

Computer Science 3620

Assignment 3 - Due Tuesday April 14th @11:55pm

NOTE: You can work in teams of 2 students.

Overview

This assignment is about developing a design for the game **minesweeper**. You can find an online version of the game at: minesweeper.online. Other versions are either included with, or downloadable for, all common OS platforms (including mobile platforms).

Game Play

The game is played by revealing squares of the grid by clicking each square. If a square containing a mine is revealed, the player loses the game. If no mine is revealed, a digit is displayed in the square, indicating how many adjacent squares contain mines; if no mines are adjacent, the square becomes blank, and all adjacent squares will be recursively revealed. The player uses this information to deduce the contents of other squares, and may either safely reveal each square or flag the square as containing a mine (e.g. right click to place a flag).



Assume there is also a "high scores" screen that lists the user's highest scores.

The Task

The assignment is about design patterns (you're not being asked to implement your proposal). You'll probably first want to develop a design without much attention paid to particular design patterns. Then, as a second round, analyze your design to

see how it could be improved by using design patterns. You should be thinking about expansion, flexibility, reusability, and so on. You should assume that, in the future, your game would evolve: someone could add new rules, or define new game objects (e.g. monster types or rewards), or want to use another type of user-interface (e.g. text-based, an interface for blind people, etc.), or port the game to a mobile device, or add new two-player mode, or ... While you are not expected to model these things for this assignment, you are expected to think about these and make design decisions that lead to a product that is as maintainable and reusable as possible.

Starting point

- Review the design principles we covered
- Start by thinking in small objects: each field (square) might be an object. You might have subclasses for types of fields (mined fields, safe fields), you might have classes for the different kinds of covers (plain cover, question mark cover, flag cover)
- Think about user operations/commands (movement, selection, flagging)
- Distinguish between visual things and domain specific things (e.g. what concepts would remain if the game was run with a different user interface)
- If you are uncertain whether you should include a particular pattern, include it and document in the drawbacks what makes you doubt if the design pattern is really appropriate.

Deliverables

You are not required to implement your design. That is, no code is required (of course it would be a lot of “fun” to do that). Instead, the deliverable is a PDF design document that will be graded on design soundness, presentation, and clarity. It must include the following:

1. Model of the minesweeper:

Submit a class diagram showing essential classes, associations (with arrows labelled), important attributes, and important operations available to other classes. Add descriptions, external narrative, etc. where necessary to make the diagram easily understandable.

2. Description of design patterns (you should use at least 3):

For each design pattern you used:

- a. Provide a UML diagram to show how you used the pattern. Also write a short textual description explaining how you used the pattern.
- b. List the advantages of using the pattern (e.g., "gives clean solution to...", "enhances maintainability because..."). This should also describe the problem you have solved by using the pattern and the positive consequences of using the pattern.
- c. List drawbacks and negative consequences of using the pattern (e.g., "overkill in this situation").

If you find/use more than three patterns, then document the most interesting three in above manner, and just list the other ones with very short descriptions.

Submission Guidelines:

Submit your assignment as a single pdf file through the Moodle link provided. Use the following naming format for your pdf file:

Student1Name_Student2Name_as3.pdf

The pdf should also include the name of the participants.