Introduction to Computer Science 2

Lab 1: Objects and Classes

Learning Goals:

- To learn how to use object and classes.
- To learn when to use fields (instance/class) and methods (instance/class)

Exercise 1 (5 points)

In this assignment, you will enhance the `BankAccount` class and see how the principle of abstraction and encapsulation enable evolutionary changes to software.

Begin with a simple enhancement: charging a fee for every deposit and withdrawal. Supply a mechanism for setting the fee and modify the deposit and withdraw methods so that the fee is levied. Test you resulting class and check that the fee is computed correctly.

Now we make a more complex change. The bank will allow a fixed number of free transactions (deposits and withdrawals) every month, and charge for transactions exceeding the free allotment. The charge is not levied immediately but at the end of the month.

Supply a new method `deductMonthlyCharge` to the `BankAccount` class that deducts the monthly charge and resets the transaction count.

Produce a test program that verifies that the fees are calculated correctly over several months.

Exercise 2 (5 points)

In this exercise you will enhance the last version of the `BankAccount` class that you have implemented for the Exercise 1.

Begin with a simple enhancement: add an instance variable to the `BankAccount` class that represents the account number. Modify the constructor of the `BankAccount` class so that it assigns the account number sequentially. This means that the first `BankAccount` object will get account number `1`, the second `BankAccount` object will get account number `2`, and so on.

The second enhancement will help bank managers to trace the transactions for each bank account. This means that you have to modify the class constructors and methods withdraw and deposit so that whenever that are executed they add a `String` object describing the transaction to a global `String` object that contains the descriptions of all the transaction so far. An example of the content of the global `String` object is given below:

BankAccount	3:	deposit	300 euros
BankAccount	143:	withdraw	100 euros
...			
BankAccount	2:	deposit	120 euros

Provide an access method for the global `String` object and a test program for the final version of the `BankAccount` class with 3 – 4 `BankAccount` objects.

Hint: the global `String` object has to be referred by a static variable.

Honor code, coding style, and deliverable:

Try to solve the exercises with what you already know. You are welcome to expand your program to do extra things but they are not mandatory.

Plagiarism is not allowed! We will run sophisticated software that automatically detects similarities on source code among students. All plagiarism incidents will be immediately reported to the Board of Examiners!

Submission!

Submit your java files to canvas.
Ask your instructor in case there is a problem with your submission.

DO NOT SEND SUBMISSIONS VIA EMAIL
YOUR LAB WILL NOT GET GRADED!