**44-542 Object Oriented Programming**

**Lab06: NGTest**

**Objective:** Covers the creation and usage of **NGTesting**

**NOTE:**

* Do not hard code any values.
* Check the sample output to know how the results need to be printed.
* Read every instruction carefully and follow them strictly.
* Do not change the name of the attributes, and methods given below.
* Write comments appropriately for all the variables and methods.
* Generate **Javadoc** for all the classes of the project.
* Each and every class that you created for this assignment should include the information given below:

/\*\*

\* Class: 44542-NN Object-Oriented Programming

\* @author FirstName LastName

\* Description: Making sure everything works

\* Due: MM/DD/YY

\* I pledge that I have completed the programming assignment independently.

\* I have not copied the code from a student or any source.

\* I have not given my code to any other student and will not share this code with anyone under my circumstances.

\*/

Where NN is the section number.

**Steps for Project Creation:**

1. Create a project name **Lastname\_Lab06NGTesting** where Lastname is your last name.
2. Create the package name **banking.**
3. All classes for this assignment should be created in the **banking** package.
4. Check the sample output to know the proper appearance of your output.
5. Use shift+alt+f to indent your code.
6. Look at the assignment folder given to you to know how to write the test class. Refer **CustomerNGTest** class.
7. Test the **Account** and **Loan** classes
8. Test positive and negative test cases for each method in the the bove-mentioned classes.
9. You must use **@Test** annotation to run your test case.
10. All the instance variables should be private.

**Customer:**

This class contains the below attributes, shown in the table. All attributes are private.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Type** | **Attribute Description** |
| **dob** | **String** | Date of birth of customer. (DD/MM/YYYY) |
| **firstName** | **String** | First Name of the customer. |
| **lastName** | **String** | Last Name of the customer. |
| **income** | **double** | The income of the Customer. |

1. Write an augmented constructor with all class attributes in the same order.
2. Write getter and setter methods for the above mentioned attributes.
3. **toString():**This method return the String. Refer the following format.

Name: Barton, Clint

Date of Birth: 09/23/1994

income: 30000

**Loan:**

This class contains the below attributes, shown in the table. All attributes are private.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Type** | **Attribute Description** |
| **LoanAmount** | **double** | Amount needed for loan |
| **NoOfEMIs** | **int** | Months are required to clear the loan |
| **interestRate** | **double** | Interest to the loan |
| **status** | **String** | Status of loan |
| **LoanSanctionTime** | **LocalDateTime** | Date and time of transaction |
| **loanType** | **String** | Type of loan(Car**, House , Business**) |

1. Constructor: There will be one constructor with following prototype.

**public Transaction(String loanType, double loanAmount, int noOfEMIS, LocalDateTime loanSanctionTime)**

1. Write getter and setter methods for the above-mentioned attributes.
2. **toString():** This method returns the String. Refert the following format.

Car 2019-09-02T08:42:02 30000.00 5% 36

SUCCESS

**Account:**

This class contains the below attributes, shown in the table. All attributes are private.

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Type** | **Attribute Description** |
| **accountNumber** | **long** | Bank Account number |
| **customer** | **Customer** | Customer of an account |
| **balance** | **double** | Balance on account |
| **loan** | **ArrayList<loan>** | List of all loans on account |

1. Constructor: There will be one constructor with following prototype.

**public Account(long accountNumber, Customer customer, double balance)**

1. Write getter methods for all instance variables.

Write the following methods. All are public

1. **generateStatement():** This method generates the statement for an account in a specified format. An Interest rate of the corresponding loan type is provided. This method returns the generated statement as a String.

Name: Scamander, Newt

Income:30000  
Date of Birth: 02/24/1997  
Account Number: 3429587739

Account balance: $10000    
------------------------------------------------------------------------------  
Loan Type      Loan Time    Loan Amount    Interest Rate   No of EMI’s Status  
Car          2022-01-02T08:42:02    30000 5% 30

SUCCESS       
House        2022-01-12T14:41:42    60000 10% 40        FAILED  
Business      2022-01-22T18:22:13    $11000 15% 70

FAILED      
-------------------------------------------------------------------------------  
Total EMI per Month: $1065.88

1. **emiCalculator(Loan loan)**: This method is of return type double and returns the monthly EMI of a loan by taking the loan object as a parameter.

**Note**: EMI = [P x r x (1+r)^n]/[(1+r)^n-1]

Where,

P = Principal amount of the loan

r = Rate of interest per month (annual rate divided by 12)

n = Total number of monthly installments

1. **emiAmount(ArrayList<Loan> loans):** This method is of return type double and returns the total EMI payment of all eligible loans of a customer in a month by taking arraylist of loans as a parameter
2. **applyLoan(Loan loan):** This method takes the loan object as a parameter and returns status (Ex: Insufficient balance, more expected loan amount,more expected EMI rate,low income) of the loan as String. This method performs actions, based on the loan type. See below for instructions for recording each transaction. After the transaction, add that one to the list.

For any type of loan, the loan object is added to the **loan** Array List after updating its status.

**Note**: The EmiAmount refers to the total EMI payment in the current month.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Income** | **Loan type** | **Eligible loan amount** | **Eligible No of EMI’s** | **Interest Rate** |
| >25000 | Car | 50000 | 36 | 5% |
| >50000 | House | 100000 | 60 | 10% |
| >75000 | Business | 150000 | 84 | 15% |

The Customer’s available balance is less than 30% of their income

* set interest rate to 0%
* status to "FAILED"
* return “Insufficient account balance”

If the Loan type is Car and the customer’s income is less than 25000 or the loan amount is greater than the eligible loan amount or the No of Emi’s greater than the Eligible No of EMI’s then

* set interest rate to 0%;
* status to "FAILED"
* return “low income” or “more expected loan amount” or “more no of expected EMIS”

else

* set interest rate to 5%
* status to "SUCCESS"
* return “loan sanctioned”

If the Loan type is House and the customer’s income is less than 50000 or the loan amount is greater than the eligible loan amount or the No of Emi’s greater than the Eligible No of EMI’s then

* set interest rate to 0%;
* status to "FAILED"
* return “low income” or “more expected loan amount” or “more no of expected EMIS”

else

* set interest rate to 10%
* status to "SUCCESS"
* return “loan sanctioned”

If the Loan type is Business and the customer’s income is less than 75000 or the loan amount is greater than the eligible loan amount or the No of Emi’s greater than the Eligible No of EMI’s then

* set interest rate to 0%;
* status to "FAILED"
* return “low income” or “more expected loan amount” or “more no of expected EMIS”

else

* set interest rate to 15%
* status to "SUCCESS"
* return “loan sanctioned”

**Sample Output:**

|  |
| --- |
| ------------------------------------------------------------  Name of the customer: Clint Barton  ------------------------------------------------------------  The Car loan status was a success with loan sanctioned for the amount of $30000 with a 5% Interest rate and 30-month EMI  The House loan status was a failed with low income for the amount of $60000 with a 0% Interest rate and 40-month EMI  The Business loan status was a failed with low income for the amount of $110000 with a 0% Interest rate and 70-month EMI  ------------------------------------------------------------  Name of the customer: Anthony Stark  ------------------------------------------------------------  The Car loan status was a failed with insufficient balance for the amount of $20000 with a 0% Interest rate and 32-month EMI  The House loan status was a failed with insufficient balance for the amount of $60000 with a 0% Interest rate and 56-month EMI  ------------------------------------------------------------  Name of the customer: Steven Rogers  ------------------------------------------------------------  The Car loan status was a failed with more expected loan amount for the amount of $60000 with a 0% Interest rate and 33-month EMI  The House loan status was a failed with more no of expected EMI's for the amount of $70000 with a 0% Interest rate and 70-month EMI  The Business loan status was a success with loan sanctioned for the amount of $110000 with a 15% Interest rate and 80-month EMI  ------------------------------------------------------------  Name of the customer: Pepper Potts  ------------------------------------------------------------  The Car loan status was a success with loan sanctioned for the amount of $30000 with a 5% Interest rate and 10-month EMI  The Car loan status was a success with loan sanctioned for the amount of $30000 with a 5% Interest rate and 15-month EMI  The Car loan status was a success with loan sanctioned for the amount of $40000 with a 5% Interest rate and 15-month EMI  The Car loan status was a success with loan sanctioned for the amount of $40000 with a 5% Interest rate and 10-month EMI  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  \*\*\*\*\*\*\*\*\*Invoke emiPayment() on Account objects\*\*\*\*\*\*\*\*\*\*  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Clint has an EMI payment of $1065.88 per month.  Anthony has an EMI payment of $0.00 per month.  Steven has an EMI payment of $2183.12 per month.  Pepper has an EMI payment of $11985.15 per month.  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  \*\*\*\*Invoke generateStatement() on all objects in accounts ArrayList\*\*\*\*  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Name: Barton, Clint  Income: $30000  Date of Birth: 09/23/1994  Account Number: 3429587739  Account balance: $10000  -------------------------------------------------------------------------  ------  Loan Type Loan Sanction Time Loan Amount Interest Rate No of EMIs  Status  Car 2022-01-02T08:42:02 $30000 5% 30  SUCCESS  House 2022-01-12T14:41:42 $60000 0% 40  FAILED  Business 2022-01-22T18:22:13 $110000 0% 70  FAILED  ------------------------------------------------------------------------  -------  Total EMI per Month: $1065.88  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Name: Stark, Anthony  Income: $20000  Date of Birth: 02/24/1982  Account Number: 8547648954  Account balance: $800  -------------------------------------------------------------------------  ------  Loan Type Loan Sanction Time Loan Amount Interest Rate No of EMIs  Status  Car 2022-05-24T14:23:34 $20000 0% 32  FAILED  House 2022-08-22T16:22:54 $60000 0% 56  FAILED  ------------------------------------------------------------------------  -------  Total EMI per Month: $0.00  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Name: Rogers, Steven  Income: $80000  Date of Birth: 07/04/1997  Account Number: 3784563478  Account balance: $40000  -------------------------------------------------------------------------  ------  Loan Type Loan Sanction Time Loan Amount Interest Rate No of EMIs  Status  Car 2022-04-02T09:32:04 $60000 0% 33  FAILED  House 2022-10-12T15:41:32 $70000 0% 70  FAILED  Business 2022-11-22T14:25:16 $110000 15% 80  SUCCESS  ------------------------------------------------------------------------  -------  Total EMI per Month: $2183.12  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Name: Potts, Pepper  Income: $28000  Date of Birth: 10/20/1990  Account Number: 3454543934  Account balance: $25000  -------------------------------------------------------------------------  ------  Loan Type Loan Sanction Time Loan Amount Interest Rate No of EMIs  Status  Car 2022-07-15T09:42:04 $30000 5% 10  SUCCESS  Car 2022-08-14T04:54:36 $30000 5% 15  SUCCESS  Car 2022-02-22T04:05:06 $40000 5% 15  SUCCESS  Car 2022-09-21T00:12:56 $40000 5% 10  SUCCESS  ------------------------------------------------------------------------  -------  Total EMI per Month: $11985.15  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* |
|  |

**Submit your solution by following the steps below:**

* Save your files in NetBeans.
* Zip your entire Project. (File name should be LastnameFirstnameLab06.zip)
* After successful submission, download the Zip file that you have submitted.
* Look in the Zip file and verify the class files, javadocs in the Zip folder are updated. If not, resave your project in NetBeans and resubmit.