The Triwizard Maze

Author: Shambhavi Srinivasa (sham.ucalgary@gmail.com)

Concepts to be applied for the problem:

1) Inheritance
2) Software reuse

Program Specification:

Introduction

The Triwizard Tournament is a magical contest held between the three largest wizarding schools of Europe: Hogwarts School of Witchcraft and Wizardry, Durmstrang Institute, and the Beauxbatons Academy of Magic. The first Tournament was held in approximately 1294, with each of the three schools being represented by one Champion apiece. Selected Champions compete in three tasks designed to test magical ability, intelligence and courage, traditionally judged by the Headmasters or Headmistresses of the competing schools. Champions compete for the honour and glory of winning the Tournament, and the prize for the victor is the Triwizard Cup and a monetary prize.

The 2009 Triwizard tournament was different because of the fact that it has four competeting champions : Harry Potter, a wizard whose name was chosen by the Goblet of Fire despite being under-aged and no one nominating his name.

Two tasks have been completed and Harry has braved his way through them emerging at the top. Harry is faced with the third and final task: Making his way through the treacherous Triwizard maze at the end of which lies the Triwizard cup and the glory of victory.

Game description

1) Starting – Harry starts at the beginning of the maze (0,0). He needs to strategically make his way to the other corner of the maze where the Triwizard cup is located. In order to help him in his quest, he is awarded:

- 100 health points
- An attack index of 10 which signifies that Harry can attack his adversary causing a damage of 10 to the health of the adversary.
- A defence index of 10. This defence index can increase in increments of 10 whenever Harry picks up a Shield. The amount of attack by an adversary towards Harry will be scaled by the defence index once Harry picks up the Shields.
- 20 spell points which Harry can use to cast spells against his adversaries. Depending upon the type of adversary, he will be able to either charm them or blind them. He will be able to increase his spell points by picking up Scrolls.

2) Adversaries – On his way through the maze Harry may encounter adversaries who are randomly patrolling the maze. These adversaries are of varying degree of "badness". Depending upon their "badness" quotient, they also come with an attack index and a defence index. Of course Harry has some amount of defence available to him.

Name	DoB*	Attack Index	Defence Index	Defence
Boggart	2	10	10	Attack + Charm + Blind
Blast-ended Skrewts	6	20	15	Attack + Charm But no Blind
Dementors	9	25	20	Only Attack

*DoB – Degree of Badness 1-3: Not so bad; 4-7: Quite bad; 8-10: Really really bad

All adversaries start with 100 health points.

3) Defence – While threading through the maze, Harry can defend himself against his adversaries using his own attack index and spell points. Each time Harry casts spell, his spell points are decremented by 10. Depending upon the type of adversary, Harry can cast the following spells:

1) Charm – Charming an adversary would disable its attack capability for some amount of time.
2) Blind – Blinding an adversary would disable its attack capability as well as make it immobile for some amount of time.

The time for which these spells will be effective depends upon the degree of badness. The more the degree of badness, the less amount of time they will be effective.

4) Artefacts – Harry can pick up various artefacts which add to his health, defence index, attack index as well as to his spell points. The following are the artefacts available:

Name	Benefit
Health artefact	+10 Health points
Shield artefact	+10 Defence index
Scroll artefact	+10 Spell points
Sword artefact	+5 Attack index

5) Movement and Attack – Harry is allowed to move to his adjacent sectors. Hence, he needs to strategically inch his way through the maze. He can pick up an artefact by moving directly onto the sector in which the object is present. When he is adjacent to an adversary, he will be attacked and he can choose to attack as well by using the menu.

```
MOVEMENT MENU: OPTIONS
7 8 9
4   6
1 2 3
To quit the game, enter a negative value.
Choice:
```

6) How the game ends – Harry wins if he reaches the Triwizard Cup at the end of the maze. A game may also end if in the unfortunate scenario Harry loses all this health and dies.

7) The maze – The maze will look something like this:

```
 0 1 2 3 4 5 6 7 8 9
  - - - - - - - - - -
0|H| | | | | | | | | |
  - - - - - - - - - -
1| | | | | | | | | | |
  - - - - - - - - - -
2|¥| |D| | |§| |§| | |
  - - - - - - - - - -
3| |+| | | | | |B| | |
  - - - - - - - - - -
4| |B| | |S| | |¥| | |
  - - - - - - - - - -
5| | |©| | | |+|§| | |
  - - - - - - - - - -
6| | | |©| | |D|S| | |
  - - - - - - - - - -
7| | | | |B|+|¥| | | |
  - - - - - - - - - -
8| | | | | | | | |S| |
  - - - - - - - - - -
9| | | | | | | |©| |¤|
  - - - - - - - - - -
```

You can correctly interpret it using the following symbol table:

Symbol	Interpretation
H	Harry Potter (That's you!)
B	Boggart
S	Blast-ended Skrewt
D	Dementor
+	Health artefact
§	Sword artefact
©	Shield artefact
¥	Scroll artefact
¤	Triwizard cup (End of the maze)

Your mission for this assignment:

You are to implement the Triwizard maze keeping in mind the above specifications. Of course you will need to use the concept of "Inheritance" in your implementation. Your program should include the following classes:

- GameBaseObject: This class should be the base class for any object to be represented in the maze. It should be extended for any game character or artefact to be represented in the maze.
- GameCharacter: This will act as the parent class for all the game characters. It will have the attributes and methods that are common to all the game characters.
- Adversary: This will be a child class of the class GameCharacter and will common functionality that are shared by all the adversaries.
- Artefact: This will act as the parent class for all the artefacts and will have their common functionality.
- TriwizardMaze: This class initializes the TriWizard maze. It also has methods for refreshing, clearing as well displaying the maze.
- CommandProcessor: This class essentially processes the "move" made by the opponent as well as Harry and responds accordingly. This has the combat mode defined in it. It also has methods for general display of menus, getting input for menu choice and checking if the character can in fact make the move on the sector.
- GameThread: This will contain the main method and its functionality is confined to only this along with declaring a few class instances.

Your program should extend the Adversary class to define Boggart, BlastEndedSkrewt and Dementors. Similarly the base class Artefact should be extended to model the Sword, Shield, Scroll and the Health artefacts.

Your implementation should follow good software design principles including:

- Ease of use and understanding
- Good documentation
- Reasonable error handling

- A visual interface for the game play

Submitting your work:

You don't need to submit your work! It's just a practise assignment for you get an idea of how the concept of Inheritance works and delve deeper into the Object Oriented programming. You are expected to read the program specifications, come up with an overall design for your program. One possible solution is already provided to you in the form of a UML diagram. Going ahead with coding this assignment with your own solution in mind is highly recommended as it will give you a clearer idea of many concepts and its just plain fun.

Resources for background information:

1) http://harrypotter.wikia.com/wiki/Triwizard_Tournament