

**CSE201 Advanced Programming**  
**Lab Assignment 03**  
**25th August 2019. Due by 11:59pm on 27th Aug 2019**

**Topics Covered: Inheritance and Polymorphism**

This is a take-home lab assignment. No extensions whatsoever will be provided. Any submission after the deadline will not be evaluated. If you see any ambiguity or inconsistency in a question, please seek clarification from the teaching staff. Please read the entire text below very carefully before starting your implementation.

**Plagiarism:** All submitted lab assignments are expected to be the result of your individual effort. You should never misrepresent someone else's work as your own. In case any plagiarism case is detected, it will be dealt as per IIITD plagiarism policy and without any relaxations:

<https://www.iiitd.ac.in/sites/default/files/docs/education/AcademicDishonesty.pdf>

Please note that you are not allowed to discuss the design/solution of the lab assignment (e.g. classroom page discussions etc.). Anyone who is found doing this will be charged with plagiarism case. No excuses!



The head of ArchFable, a single-player role-playing video game has approached you to design a prototype (no GUI) for their new title, *ArchLegends*. The game is set in a time where a demon named Lionfang and his lieutenants have taken over the kingdom of Thunderforge. The purpose of the game is to allow the user to start as a hero and then defeat Lionfang. Note that your assignment-4 (to be announced on 30/08 will be an extension of this assignment. Hence, you must attempt and submit this assignment to attempt assignment-4). In this assignment you must use OOP concepts, especially inheritance and polymorphism.

The design/working of the game is as follows:

**[A] On starting the game:**

- 1) Each invocation of the game will be considered as a new game. After starting the game you have to first provide your username (no password required) to create a new hero (hero described in point-2 below). Then you can log into the game as this hero by typing in the username. Note that there is no file handling in this assignment. Hence, no need to create a database of users or saving their game. During a game the player has the option to exit his current game. Then he can start a new game with a different username (without rebooting the game executable) and hence a new hero. He also has the option to switch between two heroes. Note that all these functionalities are within a single launch of the Java executable. Also, there is no need to provide save game feature for users. Choosing the same user next time simply automatically assigns him the hero from his previous game.
- 2) A new user has to first choose his hero avatar. This username must play this game as this particular hero only. There are four different types of heroes to choose from: Warrior, Mage, Thief, and Healer. All these heroes have an XP and a HP attribute. XP is used to level up (see point 4 below) and HP is an indicator of the health of the hero, and they default to 0 and 100 respectively at the start of the game.
- 3) The hero starts a new game at level 1. A level is decided based on the hero's HP and XP. He can move to a different level (i.e., "level up") by gaining enough XP as described below.
  - a) For level 1: The Hero has 100 HP. The hero needs 20 XP to go to level 2.
  - b) For level 2: The hero has 100 HP. The hero needs 40 XP to go to level 3.
  - c) For level 3: The hero has 200 HP. The hero needs 60 XP to go to level 4.
  - d) For level 4: The hero has 250 HP.
- 4) A new game is always started from the initial location in the Game Layout (described in Section D).

**[B] Details of the Monsters:**

- 1) There are four monsters under the command of Lionfang. They only have an HP attribute (which is determined by their level):
  - a) Goblins (can only have level 1) have 100 HP.
  - b) Zombies (can only have level 2) have 100 HP,
  - c) Fiends (can only have level 3) have 200 HP.
  - d) Lionfang (can only have level 4 as he is the boss!) has an HP of 250.

## **[C] Attributes and fight mechanism:**

### *Heroes:*

There are 3 types of actions for each of the hero when he is fighting a monster:

- 1) *Warrior*:
  - a) Attack: Does 10 HP damage to the opponent.
  - b) Defense: The opponent does 3 HP less damage in their next attack.
  - c) Special power: Attack and defense attributes get boosted by 5 for the next 3 moves.
- 2) *Mage*:
  - a) Attack: Does 5 HP damage to the opponent.
  - b) Defense: The opponent does 5 HP less damage in their next attack.
  - c) Special power: Cast a spell which reduces the opponent's HP by 5% for the next 3 moves.
- 3) *Thief*:
  - a) Attack: Does 6 HP damage to the opponent.
  - b) Defense: The opponent does 4 HP less damage in their next attack.
  - c) Special power: Steal 30% of opponents HP.
- 4) *Healer*:
  - a) Attack: Does 4 HP damage to the opponent.
  - b) Defense: The opponent does 8 HP less damage in their next attack.
  - c) Special power: Increase own HP by 5% for the next 3 moves.

Attack and defense can be done on any move but a special attack can be used only after every 4 moves. (If not used in the 4th move then it can be used in the 5th move and so on). The special attacks which affect the next 3 moves must happen concurrently with the option chosen in those moves (i.e., attack and defense).

As the hero levels up, one extra point is added to his base attack and defense attributes.

### *Monsters:*

- 1) None of the monster can defend itself (including Lionfang). They do an attack which reduces the opponents HP by a value between zero and one-fourth of monster's HP. The probability of choosing this value between the above-mentioned range must be gaussian.
- 2) Lionfang has a special attack which reduces the HP of the opponent by half. The probability of this happening is 1/10.

### **[D] Game Layout:**

To reach LionFang the hero has to go through different locations where each location consists of a monster of a randomly assigned level. From one location you can go back to the previous location or move forward to another location. You should have at least 3 locations to move forward to. You must have at least a path length of four ( three monsters ) before you reach Lionfang.

When a player chooses the next location to move, the game engine will ask him to choose one of the 3 moves (described in Section C). Once chosen, the monster does a move of its own. Game continues in this format.

On choosing the path to go to the next location, The player has to be prompted to choose one of his/her 3 moves. After this, the monster does a move of its own and so on.

Once A monster is killed, it's level\*20 must be added to the hero's XP and the hero's HP refills to the maximum allowed value. After this, the prompt for choosing a path ( has to include a path to go back as well ) must be displayed. If the Hero goes back then he must fight the monster in that location again (basically the monsters are reincarnated after getting killed by the player).

If the Hero dies then he starts over from the initial position. The locations and monsters don't change and all the killed monsters respawn.

If the Hero manages to kill Lionfang, he wins the game. Note that the game layout need not be a fully connected graph.

### **[E] Bonus:**

Implement a hint system which guides the hero to Lionfang by taking him in the path which will get him as close to Lionfang as possible keeping into account his level and the level of monsters (assume a level 1 hero has a good chance of defeating a level 1 monster but has a very bad chance of defeating level 2 and level 3 monsters and so on).

Total marks of the bonus component will be decided towards the end of the semester. During your assignment demo we will only mark your bonus component as "yes" or "no" (binary value) depending on the working of your implementation as expected (i.e., no partial marking here).

**--Sample Input/Output--**

**Welcome to ArchLegends**

**Choose your option**

- 1) New User**
- 2) Existing User**
- 3) Exit**

**1**

**Enter Username**

**pan**

**Choose a Hero**

- 1) Warrior**
- 2) Thief**
- 3) Mage**
- 4) Healer**

**2**

**User Creation done. Username: pan. Hero type: Thief. Log in to play the game . Exiting**

**Welcome to ArchLegends**

**Choose your option**

- 1) New User**
- 2) Existing User**
- 3) Exit**

**2**

**Enter Username**

**pan**

**User Found... logging in**

**Welcome pan**

**You are at the starting location. Choose path:**

- 1) Go to Location 0**
- 2) Go to Location 3**
- 3) Go to Location 6**

**Enter -1 to exit**

**1**

**Moving to location 0.**

**Fight Started. Your fighting a level 1 Monster.**

**Choose move:**

- 1) Attack**
- 2) Defense**

**1**

**You choose to attack.**

**You attacked and inflicted 6 damage to the monster.**

**Your Hp: 100/100 Monsters Hp: 94/100**

**Monster attack!**

**The monster attacked and inflicted 15 damage to you.**

**Your Hp: 85/100 Monsters Hp: 94/100**

**Choose move:**

**1) Attack**

**2) Defense**

**1**

**You choose to attack**

**You attacked and inflicted 6 damage to the monster.**

**Your Hp: 85/100 Monsters Hp: 88/100**

**Monster attack!**

**The monster attacked and inflicted 13 damage to you.**

**Your Hp: 72/100 Monsters Hp: 88/100**

**Choose move:**

**1) Attack**

**2) Defense**

**1**

**You choose to attack**

**You attacked and inflicted 6 damage to the monster.**

**Your Hp: 72/100 Monsters Hp: 82/100**

**Monster attack!**

**The monster attacked and inflicted 12 damage to you.**

**Your Hp: 60/100 Monsters Hp: 82/100**

**Choose move:**

**1) Attack**

**2) Defense**

**3) Special Attack**

**3**

**Special power activated**

**Performing special attack**

**You have stolen 25 Hp from the monster!**

**Your Hp: 85/100 Monsters Hp: 57/100**

**Monster attack!**

**The monster attacked and inflicted 10 damage to you.**

**Your Hp: 75/100 Monsters Hp: 57/100**

**Special power deactivated.**

**Choose move:**

**1) Attack**

**2) Defense**

**1**

**You choose to attack**

**You attacked and inflicted 6 damage to the monster.**

**Your Hp: 75/100 Monsters Hp: 51/100**

**Monster attack!**

**The monster attacked and inflicted 5 damage to you.**

**Your Hp: 70/100 Monsters Hp: 51/100**

**Choose move:**

**1) Attack**

**2) Defense**

**1**

**You choose to attack**

**You attacked and inflicted 6 damage to the monster.**

**Your Hp: 70/100 Monsters Hp: 45/100**

**Monster attack!**

**The monster attacked and inflicted 4 damage to you.**

**Your Hp: 66/100 Monsters Hp: 45/100**

**Choose move:**

**1) Attack**

**2) Defense**

**2**

**You choose to defend**

**Monster attack reduced by 4!**

**Your Hp: 66/100 Monsters Hp: 45/100**

**Monster attack!**

**The monster attacked and inflicted 3 damage to you.**

**Your Hp: 63/100 Monsters Hp: 45/100**

**Choose move:**

**1) Attack**

**2) Defense**

**3)Special Attack**

**3**

**Special power activated**

**Performing special attack**

**You have stolen 14 Hp from the monster!**

**Your Hp: 77/100 Monsters Hp: 31/100**

**Monster attack!**

**The monster attacked and inflicted 4 damage to you.**

**Your Hp: 73/100 Monsters Hp: 31/100**

**Special power deactivated.**

**Choose move:**

**1) Attack**

**2) Defense**

**1**

**You choose to attack**

**You attacked and inflicted 6 damage to the monster**

**Your Hp: 73/100 Monsters Hp: 25/100**

**Monster attack!**

**The monster attacked and inflicted 3 damage to you.**

**Your Hp: 70/100 Monsters Hp: 25/100**

**Choose move:**

**1) Attack**

**2) Defense**

**1**

**You choose to attack**

**You attacked and inflicted 6 damage to the monster**

**Your Hp: 70/100 Monsters Hp: 19/100**

**Monster attack!**

**The monster attacked and inflicted 0 damage to you.**

**Your Hp: 70/100 Monsters Hp: 19/100**

**Choose move:**

**1) Attack**

**2) Defense**

**2**

**You choose to defend**

**Monster attack reduced by 4!**

**Your Hp: 70/100 Monsters Hp: 19/100**

**Monster attack!**

**The monster attacked and inflicted 0 damage to you.**

**Your Hp: 70/100 Monsters Hp: 19/100**

**Choose move:**

**1) Attack**

**2) Defense**

**3) Special Attack**

**1**

**You attacked and inflicted 6 damage to the monster**

**Your Hp: 70/100 Monsters Hp: 13/100**

**Monster attack!**

**The monster attacked and inflicted 4 damage to you.**

**Your Hp: 66/100 Monsters Hp: 13/100**

**Choose move:**

**1) Attack**

**2) Defense**

**3) Special Attack**

**1**

**You choose to attack**

**You attacked and inflicted 6 damage to the monster**

**Your Hp: 66/100 Monsters Hp: 7/100**

**Monster attack!**

**The monster attacked and inflicted 1 damage to you.**

**Your Hp: 65/100 Monsters Hp: 7/100**

**Choose move:**



- 1) Attack
- 2) Defense
- 3) Special Attack

1

You choose to attack

You attacked and inflicted 6 damage to the monster

Your Hp: 65/100 Monsters Hp: 1/100

Monster attack!

The monster attacked and inflicted 0 damage to you.

Your Hp: 65/100 Monsters Hp: 1/100

Choose move:

- 1) Attack
- 2) Defense
- 3) Special Attack

1

You choose to attack

You attacked and inflicted 6 damage to the monster

Your Hp: 75/100 Monsters Hp: 0/100

Monster killed!

20 XP awarded

Level Up: level:2

Fight won proceed to the next location.

You are at location 0 Choose path:

- 1) Go to Location 1
- 2) Go to Location 4
- 3) Go to Location 7
- 4) Go back

Enter -1 to exit

--Sample Input ends here--