

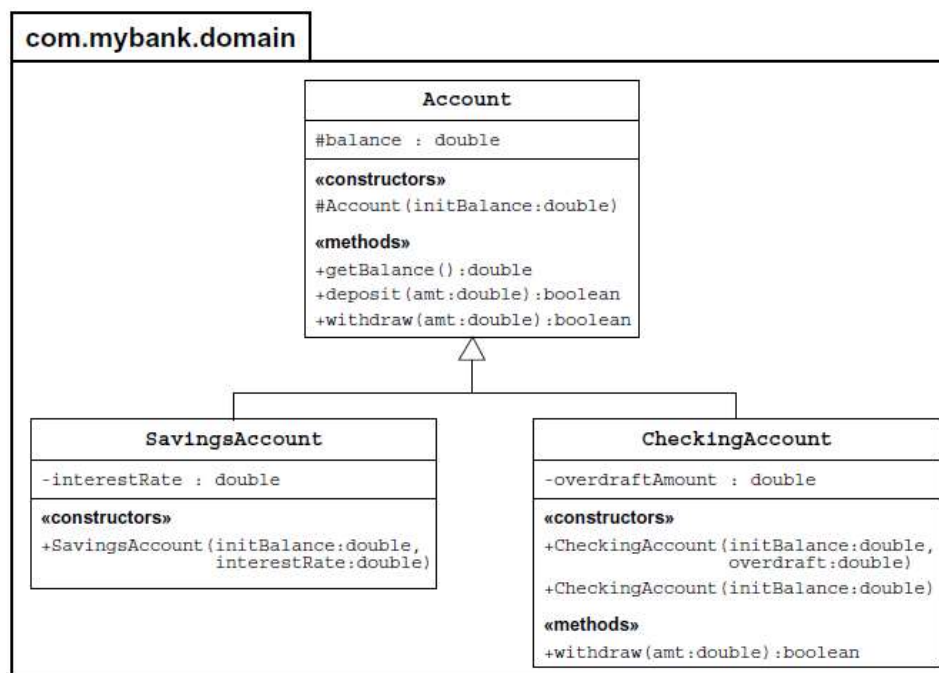
Class Design

Lab 8: Creating Bank Account Subclasses

In this exercise, you create two subclasses of the Account class in the BankProject: SavingsAccount and CheckingAccount. These account types have the following business rules.

- A savings account gains interest. The bank permits customers to store money in a savings account and, on a monthly basis, the savings account will accumulate based on the following formula: $\text{balance} = \text{balance} + (\text{interestRate} * \text{balance})$
- A checking account enables the customer to make any number of deposits and withdrawals. To protect their customers, the bank will permit a fixed amount of overdraft protection. This protection enables the customer's balance to drop below zero, but not below the amount of overdraft protection. The account's overdraft amount is decremented as it is used.

Figure below shows the UML class diagram for a design that satisfies the business rule described above.



1. Modify the Account class to satisfy the UML class diagram above. In particular, the balance instance variable and Account class constructor are now protected (indicated by the # character instead of the – character).
2. Create the SavingsAccount and CheckingAccount classes that satisfy the UML diagram above.
3. Delete the TestBanking class. Download the new TestBanking class and add it to the test package.
4. Run the test program. The output should be similar to the following.

Creating the customer Jane Smith.
Creating her Savings Account with a 500.00 balance and 3% interest.
Creating the customer Owen Bryant.
Creating his Checking Account with a 500.00 balance and no overdraft protection.
Creating the customer Tim Soley.
Creating his Checking Account with a 500.00 balance and 500.00 in overdraft protection.
Creating the customer Maria Soley.
Maria shares her Checking Account with her husband Tim.

Retrieving the customer Jane Smith with her savings account.
Withdraw 150.00: true
Deposit 22.50: true
Withdraw 47.62: true
Withdraw 400.00: false
Customer [Simms, Jane] has a balance of 324.88

Retrieving the customer Owen Bryant with his checking account with no overdraft protection.
Withdraw 150.00: true
Deposit 22.50: true
Withdraw 47.62: true
Withdraw 400.00: false
Customer [Bryant, Owen] has a balance of 324.88

Retrieving the customer Tim Soley with his checking account that has overdraft protection.
Withdraw 150.00: true
Deposit 22.50: true
Withdraw 47.62: true
Withdraw 400.00: true
Customer [Soley, Tim] has a balance of 0.0

Retrieving the customer Maria Soley with her joint checking account with husband Tim.
Deposit 150.00: true
Withdraw 750.00: false
Customer [Soley, Maria] has a balance of 150.0

Jane's savings account and Owen's checking account behave fundamentally as a basic bank account. But Tim and Maria's joint checking account has 500.00 worth of overdraft protected. Tim's transactions dip into that protection and therefore his ending balance is 0.00. His account's overdraft protection level is 424.88. Finally, Maria deposits 150.00 into this joint account; raising the balance from 0.00 to 150.00. The she tries to withdraw 750.00, which fails because neither the balance nor the overdraft protection can cover that requested amount.