Object Oriented Programming

## Spring 2022 (CS-A, CS-B)

Term Project

Submission Date: *Thursday June 1, 2022*

In this project you will implement the game "Minesweeper". Students will work in groups of size 2.

Game Introduction

Minesweeper is a single player puzzle game. The game has a board comprises of a grid of cells. Each cell either has a mine or a number. The number in the cell tells the number of mines in the neighboring cells. All cells are initially hidden. The objective of the game is to expose all the cells that does not contain any mine. The game has three levels: easy, medium and hard with sizes 9*9, 16*16 and 30*16 respectively. Below are screen shots of the game.

Easy

Intermediate

advance
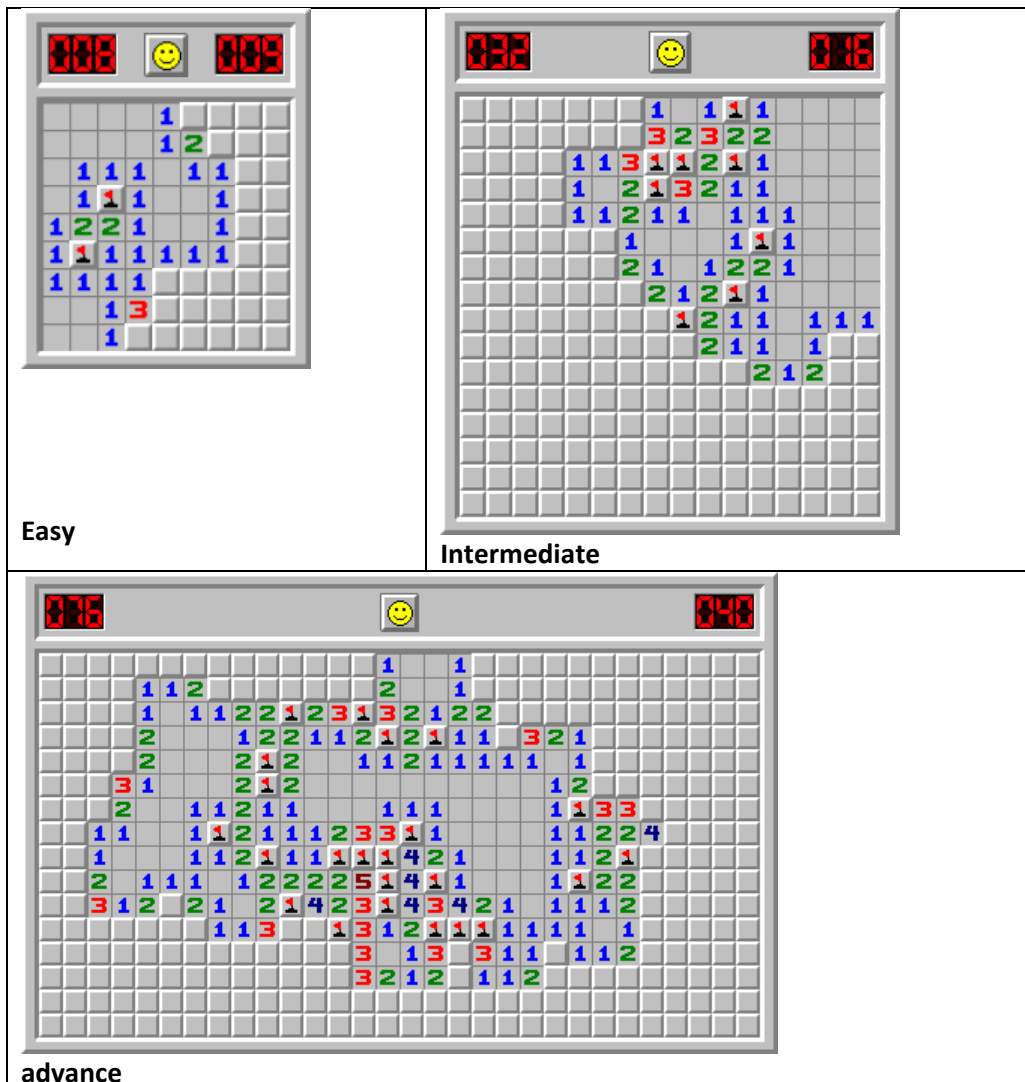
Minesweeper rules are very simple. Initially fixed number of mines are randomly distributed in cells. To win, the player need to open/expose all the non-mine cells. Player will lose the game if a mine is exposed. The number on a cell shows the number of mines adjacent to it. If a cell has zero number of mines adjacent to it then all its neighboring cells will also be exposed. Using this information, you can determine cells that are safe, and cells that contain mines. Cells suspected of being mines can be marked with a flag using the right mouse button. The left side display shows the number of remaining mines and the right side display is the timer. Top five players for each difficulty level are maintained

Programming Task

You have to implement a clone of minesweeper game using C++ and OOP principals (inheritance and polymorphism etc). At the start of the game ask the player to select a difficulty level and then randomly select cells to assign mines to those cells (10 mines in easy, 40 mines in intermediate and 99 mines in the advance level). Display the board, number of mines and timer to the player/user. Take input from the user as r, c, m where r is the row and column number of the cell and m is either L or R for left or right click. If click is left then expose the cell. Otherwise flag the cell and decrement the total number of mines. A cell which is already flagged can't be exposed. If a cell is a mine then expose all mine cells, stop the timer and end the game. If cell is a positive number just display the number. If cell is a zero number then expose all its adjacent cells. If one or more adjacent cells is a zero then expose their adjacent cells and so on. At the start timer is zero and must be incremented after every second. Display the updated game whenever times is updated or board is changed.

If a player wins, stop the timer and check if the finish is one of the best times or not. If yes then input the name of the user and update the top five player list for that difficulty level. You have to write these records in a separate file.

Bonus Task:

You can implement this game using a graphics library (like openGL) with proper window interface and mouse handling.