National University of Computer and Emerging Sciences 0005
Lahore Campus

Software Const. & Development Lab (SL3001)

Final Exam

Total Time (Hrs):	3
Total Marks:	30
Weightage	40%
Total Questions:	2

Date: 31st Dec 2024

Lab Instructor(s)

Hassan Raza (A), Zain Nasir (C), Hira Tayyab (C, B)

2505
Roll No

SE-5A
Lab Section

Student Signature

Do not write below this line

Attempt all the questions and Follow Submission rules:

a. Follow this **path** to make the submission \\Cactus1\Xeon\Fall 2024\Hira Tayab\SCD Lab Final Submissions\
b. Then go to your relevant section BSE-5A, BSE-5B or BSE-5C
c. For correct submission, make a folder with your roll number in this format **21LXXXX. Then in that folder, make 2 more folders Q1 and Q2.**
d. Now In Q1 folder add code of Q1 and a few screenshots, In Q2 folder add code of Q2 and a few screenshots.

CLO # 1: Basic Logic building

Question 1: You are tasked with creating a simple turn-based strategy game in Java. The game involves players controlling different types of characters on a battlefield. [10 marks]

✓1. Design a `Character` class as a base class with the following fields[1 mark]
- `name` (String): The name of the character.
- `health` (int): The health points of the character.
- `attackPower` (int): The attack power of the character.

Include:
- A constructor to initialize these fields.
- A method `attack(Character opponent)` that decreases the opponent's `health` by the attacker's `attackPower`.
- A method `isAlive()` that returns `true` if the character's health is greater than 0, and `false` otherwise.

✓2. Create two subclasses of `Character`: [3 marks]
- `Warrior`: Overrides the `attack()` method to increase its `attackPower` by 5 after each attack.
- `Mage`: Overrides the `attack()` method to decrease its own `health` by 3 after each attack, but deals 50% more damage than its `attackPower`.

0005

3. Create a `Battlefield` class that: [5 marks]
   - Uses a generic `ArrayList` to store a collection of `Character` objects participating in the battle.
   - Provides a method `addCharacter(Character character)` to add a new character to the battle.
   - Provides a method `startBattle()` to simulate the battle as follows:
     - Iterate through the list of characters using an iterator.
       - Each character attacks the next character in the list (in circular order, meaning the last character attacks the first).
     - If a character's health drops to 0 or below after being attacked, remove them from the list.
     - Repeat this process until only one character remains in the list.
     - Print the name of the winning character as the battle's champion.

4. Write a `main` method to demonstrate the functionality: [1 mark]
   - Create an instance of `Battlefield`.
   - Add at least three characters (one generic `Character`, one `Warrior`, and one `Mage`) to the battlefield.
   - Call the `startBattle()` method to simulate the game.
   - Print the sequence of attacks and the health of the characters after each attack.

Your implementation must demonstrate the use of inheritance, polymorphism, generics, iterators, and ArrayLists.

Note:

- Code must be properly commented.
- Attach screenshots of the final application. For all parts specifically.

CLO #: Develop Java Applications

Question 2: Real-time Chat Application using Sockets and Swing-UI with proper file structure. [20 marks]

Joe is running a customer care agency, resolving queries on call and sometimes due to excessive incoming calls, he missed some calls which caused significant loss to their business. So he decided to build a chat application for customer care that would also improve its efficiency. As a software engineer, **your task is to build a real-time chat application using sockets.**

Requirements:

a) Sign up/ Login : During signup the user will input Username, Email, and Password. [5 marks]

b) Use object serialization to store data in files. Username and Email must be unique for every user. [5 marks]

c) For every new user establish a connection with a customer care [2.5 marks] representative.

d) Break Connection when chat ends.[2.5 marks]

e) Build a proper User Interface using swing UI framework. [5 marks]

Note:

- Code must be properly commented.
- Attach screenshots of the final application. For all parts specifically.
- Must follow the **naming conventions and File Structure.**

Good Luck :)