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Class and Section \_CSC201 M6\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Points (50 points) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Project: Account Class**

CSC 201 – Computer Science I

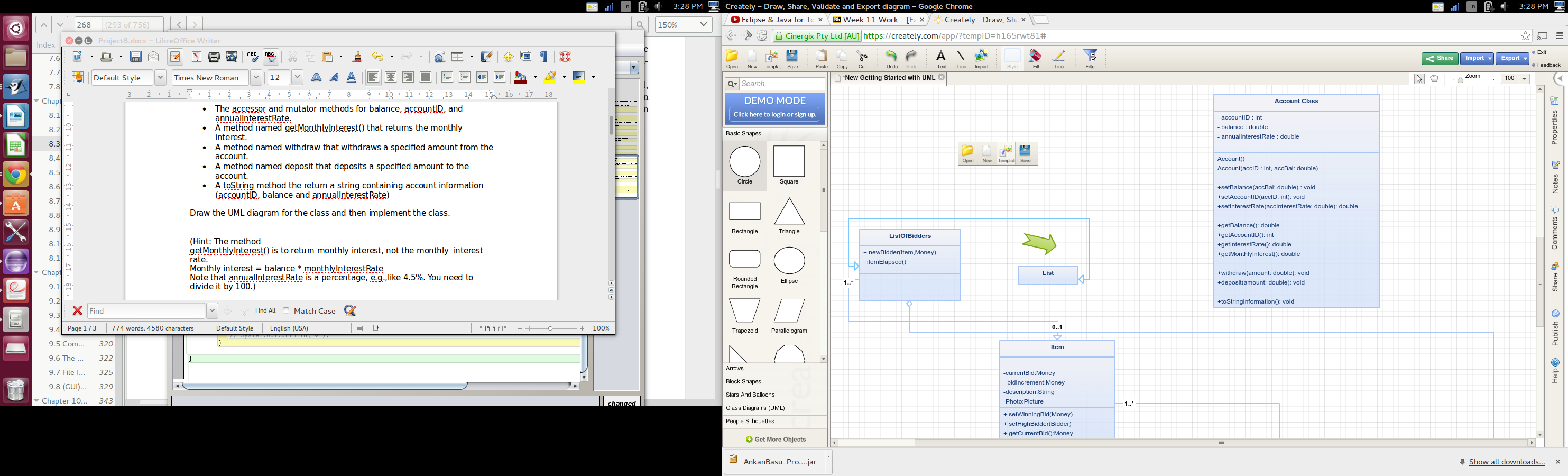
New River Community College

Problem Description:

Design a class named Account that contains:

* A private int data filed named accountID for the account
* A private double data field named balance for the account.
* A private double data field named annualInterestRate that stores the current interest rate. Assume all accounts have the same interest rate.
* A no-arg constructor that creates a default account.
* A constructor that creates an account with the specified account ID and balance
* The accessor and mutator methods for balance, accountID, and annualInterestRate.
* A method named getMonthlyInterest() that returns the monthly interest.
* A method named withdraw that withdraws a specified amount from the account.
* A method named deposit that deposits a specified amount to the account.
* A toString method the return a string containing account information (accountID, balance and annualInterestRate)

**Draw the UML diagram for the class and then implement the class.**



(Hint: The method

getMonthlyInterest() is to return monthly interest, not the monthly interest rate.

Monthly interest = balance \* monthlyInterestRate

Note that annualInterestRate is a percentage, e.g.,like 4.5%. You need to divide it by 100.)

**Write a test program that will ask the users to enter their account ID**, **balance in their account and annual interest rate.** Then it creates the account object and print the account ID, balance, and the annual interest rate.

Prompt the user whether they have a transaction. If they have, ask for the following info:

1. Amount and transaction type (0 for withdrawal and 1 for deposit)
2. Number of days passed since the previous transaction.

Your program should calculate the current balance and display that along with the accountID

The above process repeats as long as the user has a transaction.

During a withdrawal, if the balance would become negative, that transactions should be cancelled. The user should be reported about the cancelled transaction

**Sample Run:**

Please enter your account ID (an Integer Value): 1212

Please enter your initial balance: 3000

Please enter the interest rate of your account: 12.0

Initial Account Information

The account ID is: 1212

The balance is: $3,000.00

The annual interest rate is 12.0%

Do you have a transaction? Type 1 for yes; or 0 for No: 1

What type of transaction? Type 0 for withdrawal and 1 for deposit: 1

What is the amount of transaction? 1000

How many days have passed since the previous transaction? 30

The account ID: 1212

The balance in your account is: $4,030.00

Do you have a transaction? Enter 1 for yes; or 0 for No: 1

What type of transaction? Type 0 for withdrawal and 1 for deposit: 0

What is the amount of transaction? 5000

How many days have passed since the previous transaction? 30

You can't withdraw that amount. Transaction cancelled

The account ID: 1212

The balance in your account is: $4,070.30

Do you have a transaction? Enter 1 for yes; or 0 for No: 1

What type of transaction? Type 0 for withdrawal and 1 for deposit: 0

What is the amount of transaction? 500

How many days have passed since the previous transaction? 0

The account ID: 1212

The balance in your account is: $3,570.30

Do you have a transaction? Enter 1 for yes; or 0 for No: 0

**Analysis:**

(Describe the purpose, processing, input and output in your own words.)

The purpose of the program is to develop an “Account” class template and a “testAccount” class to use an object of the “Account” class. The “Account” class consists of all of the required fields and methods for a bank account. Data fields are protected.

Processing of the program requires multiple user inputs and updating the bank account as per user request in addition to updating the account with earned tax amount.

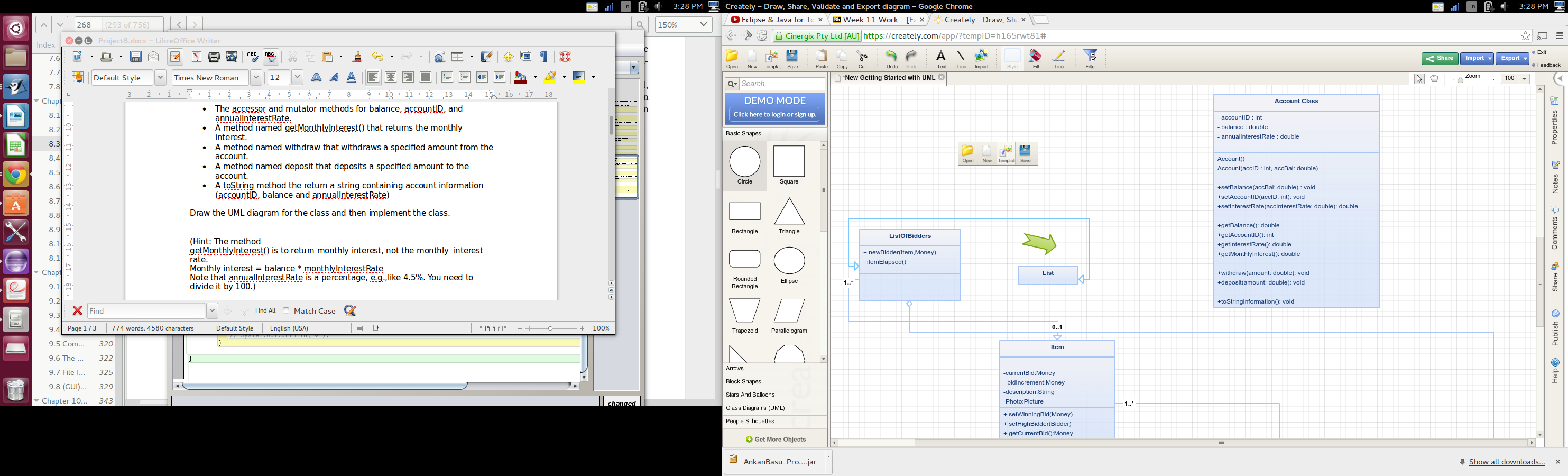
All of the user inputs are checked for errors. A summary of error validation is presented in the table below:

|  |  |
| --- | --- |
| Error validation for: | Valid range |
| Account ID | (0-infinity) Positive Integers only |
| Initial Balance | (0-infinity) Positive number, double |
| Annual Interest Rate | (0-100) double |
| Do you have a transaction | * 1. 0 and 1 only, integer |
| What type of transaction | * 1. 0 and 1 only, integer |
| Days passed | (0-infinity) Positive Integers only |
| Amount of transaction | (0-infinity) double |
| For withdrawal | Withdrawal must be <= available amount |

**Design:**

(Draw the UML diagram for the Account Class. Give the step of processing in the TestAccount class.)

UML Diagram for Account Class:



UML Diagram for an object “myAccount” from Account class:

|  |
| --- |
| myAccount = Account |
| AccountID  Balance  annualInterestRate |

Steps for processing an account from the testAccount Class:

1. **ask the users to enter their account ID**, **balance in their account and annual interest rate.**

|  |
| --- |
| //get all necessary user inputs to set up an account.  System.out.print("Please enter your account ID (an Integer Value): ");  int ID = validateAccountID(); // get account id from the user    System.out.print("Please enter your initial balance: ");  double yourBalance = validateInitialBalance(); //get initial balance from the user    System.out.print("Please enter the interest rate of your account: ");  double yourIntRate = validateIntererstRate(); //get interest rate from the user |

1. Then it creates the account object and print the account ID, balance, and the annual interest rate.

|  |
| --- |
| //create the account object and print the account ID, balance, and the annual interest rate.  Account yourAccount = new Account(); // create a new object of Account Class  yourAccount.setAccountID(ID); // updated account id in the object  yourAccount.setBalance(yourBalance); // update initial balance in the account object  yourAccount.setInterestRate(yourIntRate); // update interest rate in the account object |

1. Prompt the user whether they have a transaction.
2. Ask for the Amount and transaction type (0 for withdrawal and 1 for deposit)
3. Ask for the Number of days passed since the previous transaction.
4. Calculate the current balance and display that along with the accountID
5. Repeat as long as the user has a transaction.

**Testing: (Describe how you test this program)**

Test 1: Incomplete program. Testing for object creation part mainly and error validation during object creation.

|  |
| --- |
| Project7.main({ });  VM terminated.  yourAccount.main({ });  Please enter your account ID (an Integer Value):  re  You have entered non numeric selection.  Please correct your selection: 123  Please enter your initial balance:  sd  You have entered non numeric selection.  Please correct your selection: 100  Please enter the interest rate of your account:  sd  You have entered non numeric selection.  Please correct your selection: 12  The account ID is: 123  The balance is: 100.0  The annual interest rate is 12.00%Do you have a transaction? Type 1 for yes; or 0 for No: |

**Sample debug 2: Problem with withdraw or deposit.**

|  |
| --- |
| Exception occurred.  yourAccount.main({ });  Please enter your account ID (an Integer Value):  12  Please enter your initial balance:  1000  Please enter the interest rate of your account:  12  The account ID is: 12  The balance is: 1000.0  The annual interest rate is 12.00%  Do you have a transaction? Type 1 for yes; or 0 for No:  1 |

**Sample debug 3: getting wrong interest. Need to fix formula**

|  |
| --- |
| yourAccount.main({ });  Please enter your account ID (an Integer Value):  1211  Please enter your initial balance:  3000  Please enter the interest rate of your account:  12  The account ID is: 1211  The balance is: 3000.0  The annual interest rate is 12.00%  Do you have a transaction? Type 1 for yes; or 0 for No:  1  What is the amount of transaction?  1000  How many days have passed since the previous transaction?  30  The account ID is: 1211  The balance is: 4040.0  The annual interest rate is 12.00% |

**Sample debug 4:** Fixed logic to calculate tax and update account properly. Now only need to worry about text formatting!!

|  |
| --- |
| yourAccount.main({ });  Please enter your account ID (an Integer Value):  1212  Please enter your initial balance:  3000  Please enter the interest rate of your account:  12  The account ID is: 1212  The balance is: 3000.0  The annual interest rate is 12.00%  Do you have a transaction? Type 1 for yes; or 0 for No:  1  How many days have passed since the previous transaction?  30  What is the amount of transaction?  1000  The account ID is: 1212  The balance is: 4030.0  The annual interest rate is 12.00% |

**Sample debug 5 : updated text formatting. If no transaction, exit system.**

|  |
| --- |
| Please enter your initial balance: 3000  Please enter the interest rate of your account: 12  Initial Account Information  The account ID is: 1213  The balance is: 3000.0  The annual interest rate is 12.00%  Do you have a transaction? Type 1 for yes; or 0 for No:  0  VM terminated. |

**Final Debug to match example output:**

|  |
| --- |
| testAccount.main({ });  Please enter your account ID (an Integer Value): 1213  Please enter your initial balance: 3000  Please enter the interest rate of your account: 12  Initial Account Information:  The account ID is: 1213  The balance is:$ 3000.00  The annual interest rate is 12.00%  ---------------------------------------------------------  Do you have a transaction? Type 1 for yes or 0 for No: 1  What type of transaction? Type 0 for withdrawal and 1 for deposit: 1  How many days have passed since the previous transaction? : 30  What is the amount of transaction? :1000  The account ID: 1213  The balance in your account is: $ 4030.00  -------------------------------------------------------------------  Do you have a transaction? Type 1 for yes or 0 for No: 1  What type of transaction? Type 0 for withdrawal and 1 for deposit: 0  How many days have passed since the previous transaction? : 30  What is the amount of transaction? :5000  You can't withdraw that amount. Transaction cancelled.  The account ID: 1213  The balance in your account is: $ 4070.30  -------------------------------------------------------------------  Do you have a transaction? Type 1 for yes or 0 for No: 1  What type of transaction? Type 0 for withdrawal and 1 for deposit: 0  How many days have passed since the previous transaction? : 0  What is the amount of transaction? :500  The account ID: 1213  The balance in your account is: $ 3570.30  -------------------------------------------------------------------  Do you have a transaction? Type 1 for yes or 0 for No: 0  Good Bye  VM terminated. |

How to submit your assignment

1. Login Blackboard
2. Click on Assignments on the left
3. Click on Week 11 Work folder
4. Read the instruction there and submit the following items:

* Your jar file with source code. **The jar file without the source code will not be graded.** **The jar file should contain the source code for this project only. Remove all other java file you may have.** Please use the steps given on Project 1 Instructions to create your jar file. Rename your jar file as YourName\_Project8. Suppose your name is Susan Boyd, you should rename your jar file as SusanBoyd\_Project8. **Files with wrong name will not be graded.**
* This document with answers for analysis, design and testing. Rename this document as Project8\_Yourname. Suppose your name is Susan Boyd, you should rename this document as Project8\_SusanBoyd. **Files with wrong name will not be graded.**

This document is worth 10 points and the comments in your program is worth 10 points. Working code is worth 30 points.