COMP101 Lab9: Bank account report

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Requirements

The problem to solve were to write a program that will simulate a basic bank account operations (deposit and withdrawal). After inputting deposit and withdrawal amount from keyboard the program should calculate and display the details (name, account ID, balance) for all of accounts and whether debit card is allowed or not, overdraft limit, account fee for current account and an interest rate for deposit account. As for extended requirements, the additional sub-type of current account should be created – advantage account and add another attribute to all types – whether it has free travel insurance or not.

Analysis and design

I wrote this program in five classes. `BankAccountUser` – the user class for the program, `BankAccount` – the main program class and the subclasses `CurrentAccount` and `DepositAccount` and, for extended requirements, a subclass of `CurrentAccount`, `AdvantageAccount`.

In `BankAccount` class I created method `printBasics` to print the name, account number, balance and whether it has free travel insurance or not. `depositMoney` method adds deposit to balance and prints the results. `withdrawMoney` method subtracts withdrawal from balance if and only if the balance is greater than or equal zero, otherwise displays error. `returnInsurance` simply returns false and is needed to determine if the account has free travel insurance or not.
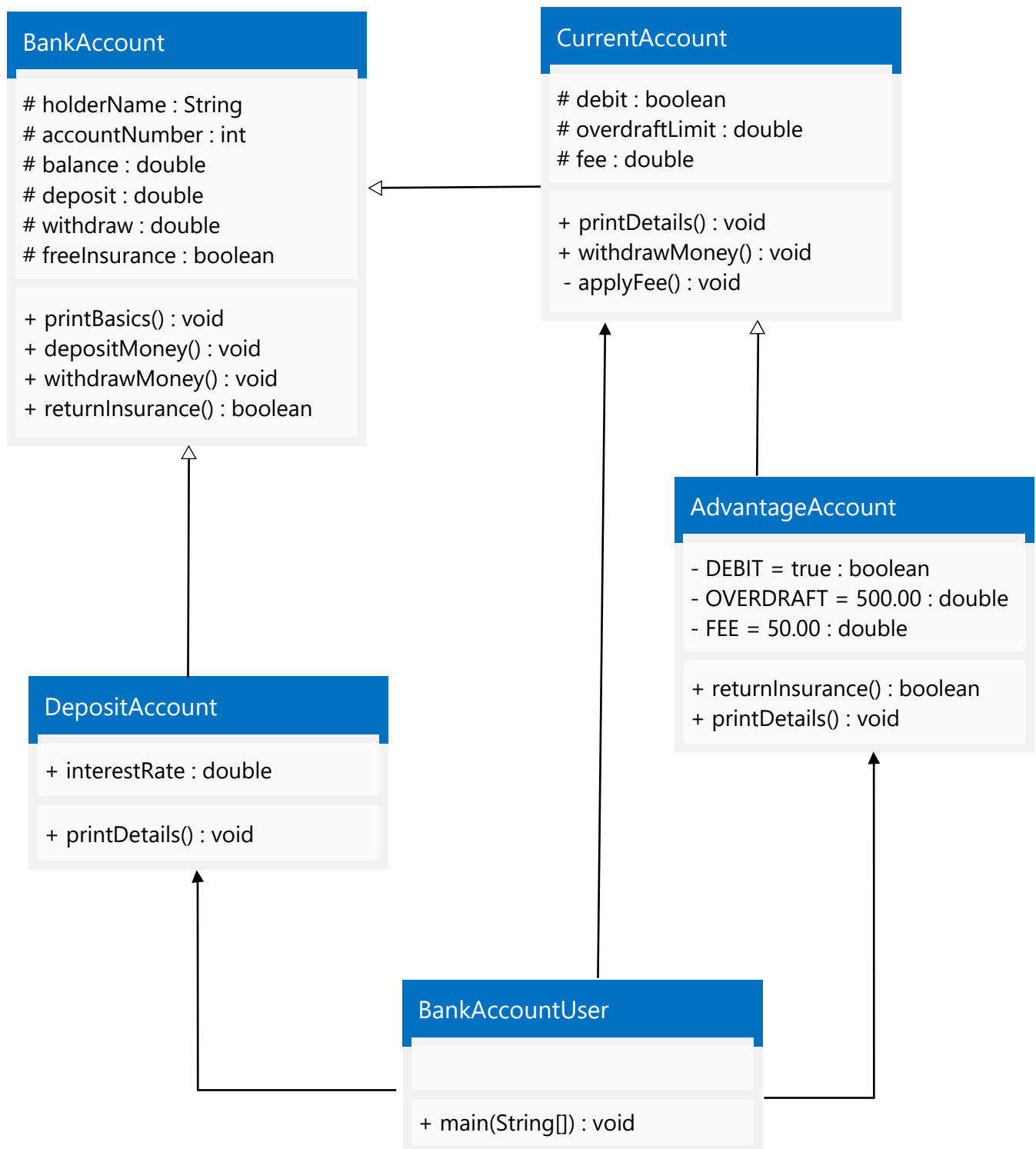
`DepositAccount` class is a subclass of `BankAccount`. I created a `printDetails` method to print deposit-related details (type, interest rate).

`CurrentAccount` class is a subclass of `BankAccount` and has a `printDetails` method to print type, whether the debit card is allowed or not, overdraft limit and the fee. `withdrawMoney` method overrides the superclass method and the difference is compared to overdraft limit instead of zero. `applyFee` method adds a fee to current balance and warns if the overdraft limit is exceeded.

`AdvantageAccount` class is a subclass of `CurrentAccount`. It has a fixed values of overdraft (500) and the fee (50). It also has a debit card allowed to true. `returnInsurance` method overrides the method in `BankAccount` class and returns true instead of false. `printDetails` prints type, debit card is allowed or not, overdraft limit and the fee.

In `BankAccountUser` class I created some constants to hardcode values used in program. I allowed to input deposit and withdrawal from keyboard and, if the value is outside the range, input again. I instantiated `CurrentAccount`, `DepositAccount` and `AdvantageAccount` objects and called `printBasics`, `printDetails`, `depositMoney` and `withdrawMoney` for each of them.

Class diagram

BankAccount

holderName : String
accountNumber : int
balance : double
deposit : double
withdraw : double
freeInsurance : boolean

+ printBasics() : void
+ depositMoney() : void
+ withdrawMoney() : void
+ returnInsurance() : boolean

CurrentAccount

debit : boolean
overdraftLimit : double
fee : double

+ printDetails() : void
+ withdrawMoney() : void
 - applyFee() : void

AdvantageAccount

- DEBIT = true : boolean
- OVERDRAFT = 500.00 : double
- FEE = 50.00 : double

+ returnInsurance() : boolean
+ printDetails() : void

DepositAccount

+ interestRate : double

+ printDetails() : void

BankAccountUser

+ main(String[]) : void

Pseudocode

```
METHOD printBasics
    INPUT
    OUTPUT
    PRINT the name of the holder, account number, balance and if it has free travel
        insurance or not
METHOD depositMoney
    INPUT
    OUTPUT
    PRINT the sum of balance and deposit
    SET the balance to them
METHOD withdrawMoney
    INPUT
    OUTPUT
    SET the temp as the difference of balance and withdraw amount
    IF temp < 0
        AND absolute of temp < overdraft limit (for current account) THEN:
            PRINT the error
    ELSE
            SET the balance to temp
            PRINT the balance
            CALL applyFee method (for current account)
METHOD applyFee
    INPUT
    OUTPUT
    SET the temp as difference of balance and fee
    IF temp < 0 AND absolute of temp < overdraft limit THEN:
            PRINT the warning
    SET the balance to temp
    PRINT the balance
```

Testing

I tested all needed input cases. Some of them are not listed because of obvious/similar behavior as listed below.

INPUT VALUES		EXPECTED RESULT		
Deposit	Withdrawal	Current account balance	Deposit account balance	Advantage account balance
400	50	After depositing: 400.00 After withdrawing: 350.00 After applying fee: 335.00	After depositing: 400.00 After withdrawing: 350.00	After depositing: 400.00 After withdrawing: 350.00 After applying fee: 300.00
400	500	After depositing: 400.00 After withdrawing: -100.00 After applying fee: -115.00	After depositing: 400.00 Display error After withdrawing: 400.00	After depositing: 400.00 After withdrawing: -100.00 After applying fee: -150.00

400	1000	After depositing: 400.00 Display error After withdrawing: 400.00	After depositing: 400.00 Display error After withdrawing: 400.00	After depositing: 400.00 Display error After applying fee: 400.00
200	390	After depositing: 200.00 After withdrawing: -190.00 Display warning After applying fee: - 205.00	After depositing: 200.00 Display error After withdrawing: 200.00	After depositing: 200.00 After withdrawing: -190.00 After applying fee: -240.00
300	790	After depositing: 300.00 Display error After withdrawing: 300.00	After depositing: 300.00 Display error After withdrawing: 300.00	After depositing: 300.00 After withdrawing: -490.00 Display warning After applying fee: -540.00
3 0 0 -2 -1 -3	-4 0 3 0 -3 4	Display error message and allow to re-enter values		

The finally working program returned:

CONSOLE

```
$java BankAccountUser
======= BANK ACCOUNT + EXTENDED =======
 This program simulates the basic bank account system.


 Give me the amount of money to deposit: 400

 Give me the amount of money to withdraw: 50



 John Smith's account
 ---------------------------------------
 Account number: 201123451
 Balance: 0.00
 Free travel insurance? false
 Type of account: Current
 Debit card allowed? false
 Overdraft limit: 200.00
 The fee: 15.00

 Depositing the money...

 The balance for John Smith is 400.00

 Withdrawing the money...

 The balance for John Smith is 350.00

 Applying the fee...
```

```
The balance for John Smith is 335.00


Annie Smith's account
---------------------------------------
Account number: 522531423
Balance: 0.00
Free travel insurance? false
Type of account: Deposit
Interest rate: 0.30

Depositing the money...

The balance for Annie Smith is 400.00

Withdrawing the money...

The balance for Annie Smith is 350.00


David Jones's account
---------------------------------------
Account number: 201024628
Balance: 0.00
Free travel insurance? true
Type of account: Advantage
Debit card allowed? true
Overdraft limit: 500.00
The fee: 50.00

Depositing the money...

The balance for David Jones is 400.00

Withdrawing the money...

The balance for David Jones is 350.00

Applying the fee...

The balance for David Jones is 300.00
$java BankAccountUser
 ======= BANK ACCOUNT + EXTENDED =======
 This program simulates the basic bank account system.


 Give me the amount of money to deposit: 400

 Give me the amount of money to withdraw: 500



 John Smith's account
 ---------------------------------------
 Account number: 201123451
```

```
Balance: 0.00
Free travel insurance? false
Type of account: Current
Debit card allowed? false
Overdraft limit: 200.00
The fee: 15.00

Depositing the money...

The balance for John Smith is 400.00

Withdrawing the money...

The balance for John Smith is -100.00

Applying the fee...

The balance for John Smith is -115.00


Annie Smith's account
---------------------------------------
Account number: 522531423
Balance: 0.00
Free travel insurance? false
Type of account: Deposit
Interest rate: 0.30

Depositing the money...

The balance for Annie Smith is 400.00

Withdrawing the money...

  ERROR: You don't have enough money to withdraw this amount.

The balance for Annie Smith is 400.00


David Jones's account
---------------------------------------
Account number: 201024628
Balance: 0.00
Free travel insurance? true
Type of account: Advantage
Debit card allowed? true
Overdraft limit: 500.00
The fee: 50.00

Depositing the money...

The balance for David Jones is 400.00

Withdrawing the money...

The balance for David Jones is -100.00
```

```
   Applying the fee...

   The balance for David Jones is -150.00

$java BankAccountUser
 ======= BANK ACCOUNT + EXTENDED =======
 This program simulates the basic bank account system.


 Give me the amount of money to deposit: 400

 Give me the amount of money to withdraw: 1000



 John Smith's account
 ----------------------------------------
 Account number: 201123451
 Balance: 0.00
 Free travel insurance? false
 Type of account: Current
 Debit card allowed? false
 Overdraft limit: 200.00
 The fee: 15.00

 Depositing the money...

 The balance for John Smith is 400.00

 Withdrawing the money...
    ERROR: The amount of money exceeds the overdraft limit. Can't withdraw money.

 The balance for John Smith is 400.00


 Annie Smith's account
 ----------------------------------------
 Account number: 522531423
 Balance: 0.00
 Free travel insurance? false
 Type of account: Deposit
 Interest rate: 0.30

 Depositing the money...

 The balance for Annie Smith is 400.00

 Withdrawing the money...

   ERROR: You don't have enough money to withdraw this amount.

 The balance for Annie Smith is 400.00


 David Jones's account
 ----------------------------------------
 Account number: 201024628
```

```
 Balance: 0.00
 Free travel insurance? true
 Type of account: Advantage
 Debit card allowed? true
 Overdraft limit: 500.00
 The fee: 50.00

 Depositing the money...

 The balance for David Jones is 400.00

 Withdrawing the money...
    ERROR: The amount of money exceeds the overdraft limit. Can't withdraw money.

 The balance for David Jones is 400.00

$java BankAccountUser
 ======= BANK ACCOUNT + EXTENDED =======
 This program simulates the basic bank account system.


 Give me the amount of money to deposit: 200

 Give me the amount of money to withdraw: 390



 John Smith's account
 --------------------------------------
 Account number: 201123451
 Balance: 0.00
 Free travel insurance? false
 Type of account: Current
 Debit card allowed? false
 Overdraft limit: 200.00
 The fee: 15.00

 Depositing the money...

 The balance for John Smith is 200.00

 Withdrawing the money...

 The balance for John Smith is -190.00

 Applying the fee...
   WARNING: The balance exceeded the overdraft limit.

 The balance for John Smith is -205.00


 Annie Smith's account
 --------------------------------------
 Account number: 522531423
 Balance: 0.00
 Free travel insurance? false
 Type of account: Deposit
```

```
Interest rate: 0.30

Depositing the money...

The balance for Annie Smith is 200.00

Withdrawing the money...

   ERROR: You don't have enough money to withdraw this amount.

The balance for Annie Smith is 200.00


David Jones's account
----------------------------------------
Account number: 201024628
Balance: 0.00
Free travel insurance? true
Type of account: Advantage
Debit card allowed? true
Overdraft limit: 500.00
The fee: 50.00

Depositing the money...

The balance for David Jones is 200.00

Withdrawing the money...

The balance for David Jones is -190.00

Applying the fee...

The balance for David Jones is -240.00

$java BankAccountUser
======= BANK ACCOUNT + EXTENDED =======
This program simulates the basic bank account system.


Give me the amount of money to deposit: 300

Give me the amount of money to withdraw: 790



John Smith's account
----------------------------------------
Account number: 201123451
Balance: 0.00
Free travel insurance? false
Type of account: Current
Debit card allowed? false
Overdraft limit: 200.00
The fee: 15.00

Depositing the money...
```

```
The balance for John Smith is 300.00

Withdrawing the money...
    ERROR: The amount of money exceeds the overdraft limit. Can't withdraw money.

The balance for John Smith is 300.00


Annie Smith's account
----------------------------------------
Account number: 522531423
Balance: 0.00
Free travel insurance? false
Type of account: Deposit
Interest rate: 0.30

Depositing the money...

The balance for Annie Smith is 300.00

Withdrawing the money...

    ERROR: You don't have enough money to withdraw this amount.

The balance for Annie Smith is 300.00


David Jones's account
----------------------------------------
Account number: 201024628
Balance: 0.00
Free travel insurance? true
Type of account: Advantage
Debit card allowed? true
Overdraft limit: 500.00
The fee: 50.00

Depositing the money...

The balance for David Jones is 300.00

Withdrawing the money...

The balance for David Jones is -490.00

Applying the fee...
    WARNING: The balance exceeded the overdraft limit.

The balance for David Jones is -540.00

$java BankAccountUser
======= BANK ACCOUNT + EXTENDED =======
This program simulates the basic bank account system.


Give me the amount of money to deposit: 3
```

```
Give me the amount of money to withdraw: -4

  ERROR: You entered incorrect data (out of range). Try again.

Give me the amount of money to withdraw:
```