**Minesweeper requirements analysis**

**GENERAL REQUIREMENTS**

Minesweeper is a single player video game. The objective of the game is to clear a rectangular tile grid that contains hidden bombs without setting any of them off. Additionally, there will be a timer which the user will be racing against. Once the player has handled each of the tiles within the allotted time then the game has been won.

The Minesweeper game must be developed using the Java language v8.0 and execute on the Java 8 runtime environment. The game’s GUI must be developed using the JavaFX GUI framework.

**PHASE 1 REQUIREMENTS**

The core game logic will be housed in the “minesweeper” class and expose a public API for a possible GUI client. There shall be a “*marktile*” method that accepts a row, col, and tile value. Invalid row and col values will be ignored. A tile that is opened will stay opened. Tiles marked as a flag cannot be opened. Additionally, tile values can only be changed when a game is in progress. If a tile is marked opened and does not contain a clue or a main, then the method must be continually invoked until all adjacent tiles are opened under the same conditions. Game status is updated after every opened tile. There shall be a “*getBoard*” method that will return a character representing the tile at the requested index. If the game is in progress return ‘1’-’8’ for clue values, a blank if opened, ‘X’ if closed, ‘?’ if marked question, ‘F’ if flagged, and ‘\*’ if a mine. If the game is over, return ‘-’ for incorrectly flagged mines, a ‘!’ for the mine that ended the game, and ‘F’ if game is won.

**PHASE 2 REQUIREMENTS**

On initial launch the game will display a window that will contain a menu bar at the top of the window. The menu bar will contain two menu items: “File” and “Level”. The File menu will have two possible selections: “New” and “Quit”. Selecting “New” will start a new game. Selecting “Quit” will close the window and exit the application. The Level menu will contain three possible level difficulties: “Beginner”, “Intermediate”, and “Expert”. The beginner level is a 9x9 tile grid, intermediate is 16x16, and expert is 24x24. Since the size of the grid changes with the difficulty it is important that the window resize itself to accommodate the size of the game tile grid.

Once the game has begun the following will be displayed within the window: the existing menu bar as stated as above, a brief line of text describing the input methods (left click opens a tile, middle click question-marks a tile, and right-click flags a tile), the game status, the appropriately sized game tile grid, and a countdown timer at the bottom. The timer will be displayed in minutes and have text that states, “Time’s up in N minutes…”. The available time is based off of the difficulty setting: beginners are alloted 5 minutes, intermediate 10 minutes, and expert players 15 minutes.

The game tiles will all be in an initial state of “closed” and will not have a graphic. When a player clicks on a tile then the tile contents will be revealed: either a bomb (thus losing the game), a hint (to be explained), or an empty tile. If an empty tile is opened then the game must continue to reveal any adjacent tiles that are also empty. Hints are also revealed for adjacent tiles to the empty tile. Hints indicate how many bombs are adjacent to this particular tile and are represented as a number value of 1 to 8 inclusive (an individual tile could conceivably have 3 bombs above and below, and 2 on each side -- 3+3+2 = 8. A player may also mark a tile as a question mark (middle click) or flag a tile as a suspected bomb (right click). It is okay for a player to change a flag to a question mark then open it.

If a player clicks on a tile that is a bomb then the game is lost. The game board will reveal all existing bombs, as well as indicate if any tiles were mis-marked as a bomb with a red “X” overlayed on the bomb graphic. In order for the player to win the game, all times must be in an opened state (question marked tiles are still considered a closed state) and any flagged tiles must be contain a bomb.