PTSD Final Project: Collectible Card Video Game

This final project for PTSD will require you to use most of the knowledge and skills you gained from PTSD. For this project, you will need to develop a collectible card video game. The game will be single player and will allow the player to:

- Randomly generate cards/decks
- Export the generated decks
- Play the game
- Save a history of the game (which cards were played, etc…)

A small part of the project will be in C, while the majority of the project will be in Java.

Figure 1: Example of Collectible Card Video Game. Pictures may differ from the actual final project.

You will have a lot of freedom in terms of implementation and design choices. Your final grade will depend on:

1. **The number of features you implemented in your project**
2. **The quality of the code, including:**
    a. **Comments**
    b. **Graphical Interface**
    c. **Correct use of packages and class hierarchy**
    d. **Correct use of visibility in Java (private/protected/public/package)**
    e. **Correct use of static in Java**
    f. **Synchronization between threads**
    g. **Memory management for the C part**
3. **The "fun" factor of your game. This part will be a small portion of your final grade (5 points). Programming well is important, having a readable code is nice but having a resulting program that is fun to use is also crucial. The fun factor is by essence entirely subjective.**

The project is divided in two programs. A program in C to create a deck, and the main program, in Java that will allow you to play the game.

I. General Principle

Collectible Cards Video Games are a computer adaptation of Collectible Card Games. An example of CCVG is Hearthstone (https://en.wikipedia.org/wiki/Hearthstone:_Heroes_of_Warcraft), and a good example of CCG is Magic (https://en.wikipedia.org/wiki/Magic:_The_Gathering). Such games are played as one player versus one player. Each player builds a deck of N cards (let us say N=30 for this project). Each card is either a creature or a spell. A creature is a monster that will fight for the player that invoked it. A spell can alter a creature, deal damage to a target or heal a target.

One player starts the game with three random cards taken from their deck. During their turn, they may play one or multiple cards from their hand, providing they have enough resource to do so. At the beginning of their turn, the resources available for one player are reset and the player draws a card from their deck. In this project, we will use a concept similar to the one in Hearthstone: players have 1 available resource in turn 1, 2 on turn 2, 3 on turn 3 and 10 on turn 10 onwards.

Each player starts with 30 health points (HP). The goal of the game is to reduce the amount of HP of the enemy player to 0 or less. Players can have up to 10 cards in their hand. Should they draw a new card, this card would be lost and thus removed from the deck.

A game also may end if one player's deck is empty and they are unable to draw a card at the beginning of a turn. The losing player in that case is the player with the least amount of HP.

II. Spells vs Creature

Any deck will contain a combination of creatures and spells. Both spells and creature have a cost in terms of resource (between 1 and 10). Whenever a creature card is played, the creature appears on the board but is not able to attack until the beginning of the player's next turn. Each creature has an attack score as well as HP (hit points). The creatures are shown on the board (see Figure 1). Each player can only have a maximum of 7 creatures on the board. Creatures may attack any enemy creature of the enemy hero.

Spells are cards that produce an immediate effect. They can even alter a creature (change either its attack or HP), heal a character (creature or hero) or deal damage to a creature or hero.

III. Creating random cards and a deck (C part)

This part will count for 15 points. The C program will basically generate a file (you choose the format) that will be a description of both the player's and their enemy's deck. Each deck contains exactly 30 cards. Each card can be either a spell or a creature.

You may generate cards with the following simple rules:

A. Generating a creature

A creature has a resource cost of 1 to 10. A 1-cost creature usually has 3 stats points that can be distributed between attack and HP (2 attack and 1 HP or 1 attack and 2 HP). The general number of stats point for a x-cost creature is 2x + 1.

B. Generating a spell

A spell that damages a creature can produce 1.5 damage per resource used (rounded down). A 1 resource spell can thus do up to 1 damage, a 2 resource can do up to 3, etc…

Healing spell follow the same pattern, except such a card can heal up to 2.5 HP per resource.

You are free to generate each deck the way you want with any rules you want (from fully random, to following a specific resource curve, etc…).

IV. The game program (Java part)

After the program starts, it should offer the following choices:

- Load decks from a file
- Exit

The main interface will display the current game (similarly to Figure 1). You need to be able to show:

1. All the cards from the player's hand
2. The amount of resources (available and total)
3. The player's health
4. The board (own creatures at the bottom, enemy's creatures on top)
5. The enemy's health
6. The number of cards in the enemy's hand
7. The amount of resources of the enemy (available and total)