CS 1410: Bank Accounts

We are all too familiar with bank accounts. Typically, there are two types of bank accounts: checking accounts and savings accounts. Often, savings accounts have a perk of earning interest on the total balance in the account. Checking accounts, on the other hand, usually do not earn interest, but they do allow an overdraft limit (meaning, the account can be withdrawn to a negative balance, up to a certain negative amount). There are other types of accounts, but our assignment will focus on these two types.

Assignment

For your assignment, you will create a series of classes, using class inheritance, that implement the necessary logic for checking accounts and savings accounts. You will also create a simple program to demonstrate the functionality of the classes that you create.

You should create three classes: Account, CheckingAccount, and SavingsAccount:

- When constructed, the Account class should receive parameters for an account holder’s name, account number, and the starting balance. The class should have methods to deposit and withdraw money to and from the account, checking to see that the amount deposited or withdrawn is not negative. Furthermore, the withdraw method should not allow the account to have a negative balance (withdrawals that exceed the account’s balance should not be allowed).

- The CheckingAccount class should inherit from the Account class, and, when constructed, should receive an additional parameter for the overdraft limit (in addition to the parameters required by the Account class). This class should also have a method to withdraw money, but should instead prevent withdrawal amounts that exceed the account balance plus the overdraft limit specified.

- The SavingsAccount class should also inherit from the Account class, and, when constructed, should receive an additional parameter for the savings interest rate. This class should have one additional method to add monthly interest for a single month to the current account balance. Monthly interest is calculated by dividing the interest rate by 100, and then dividing by 12 (for monthly interest), and then multiplying by the current account balance.

Your program should start by asking the user to choose an account type (checking or savings), and then ask for any necessary information in order to create that type of account (e.g. for a checking account: account holder’s name, account number, starting balance, and overdraft limit).

Then, your program should give the user options to deposit money, withdraw money, and quit. For savings accounts, you should also provide an option to add monthly interest. Depositing and withdrawing money should additionally ask for an amount to deposit or withdraw. If the user attempts to withdraw too much money, they should be notified and the account balance should not change. In all cases, the new account balance should be printed. This should continue until the user quits your program.

Extra Challenges

- Add an additional type of account, such as a credit card account or a loan account. Such accounts may have different limitations or options.

Hints

- Review class inheritance prior to starting. You will need to understand inheritance in order to create all of the necessary classes as required by this assignment.

- To round the account balance after adding interest, use the `round()` function in Python to round a number to the desired precision (number of decimal places). For example: \( x = \text{round}(x, 2) \)

Sample

Program execution:

```
What type of account would you like to track?
[c] Checking account
[s] Savings account
```
Enter an option: c

Great! I need some information to start:
What is the name of the account holder? DJ Holt
What is the account number? 8473218539
What is the starting balance? 1250.25
What is the overdraft limit? 100.00

What would you like to do?
[d] Deposit money
[w] Withdraw money
[q] Quit
Enter an option: d
How much do you want to deposit? 500.00
Your account balance is now $1750.25

What would you like to do?
[d] Deposit money
[w] Withdraw money
[q] Quit
Enter an option: w
How much do you want to withdraw? 1000.00
Your account balance is now $750.25

What would you like to do?
[d] Deposit money
[w] Withdraw money
[q] Quit
Enter an option: w
How much do you want to withdraw? 800.00
Whoa! Insufficient funds available.
Your account balance is now $-49.75

What would you like to do?
[d] Deposit money
[w] Withdraw money
[q] Quit
Enter an option: w
How much do you want to withdraw? 100.00
Bye! Your final account balance is $-49.75

What type of account would you like to track?
[c] Checking account
[s] Savings account
Enter an option: s

Great! I need some information to start:
What is the name of the account holder? DJ Holt
What is the account number? 8473218539
What is the starting balance? 1250.25
What is the interest rate? 2.5

What would you like to do?
[d] Deposit money
[w] Withdraw money
[a] Add monthly interest
Quit
Enter an option: d
How much do you want to deposit? 500.00
Your account balance is now $1750.25

What would you like to do?
[d] Deposit money
[w] Withdraw money
[a] Add monthly interest
[q] Quit
Enter an option: w
How much do you want to withdraw? 1000.00
Your account balance is now $750.25

What would you like to do?
[d] Deposit money
[w] Withdraw money
[a] Add monthly interest
[q] Quit
Enter an option: w
How much do you want to withdraw? 800.00
Whoa! Insufficient funds available.
Your account balance is now $750.25

What would you like to do?
[d] Deposit money
[w] Withdraw money
[a] Add monthly interest
[q] Quit
Enter an option: a
Monthly interest added!!
Your account balance is now $751.81

What would you like to do?
[d] Deposit money
[w] Withdraw money
[a] Add monthly interest
[q] Quit
Enter an option: q
Bye! Your final account balance is $751.81