Users' Manual

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Goal of Program

The program aims to realize the popular game "minesweeper" in terminal. The only input will come from the keyboard and the output is displayed in terminal. You can choose the size of the minefield as well as the number of mines. There are four basic operations during the game, sweep, flag, de-flag and expand.

You should use those four operations and based on logic, to deduce and reveal all the coordinates that are free of mine.

Building Requirements

1. Operating system should be Mac OS.
2. The "gcc compiler" must be implemented on your Mac OS. (To check this, type "gcc -v" into your terminal)

Build Guides

1. There should be four source files put in the same folder:
   - main.c
   - game.c
   - game.h
   - makefile
2. Open the terminal, change directory to the folder contains these four source files. Type in "make" then hit enter. Type in "./output" then hit enter.

```
[LdeMacBook-Pro:~ lz$ cd Desktop/minesweeper/Minesweeper1.1
[LdeMacBook-Pro:Minesweeper1.1 lz$ make
gcc -c main.c
gcc -c game.c
gcc main.o game.o -o output
[LdeMacBook-Pro:Minesweeper1.1 lz$ ./output
```

   (In the above case, all source files are saved in Minesweeper1.1 folder under minesweeper on the Desktop)
3. Program should start to run as the following.

```
--Hello, We HAVE NOT Met SINCE THE EXISTENCE OF THE UNIVERSE!
                : ) ) )



   Do you want to start a new game?


       1--START :)     0--QUIT :(
```

   (* After your first run, an extra "time.txt" file should appear in your source folder, do not delete it.)

Controls of Game

(You should always enter the number corresponding to the operation you want and hit enter to progress.)

- You can choose whether or not to start a new game in the beginning of the run as well as the end of each game. Enter 1 to start and 0 to quit.
- If you chooses to start, you will be asked to enter the size of the field (width & height) and the number of mines according to your own desire. (The number of mines should be approximately 7% at minimum of the product of width and height and should not exceed the product of width and height.)
- A mine field will be generated at this point. You will be asked to enter the first coordinate to sweep.
- From then on, you have four options to choose from until the end of the game.
    1. Sweep
       This is to reveal the covered mine.
        - ➔ If the chosen coordinate contains a mine, gameover.
        - ➔ If the chosen coordinate does not contain a mine, and if there are mines under its direct neighbours, the chosen coordinate will show the number of mines surrounding it. (maximum 8)
        - ➔ If the chosen coordinate does not contain a mine, and if there is no mine under its direct neighbours, the coordinate will show nothing and there will be an automatic expansion (the neighbours will also go through "sweep" until a coordinate with numbers shown is reached).
    2. Flag
       This is for the you to mark the coordinate where a possible mine lay beneath it. The number of flags and the correct placement of flags will not affect the end of game.
    3. De-flag
       This is for the you to cancel a set flag.
    4. Expand
       This is a shortcut for the you to sweep at once all the eight coordinates (except the flagged ones) around the chosen coordinate.
- Enter the coordinate of the element you want, you can make progress of the game.
- The game will end either you sweeps a mine (fail) of you reveals all the mine free coordinates (succeed).
- In case the game ended, you will be asked again whether to start a new game.

Features

1. You can see your last logging time at the beginning of run after your first run.
2. During the game, you can check the "remaining" number of mines(total number of mines – your flags) which is displayed under the mine field. (*This number does not show whether your flags were put into the right place.)
3. At the end of the game, you will be informed the time consumption of your previous game.
4. You can determine the coordinate using the x/y-axis along the field.

Warnings

- In the following situation, you will hear a warning sound and you will get a hint from the computer to manipulate your entry to a valid one.
    1. You have entered too much or too few mines based on your desire field size.
    2. You have entered a coordinate that is not in the scope of the field.
- In the following cases, you will hear a warning sound and no operation will take place according to your invalid entry.
    1. You chose to flag, but you select a coordinate which has been revealed or has been flagged.
    2. You chose to de-flag, but you select a coordinate which has not been flagged.
    3. You chose to expand, but you select a coordinate which has not been revealed.