Vincent Zhang
U4 Summative Stage 2 Feasibility Document
August 13, 2023

FEASIBILITY DOCUMENT

PROBLEM DEFINITION:

The project will be a recreation of the logic game "Minesweeper", first developed and released by Microsoft in the 1990s. The object of the game is to "flag" all "mines" on a square tile grid, where the labels on individual tiles indicate how many mines are adjacent to that square. For instance, if a certain square is labelled 1, there is 1 mine in any of the 8 squares surrounding that individual tile; if a certain square is labelled 2, there are 2 mines in any of the 8 squares surrounding that tile; and so on. If there are no labels on a square, either there are no mines adjacent to that tile, or the tile has not been discovered yet. Thus, the information allows the user to deduce the location of all mines on the game board.

PROBLEM ANALYSIS:

1. Hardware / Software Requirements and Integration: most modern computing devices should be able to handle the execution of the program; it should not require heavy computations. However, the user must have a Java Compiler installed on their machine.
2. User Training: due to the simplicity of the game, a brief introduction to the game that is accessible on a side menu of sorts will be sufficient for the user to understand the game in a reasonably short time period.
3. Recommended Age: due to the simplicity of the game, there should be no age restrictions on the accessibility of the program. However, the "mines" may be suggestive of violence and precaution should be taken to warn the user of potential negative influence on the minds of younger users.
4. Time Constraints: the project must be completed within 2 weeks.

SOFTWARE PROJECT PLAN

1. Statement of Work
    a. Subtasks:
        i. Graphical User Interface Design (minimalistic and clean): *See below*
        ii. Implementation of Features (front-end design):
            1. Customize board size and mine density through a JFrame drop-down menu

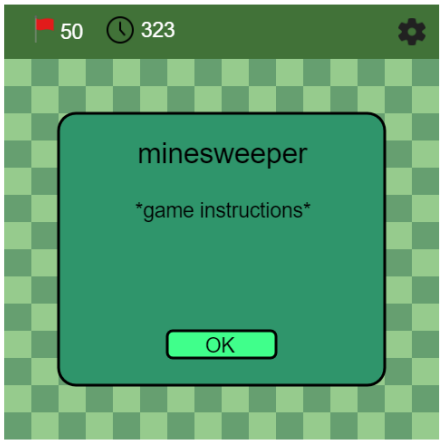
2. Access game information, such as game instructions, from a JFrame side-menu
3. View count-down timer or regular timer to keep track of user performance
4. Save current game data to an external storage file to be accessed at a later point in time
5. Full screen application

iii. Back-end algorithm design (*See below)*

1. Game board generation and mine placement using random number-generating algorithms from the Java Random library
2. Algorithm to label all tiles according to the number of adjacent tiles possessing mines (may consider recursion)
3. Algorithm to translate game board information from a 2 dimensional parallel array into an XML file.
4. Algorithm to translate contents of the XML file into the graphical game board
5. Algorithm to set application window size depending on the size of the grid

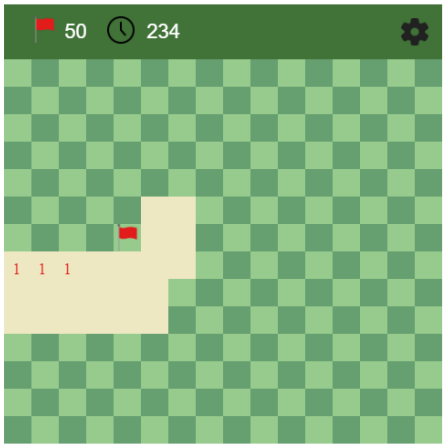
Graphical User Interface Concept Sketches:

2. Welcome screen (including some "Continue previous round?" prompt)



3. Settings menu

4. Game board



Algorithm Concept Designs:

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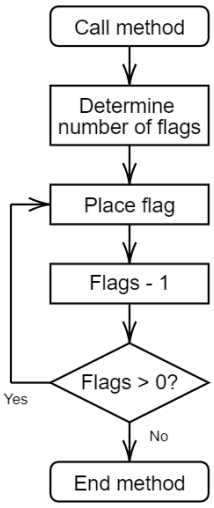
1. Board Generator:



2. Assigning numeric values to tiles (in pseudocode)

```
For each tile on the board:
    If tile == -1 (has a mine)
        Each adjacent tile += 1
```

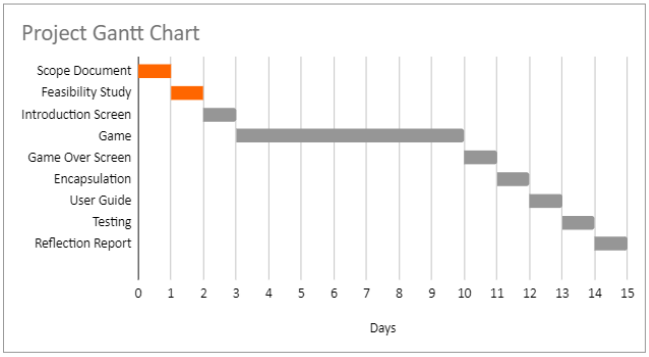
3. Displaying tiles recursively (in pseudocode)

```
Function uncoverTile(tile coordinates):
    Set tile state to uncovered
    For each adjacent tile:
        If adjacent tile is not uncovered && is not a mine:
            uncoverTile(tile coordinates)
```

5. List of Resources
    a. OVS ICS4U video lectures and documents

6. Work Breakdown and Project Schedule

SubTask	Start Time	Length of Task (days)	Progress %
Scope Document	0	1	100
Feasibility Study	1	1	100
Introduction Screen	2	1	0
Game	3	7	0
Game Over Screen	10	1	0
Encapsulation	11	1	0
User Guide	12	1	0
Testing	13	1	0
Reflection Report	14	1	0



Project planned date of completion: August 23, 2023

7. Risk Plan
    a. Project Management discovers that the algorithm implementation is too difficult:
        i. Extend the project deadline
        ii. Contact more experienced software developers
    b. The lead software developer becomes suddenly and unexpectedly ill:
        i. Extend the project deadline