CS611 Legends: Monsters and Heroes Fall 2020

This assignment is to implement a role playing game in Java using Object Oriented principles and design. This is a magical game full of spells, heroes and monsters.

The heroes and monsters live in a world represented by a square grid of fixed dimensions. This world has three types of places to be; Common space (either a safe zone or where heroes come across monsters and fight), Inaccessible (places the heroes can't go), and Markets (where items are bought and sold). The heroes and monsters do not get along and therefore fight each other. Heroes can use weapons, armors, potions, and spells against the monsters. Every time the heroes win, they gain some experience and some money. When they accumulate enough experience they level up which means that their skills become stronger. The goal of the game is for the heroes to gain experience and level up indefinitely.

I. The Market

There are markets where the heroes can buy and sell weapons, armors, spells and potions:

- A weapon can be used by a hero to attack a monster. A weapon has a name, a price and a minimum hero level required to be used by a hero. It has a specific amount of damage that it can inflict, and it may require one or two hands to be used (i.e. as you may imagine a bow requires two hands). (For simplicity you can assume that a hero can hold at most one weapon at a time).
- An armor, which when worn by a hero, reduces the incoming damage from enemy's attacks. An armor has a price, a name and a minimum hero level as a requirement to be used.
- A potion can be used by a hero in order to increase one of their statistics by some amount. Potions are single-use items which means that once they are used they cannot be reused. Potions as well have a price, a name and a minimum hero level as a requirement to be used. You can assume for simplicity that the level requirement is enforced during the purchase (i.e. when a hero tries to buy an item with a level requirement bigger than their level they get rejected by the market).
- A spell represents a magic attack and can be executed by a hero. A spell has a name, a price and a minimum hero level required to be used by a hero. A spell has a damage range and an amount of magic energy (called *mana*) that it requires in order to get casted. After casting a spell, this specified amount of mana is deducted from the hero. The level of damage a spell causes depends on the dexterity skill level of the hero. Spells:
    - An ice spell, apart from the damage it causes it also reduces the damage of the enemy.
    - A fire spell, apart from the damage it causes it also reduces the defense of the enemy.
    - A lightning spell, apart from the damage it causes it also reduces the dodge chance of the enemy.

II. The Heroes and Monsters

The heroes have a name, a level and some health power (called *HP*). For simplicity think of this value as not capped (for example in other games a hero has a maximum of e.g. 100hp and cannot go over this limit so if the hero has 90 hp and uses a potion that increases hp by 50 the hero's hp would now be 100. In our game you can assume that the hero's hp will be 140 in the same scenario). When their hp becomes equal to zero the hero faints. They also have some *mana* and some skills that affect their fighting efficiency (you can assume that *mana* is uncapped too). Those skills are strength, dexterity and agility. A hero's strength is added to the amount of damage they deal when using a weapon. A hero's dexterity increases the amount of damage they deal when casting a spell. A hero's agility increases their chance to dodge an incoming attack. A hero has some money and some exp. When a hero accumulates enough experience points it levels up. During each of those times the levels of the skills of the hero get increased by some number. There are three types of heroes; warriors, sorcerers and paladins.

- Warriors are favored on strength and agility.
- Sorcerers are favored on the dexterity and the agility.
- Paladins are favored on strength and dexterity.

Favored means that their starting stats on those sectors will be increased and that every time they level up those statistics will be furtherly boosted.

Monsters have a name, some HP, and a level. Their stats include a base damage that they can inflict, a defense stat, which is deducted from the damage of an incoming attack and a dodge chance for evading incoming attacks. There are three kinds of monsters: dragons, exoskeletons and spirits.

- Dragons have a higher damage
- Exoskeletons have increased defense and
- Spirits have a higher dodge chance.

III. The World of Play

The world of the game is represented by a grid of specific dimensions. At any given moment the team of heroes (which are at most three and at least one) is placed in a specific tile of the grid and they can move by one tile/cell up or down or left or right. The grid contains tiles which may be inaccessible, marketplaces, or common tiles/cells. As the name suggests, heroes cannot access a non-accessible tile. The heroes can buy items from the market if they have enough money to do so. Each hero has her/his private wallet and does not wish to share her/his money with any other hero. Moreover, they can sell the items in their inventory for half the price at which they were bought. Those transactions must take place through a special menu where the player will be able to see all the items available for selling or buying as well as the information of those items (price, required hero level etc.). Finally, every time the heroes visit a common tile there is a chance that they will engage in battle with monsters of the same level as the level of the highest leveled hero. The monsters that "live" in a cell are not created when the map is created. Every time the heroes visit a cell we "roll a dice" and if they are "unlucky" then at that moment we create the monsters and initiate the fight. The fight starts automatically as soon as the heroes move to that tile (if it is one of their unlucky tiles).

When the heroes are neither in the marketplace nor engaging in battle, they should be able to check their inventories and/or change their weapons or armor. They should also be able to consume a potion. **The player should be able at any moment to display information related to the heroes like their level, their hp, their mana, their current exp and their skill levels**. The player should be able at any moment to display the map (grid). There should also be a comprehensive way of visually representing all the tiles and their properties (whether the heroes are in a specific tile, if a tile is accessible and if it contains a market). The player should be able at any moment to quit the game.

IV. The Fight

A fight takes place between heroes and monsters. A fight consists of multiple rounds. The first to attack is always the team of heroes. The fight ends only when the hp of either all the monsters or all the heroes are zero. If the heroes win the fight, they earn some money based on the level and the number of monsters that they faced in that fight. If the monsters win the fight, the heroes lose half of their money. At the end of an *entire fight* (won by the heroes), if a hero's hp is zero, the hero gets revived by the other hero(es) and gets back half of his/her hp but doesn't gain any exp or money. At the end of each *round* during a fight, heroes that are still alive regain some of their hp and mana. During a round of the fight, when it is the heroes' turn, the player chooses for each hero whether they will do a regular attack, cast a spell, use a potion, OR change their armor/weapon. At each round a hero can perform only one of the above. Make sure that during a round of a fight you show clearly to the user who caused how much damage to whom. At each round the player can display the stats of a hero or a monster. You can assume that all of the fights will be either 1v1, 2v2 or 3v3 depending on the number of the heroes the player wants to start their game with. (So, for example if the player decided to start their adventure with two heroes, then every time the heroes get in a fight the fight will be against exactly two monsters. For more simplicity you can assume that the first hero will always attack the first monster and the second hero the second monster. However, do not forget to think of the case that one of them faints and the alive hero has to fight both of the monsters – or the opposite.)

V. Controls

W/w: move up
A/a: move left
S/s: move down
D/d: move right
Q/q: quit game
I/i: show information. If we are not in a fight this should show information about the heroes (more specifically their level, their hp, their mana, their current exp, their money and their skill levels). If we are on a fight this should show information about the heroes (more specifically their level, their hp, their mana and their currently equipped weapons and armors) and in a separate section information about the monsters (more specifically their level, their hp, their defense and their damage)

While you and I now know the keys used to play the game, keep in mind when coding that you might want to give this to your little brother to play who does not know any of this...

Some notes regarding the logistics of the rules:

- A spell's final damage can be calculated by the following formula: spells_base_damage + (dexterity/10000)*spells_base_damage.
- You can assume that hp of both heroes and monsters can be calculated as: 100*their_level
  When a hero levels up then this formula is used to reset and calculate her/his hp.
- You can assume that the mana of the heroes when they level up can be calculated as: current_mana*1.1.
- You can assume that the damage a hero causes with an attack with their weapon can be calculated as: (strength + weapon damage)*0.05.
- You can assume that a hero has a probability of dodging an attack which can be calculated as: agility*0.002.
- You can assume that a monster has a probability of dodging an attack, which can be calculated as: dodge_chance *.01
- You can assume that a hero needs to acquire their_current_level*10 more experience points to level up. A hero never loses experience. It accumulates over the course of the game.
- You can assume that when a hero levels up all of their skills get increased by 5% and their favored skills get an extra 5% increase.
- You can assume that during every round of a fight the heroes regain 10% of their hp and 10% of their mana.
- You can assume that after every successful fight each hero who did not faint gains 100*monsters_level coins and 2 exp for their troubles.
- You can assume that the level of the enemy's skill deterioration that is caused from each of the spells is equal to 10%.
- A sample dimension size in which the game can be played is 8x8. In this size our suggestion is to have (randomly assigned) 20% non-accessible cells, 30% markets and 50% common cells.

A personal note for those who may want to explore a more colorful terminal experience:

Although you are not expected to do so, you may want to use some colors to represent different messages or map visualizations on the terminal. This can be done quite easily if you follow the instructions of this link.