the specific sudoku's column.

- void clearBox(size_t column, size_t row)
  Clears values in map(3x3 box) that can't occur in the specific sudoku's box.

- void onlyOneColumn(bool &flag, bool &goOutOfLoop, size_t column, size_t row, size_t p)
  Checks if there is only one possibility of putting number in the column.

- void onlyOneRow(bool &flag, bool &goOutOfLoop, size_t column, size_t row, size_t p)
  Checks if there is only one possibility of putting number in the row.

- void onlyOneBox(bool &flag, bool &goOutOfLoop, size_t column, size_t row, size_t p)
  Checks if there is only one possibility of putting number in the box.

- void insertElement(bool &goOutOfLoop, size_t row, size_t column, size_t p)
  Puts element into the field.

- Board m_board std::vector <std::vector<std::set < size_t > >
  Private object, contains elements of sudoku grid.

4 Tests

Valgrind tests proves that there are no memory leaks and in case of inappropriate sudoku program stops solving the sudoku.