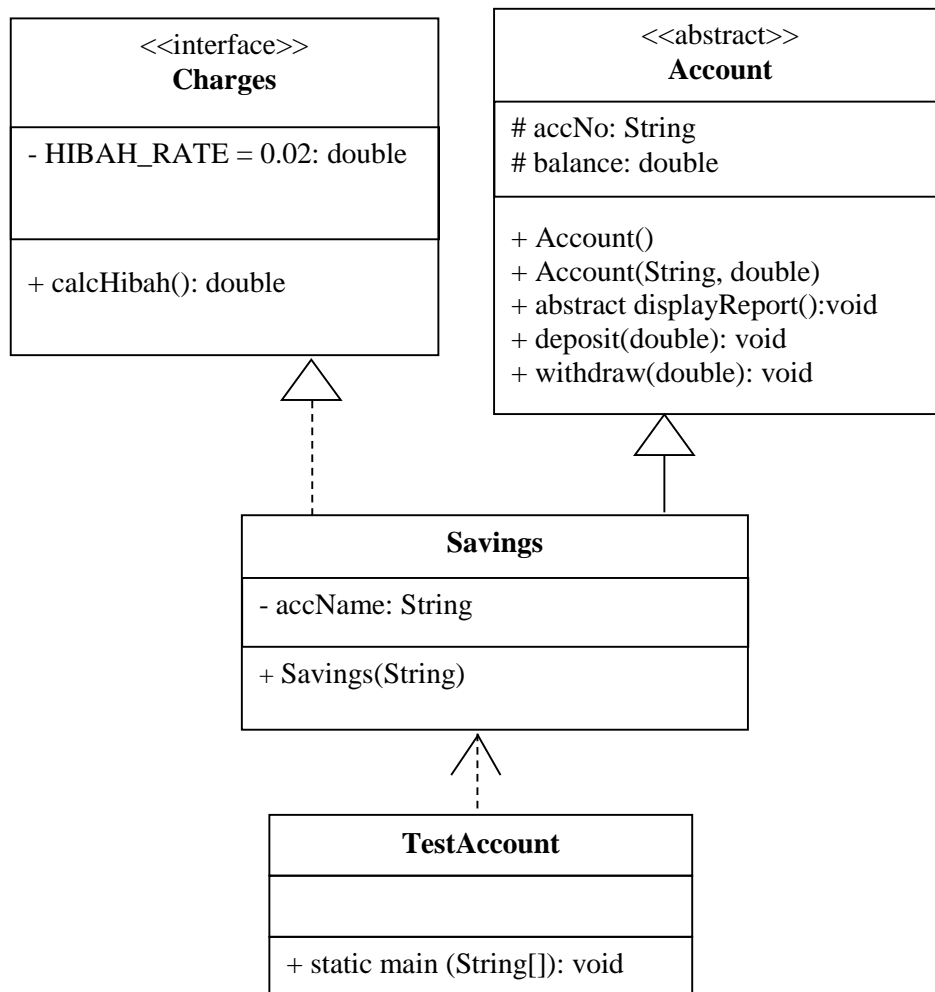# Polymorphism Exercise
## Object Oriented Programming (SECJ2154)

**Question**

Given the following class diagram in Figure C1, sample output in Figure C3, and the description methods of classes in Table C1. Answer all questions in this part.



**Figure C1 :** Class Diagram for Mini Banking System

Write a complete Java program that contains classes as shown in Figure C1. The description of the classes as below:

i.  The **Account** class which is an abstract class that contains two instance variables i.e. **accNo** represents customer account bank number and **balance** represents current

balance in customer account; and five methods including two overloading constructors and one abstract method. [10 Marks]

ii. The **Charges** interface contains a constant variable i.e. **HIBAH_RATE** represents the hibah rate (Definition Hibah = Gift, donation); and an abstract **calcHibah** method.

[2 Marks]

iii. The **Savings** class which represents customer saving account that inherits **Account** class and implements **Charges** interface. The **Savings** class enables the customer to make deposit and withdraw transactions to their account. The **Savings** class contains one instance variable i.e. **accName** that represents customer name and one constructor.

[6 Marks]

iv. The **TestAccount** class represents the application program that contains the **main()** method. The main method should do the following: [12 Marks]

a) Instantiates an object of class **Savings** with the account holder name **"Ahmad"**.
b) The **do...while** loop will display the following bank transaction menu:

```
******** BANK ACCOUNT MENU ********

1.   Savings Account Deposit
2.   Savings Account Withdrawal
3.   Display Report
4.   Exit

Please enter your choice (1-4) :
```

**Figure C2** : Menu of Mini Banking System

c) The switch-case choice or any selection tool to perform:
   i.   1 – Ask the user to enter amount of deposit and call **deposit()** method.
   ii.  2 – Ask the user to enter amount of withdraw and call **withdraw()** method.
   iii. 3 – Call **displayReport()** method.
   iv.  4 – Exit from system

**Table C1 :** Description of methods of **Account** and **Saving** class

| Method | Description |
|---|---|
| **Account()** | A superclass default-constructor that initializes instances variables with "" and 0.00, respectively. |
| **Account(String, double)** | A superclass parameterized-constructor that receives account number of type **String** and account balance of type **double**, and initializes the instances variables with the received values. |
| **Savings(String)** | A subclass constructor which receives customer name. This constructor will call the superclass constructor to initialize the inherited instance variables with (**"001", 2000.00**) and then initialize its own instance variable with the received value. |
| **calcHibah()** | An overridden **Saving** class method which calculates monthly hibah earned (**balance * HIBAH_RATE**), update current account balance with hibah earned and then return the value of hibah earned of type double. |
| **displayReport()** | An overridden **Saving** class method which will call **calcHibah** method. Then display the earned hibah and ending balance of the account. |
| **withdraw()** | An **Account** class method that will check the condition of the current balance before processing the withdrawal transaction. If (**request_amount < 0**, then print the appropriate message) or if (**balance – request_amount < 0**, print the appropriate message) or if there is enough money in the account, then withdraw the requested amount and update the balance value (**balance - amount**). |
| **deposit()** | An **Account** method that always accept the deposit and update the balance value (**balance + amount**). |

```
******* BANK ACCOUNT MENU *******

1.  Savings Account Deposit
2.  Savings Account Withdrawal
3.  Display Report
4.  Exit


Please enter your choice (1-4) : 1


Enter amount to deposit: 20.00
Please insert your cash.
Deposit accepted.
Your current balance is RM2020.00


******* BANK ACCOUNT MENU *******

1.  Savings Account Deposit
2.  Savings Account Withdrawal
3.  Display Report
4.  Exit


Please enter your choice (1-4) : 2
Enter amount to withdraw: 50.00
Please take your cash.
Your current balance is RM1970.00


******* BANK ACCOUNT MENU *******

1.  Savings Account Deposit
2.  Savings Account Withdrawal
3.  Display Report
4.  Exit


Your choice, please: (1-4) : 3


Monthly Hibah Earned: RM39.40
Ending Balance: RM2009.40


******* BANK ACCOUNT MENU *******

1.  Savings Account Deposit
2.  Savings Account Withdrawal
3.  Display Report
4.  Exit


Please enter your choice (1-4) : 4
Press a key to continue...
```

*Note: The underlined words are the user input from keyboard.*

**Figure C3:** Sample Output