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 |

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| --- |
| 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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 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: | |