ZCAS University

SCHOOL OF COMPUTING, TECHNOLOGY AND APPLIED SCIENCES

MID-SEMESTER EXAM-2023

ADVANCED OBJECT ORIENTED PROGRAMMING (CIT2122)

INSTRUCTIONS:

1. This paper consist of only one practical question
2. **You are required to ensure that you have a working machine and all the programmes are running perfectly.**
3. Open your ECLIPSE or any IDE of your choice and create a Java Project with your name and ID. For example Emmanuel_202228292.
4. Ensure that your programme runs to score maximum points.
5. Time allowed is 1hr 30 Minutes
6. Copy all your working code and save it in notepad with your name and ID, same as in 3 above for submission using a device to be provided.

Case Study

The university has decided to develop its own WatCard system, rather than rely on software from a vendor. The initial release of the software allows a WatCard holder to use his or her card to gain access to secure areas on campus (e.g., their residence after hours, computer rooms). He or she can also use the card as a debit card, meaning that he/she can deposit money into an associated account, and can purchase items in certain locations by using the card to withdraw money from the account. In the beginning, students will only be able to use their WatCards to pay various university-related fees: parking fees (at parking permit dispensers), library fees, equipment rental fees at the Physical Activity Centre, fees for official transcripts, etc. Also, in the beginning, only online deposits will be supported. The system keeps a Usage record of every use of the WatCard.

Questions

1. Draw a domain model for the proposed WatCard system. **[15 Marks]**
2. Use your Java programming knowledge to implement this model by using the following OOP concepts:
   i. Inheritance
   ii. Super classes
   iii. Polymorphism
   iv. Method overriding and
   v. Interfaces

Your system should model the following aspects:

- Create a class called **User** which will represent a person who holds a WatCard. This class should include attributes like **name, ID**, and **balance.** **[5 Marks]**
- Create an interface called **AccessControl** which defines a method **grantAccess()** for allowing access to secure areas on campus. **[5 Marks]**
- Create another interface called **DebitCard** which defines methods **depositMoney()** and **withdrawMoney()** for managing the user's account balance. **[5 Marks]**
- Create a third interface called **FeePayment** which defines a method **payFee()** for paying university-related fees. **[5 Marks]**
- Create a class called **UsageRecord** to keep track of every use of the WatCard. Include attributes like **timestamp, action**, and **location.** **[5 Marks]**
- Create another class called **Student** which extends the User class and implements the **AccessControl, DebitCard,** and **FeePayment** interfaces. **[5 Marks]**
- Implement methods to override the interface methods for **granting access, depositing** and **withdrawing money,** and **paying fees.** **[25 Marks]**
- Create a test cases to verify that the system functions as expected. **[25 Marks]**
- **Anything else is free style.** **[5 Marks]**