Homework 3: Software Design Patterns

Objective:
- o To understand and use the software design patterns.

Due Date: Thursday 26ᵗʰ November, 11:59pm (5% per day will be applied on late submissions).

Upload on iLearn:
- one clear and organized solution document (following the solution template provided).
- The Java files.

Hogwarts School of Witchcraft and Wizardry

A wizarding war is taking place in Hogwarts as Voldemort and his Death Eaters invade the school. The player needs to find Hermione, who is hiding in the library, in 5 minutes, before Voldemort finds him. The player uses the Marauder's map to find her and looks in 3 locations: Dining Hall, Potions Classroom and Library. Before finding Hermione, the player must make a potion in the Potions Classroom to prevent anyone from recognizing or seeing them while they make their way out. In each location, the player faces Death Eaters that s/he has to fight to proceed.

Image Source

Requirements:
- There are four spells that the player can cast when fighting:
  - o *Expelliarmus*: disarms the weapon from the enemy
  - o *Stupefy*: stuns the opponent
  - o *Protego*: protects the caster with an invisible shield
  - o *Expecto Patronum*: used for protection against dark magic
- The player fights the following Death Eaters:
  - o In the Dining Hall, the player fights Bellatrix Lestrange.
  - o In the Potions Classroom, the player fights Professor Snape.
  - o In the Library, the player fights Draco Malfoy.
- Once the player defeats Professor Snape in the Potions Classroom, the player must make 2 flasks of either the Polyjuice potion (the change appearance potion) or the Invisibility potion, one for him/herself and one for Hermione. The potions are made as follows:
  - o Polyjuice potion:
    1. Add fluxweed and lacewings in cauldron
    2. Stir 4 times clockwise
    3. Heat at high temperature
    4. Wave wand to complete the brewing process
  - o Invisibility potion:
    1. Add cherries and spiders in cauldron
    2. Stir 3 times anticlockwise
    3. Heat at high temperature
- The player enters in the console "make *<potion_name>*" which executes the brewing process and prints its preparation (*see sample output on page 3*).

- The same requirements from before apply:
  - The game starts when the player types "*I solemnly swear that I am up for no good*" and ends when s/he types "*mischief managed*".
  - When 5 minutes pass, the timer should update a flag that time is up and warn the player to hide the map contents.
  - Hermione continuously observes the player's location and if s/he walks into the Library with the two potion flasks, Hermione should shout out "I am here!".
  - The player should hide the map contents if s/he finds Hermione before time is up.
  - If time is up before the player finds Hermione, s/he has 10 seconds to hide the map. If the player doesn't hide it in time, the game should print that the player was caught and the Marauder's map was confiscated. The game will then end.
  - Edit the locations' descriptions and characters' speech to show the conversation between the player and the villains when s/he enters a location.

Assignment:
  a. State how the software design patterns can be used to implement the game.
  b. Implement the game using suitable software design patterns.
  c. Show sample input/output going through all locations and covering both cases; finding Hermione before time is up and getting caught.

Note: Feel free to refactor your previous homework solutions.

Sample Output:

"Messrs Moony, Wormtail, Padfoot and Prongs Purveyors of Aids to magical Mischief-Makers are proud to present THE MARAUDER'S MAP"

Say the magic phrase to reveal the map.

> I solemnly swear that I am up for no good

The Entrance

You arrive at the doors of Hogwarts. The door on the north wall leads to the dining hall, the door to the east leads to the Potions class, and the door to the west leads to the Library.

>walk north

You have entered the dining hall.

>look around

The dining hall is the biggest open area inside Hogwarts. Bellatrix Lestrange is here, get ready to fight!

1 minute passed, you have 2 minutes left...

>Expelliarmus

You defeated Bellatrix! The door on the east leads to the Potions Classroom.

>walk east

You have entered the Potions Classroom.

>look around

Potions is one of the core subjects that first year students are required to study. In the potions class there is Professor Snape who teaches the subject. He does not seem very happy to see you and starts attacking you!

>Protego

You saved yourself…now you can now use the cauldron and ingredients to make the Polyjuice potion or the invisibility potion to proceed without anyone recognizing you…

>make Polyjuice potion

Adding fluxweed and lacewings in cauldron…

Stirring 4 times clockwise…

Heating at a high temperature…

Waving hand to complete brewing…

Potion is ready!

You now have 1 flasks of Polyjuice

>make Polyjuice potion

Adding fluxweed and lacewings in cauldron…

Stirring 4 times clockwise…

Heating at a high temperature…

Waving hand to complete brewing…

Potion is ready!

You now have 2 flasks of Polyjuice

3 minutes passed...Hide map contents before you get caught!

>mischief managed

Hiding map contents...end.