Assignment 5

UML Modelling and Classes

Instructions

This assignment concerns the development of UML models, and the construction of classes in Java using object composition i.e. write class declarations that define types of object that contain and manipulate other objects.

Consider the following scenario:

Typically, a bank allows a client to open and close an account, view his/her balance and/or account information, deposit and withdraw cash and transfer cash to a different account.

A client typically withdraws cash from an ATM. An ATM has different features such as the keypad with which a user can perform different functions. Furthermore, it allows for cash deposits through a cash deposit slot, cash withdrawal happens through the cash dispenser, and the balance and the deposit/transfer/withdrawal amounts can be viewed on a screen.

The ATM uses the bank database to authenticate clients so that they can perform the above functions. The database is used to keep track of all client accounts: their available balance, their total balance (available plus not-yet-available), and their transaction history (all debits and credits performed).

An account has an account number, pin, available balance, total balance and credit history. To access the account, a client must be validated through their pin. Once validated, a client can then deposit, withdraw and transfer money, and can view their available balance, total balance, debits and credits.

NOTE: The cash dispenser can only dispense cash if a client has sufficient balance available in the account.

Exercise 1: Use Case Diagram [10 marks]

Using the scenario given on page 1, and a software tool of your choice (e.g Draw.io), draw a Use Case diagram for the ATM system. Provide as much detail as possible in your Use Case diagram.

Exercise 2: Class Diagram [25 marks]

By identifying problem domain objects, and the relationships between them, draw a UML class diagram for the ATM system. Some classes, instance variables and methods have been identified, and their source code has been provided. Identify the missing classes, instance variables and methods to add the necessary detail to your class diagram.

Exercise 3: Sequence Diagram [25 marks]

Draw a UML sequence diagram for the scenario where a client successfully withdraws cash at the ATM.

Exercise 4: [40 marks]

On the Amathuba page for this assignment, you will find some sample classes. Use these classes to help you implement the remaining classes. For instance, your task is to implement the `Account` and `CashDispenser` classes and any other class(es) that you deem necessary. The following sample I/O demonstrates the expected behaviour from these classes:

Sample I/O* (NOTE: *the input from the user has been shown in* bold*):

```
Enter account number:
321465
Enter PIN:
1234
Invalid account number or PIN. Please try again.
Enter account number:
123456
Enter PIN:
1234
Main menu:
1. View balance
2. Withdraw cash
3. Deposit funds
4. Exit
4
```

Sample I/O* (NOTE: *the input from the user has been shown in* bold*):

```
Enter account number:
654321
Enter PIN:
4321
```

```
Main menu:
1. View balance
2. Withdraw cash
3. Deposit funds
4. Exit
2
Enter amount to withdraw:
10000
Insufficient funds in account.
Main menu:
1. View balance
2. Withdraw cash
3. Deposit funds
4. Exit
3
Enter deposit amount:
120000
Insert deposit envelope.
Deposit successful.
Main menu:
1. View balance
2. Withdraw cash
3. Deposit funds
4. Exit
1
Available Balance: 120500.0
Total Balance: 120800.0
Main menu:
1. View balance
2. Withdraw cash
3. Deposit funds
4. Exit
2
Enter amount to withdraw:
20000
Withdrawal successful. Please take your cash.
Main menu:
1. View balance
2. Withdraw cash
3. Deposit funds
4. Exit
1
Available Balance: 100500.0
Total Balance: 100800.0
Main menu:
1. View balance
2. Withdraw cash
3. Deposit funds
4. Exit
4
```

Submission

Submit your UML use case diagram, UML class diagram and UML sequence diagram as well as your `.java files` to the automatic marker inside a zip folder named as follows: ABCXYZ001.zip (where ABCXYZ001 is your student number).