VIT®
Vellore Institute of Technology
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School of Computer Science and Engineering
Mid Term Test, Winter Semester, 2020-21

Program: CSE1007- Java Programming Lab Time: 10-11.30PM

Slot: L21+L22 Date: 20-05-2021

Instructions:

1. Write your name, reg.no, slot and date and the components of program-1 and program-2.

2. The modulus 10 of your REGNO(Consider only numeric) is your questions.

3. You uploaded document must be question, algorithm, complete source code, and sample input and output.

   [If any error occurs, copy and paste the error details in the output part]

4. Save your document with regno_questionno.docx and upload the code using the link VTOP. You have to upload the document before 11.30AM today(20.05.2021). If you upload the document after this period will not consider for evaluation.

Questions:

(0) Create a package by name Number. Include a class AmicableNumbers within the package. The class AmicableNumbers should have a method that accepts two numbers and checks if they are Amicable Numbers or not. Amicable numbers are two different numbers so related that the sum of the proper divisors of each is equal to the other number. (A proper divisor of a number is a positive factor of that number other than the number itself. For example, the proper divisors of 6 are 1, 2, and 3.) For example, the smallest pair of amicable numbers is (220, 284); for the proper divisors of 220 are 1, 2, 4, 5, 10, 11, 20, 22, 44, 55 and 110, of which the sum is 284; and the proper divisors of 284 are 1, 2, 4, 71 and 142, of which the sum is 220. Create a main class that uses the class defined in the package Number. The main class should be declared outside this package.

(1) VIT PAT Office has shortlisted merit students from B.Tech 2020 batch, possessing programming skill in Java for an internship. Create a class 'StudentDetails' with instance members – Register Number, Name, Mobile Number, Aadhar Number and Passport Number. Write a program to read the details of the student and validate the Mobile Number and Passport Number. A valid Mobile Number has 10 characters. If the Mobile number read is not valid throw a user defined exception "InvalidMobileNumberException". A valid Passport Number has 8 characters, where the first character is an uppercase alphabet followed by 7 digits. Example – R1234567. If the Passport Number read does not meet the above criteria throw an user-defined exception "InvalidPassportNumberException". Write a main class that creates an object of type StudentDetails only when the input details are valid.

(2) Three candidates OPS, EPS and Stalin of Tamilnadu to contest for the Chief Minister election with the total strength of 240 MLAs. Write a Java program to simulate the vote casting by generating 240 random numbers (1 for OPS, 2 for EPS and 3 for Stalin) and store them in an array. Create four threads to equally share the task of

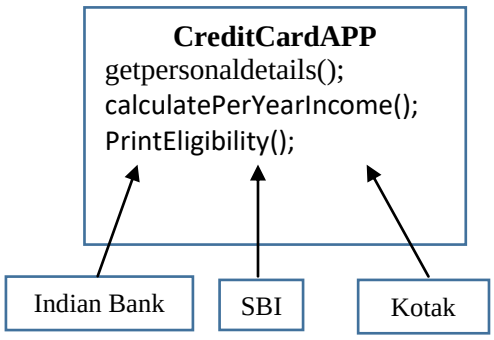
counting the number of votes cast for all the three candidates. Use synchronized method or synchronized block to update the three count variables. The main thread should receive the final vote count for all three contestants and decide the Chief Minister based on the values received.

(3) An industry named "ABC pvt ltd." needs to store the employee details in their system. The details include ID, name, designation, salary, etc. Create a class to store the Employee records such as Employee ID, Name, Salary, etc. Implement linked list and store each record in a node. Write a Java program to retrieve first and last occurrence of a given salary amount and remove the corresponding records without using inbuilt functions.

(4) Write a Java program to create a class Person that implements serialization concept with name,age and anuual income of a person as its data members. Store the state of objects of this class in a file. Write another class that reads the objects of the Person class from the file. For each object of the class stored in the file, check the age of the person.

- If the age of a person exceeds 65, then categorize the person as very old.
- If the age of a person exceeds 45, then categorize the person as old.
- If the age of a person exceeds 25 but is less than 45, then categorize the person as very old.
- If the age of a person exceeds 65, then categorize the person as young.
- If the age of a person is less than 25, then categorize the person as very young.

(5) The bank association has decided to automate the credit card application process in using common methods.

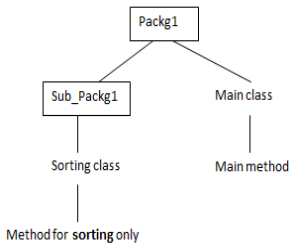


CreditCardAPP Interface methods: - The methods inside the credit card app has to be redefined in individual bank classes.

- getpersonalDetails – Method receives the name, mob, address, nominee, age, email for a customer.
- CalculatePerYearIncome – Take input of gross salary.
    - NetSalPerMonth = GrossSalary – (GrossSalary * 0.2)
    - PerYearIncome = NetSalPerMonth *12
- PrintEligibility – This is decided based on previous loan EMI. Get the input of EMI that an employee pays per month
    - EligibilityScore = 3. If employee does not pays any EMI.
    - EligibilityScore= 2. If employee pays EMI for less than 20% of his perYearIncome.
    - EligibilityScore=1. If employee pays EMI for less than 40% of his perYearIncome.
    - EligibilityScore=0. If employee pays EMI for less than 60% of his perYearIncome.

Write a Java program that creates the banking class for individual banks like Indian Bank, SBI and Kotak. Redefine the methods of the interfaces in all classes.

(6) There is a waiting line outside a movie theatre. Everyone has ticket on which seat number is written. Write a java program to sort everyone according to their seat number so that everyone can be seated and enjoy the movie. Write a program using user defined package.



Call the sorting method into main method for processing.

(7) Mr. X is maintaining two arrays where the first one holds the employee IDs and the other with the number of days, he/she is present in this month. The employer wants to identify the employees those who are present for less than 10 days. In this case, you should sort the employees by creating Java program with the support of collections for sorting the same. The program should print the output of the attendance from low to high. An example is shown below: Example: N=6 Attendance: [20, 3, 7, 25, 30, 29] Output: Attendance: [3, 7, 20, 25, 30, 29].

(8) (a) Create an interface named capstone with necessary abstract methods in Package 1. Implement the interface to create classes like Inhouse, PAT_Internship and NonPAT_Internship with required data members and methods in Package 2. Define an object of each child classes with parent reference and print the info in subPackage 2.

b. Create an abstract class named capstone with necessary abstract methods in Package 1 and define classes like Inhouse, PAT_Internship and NonPAT_Internship

with required data members in sub package 1. Get a choice from student and based on the input from student, create parent reference to hold the respective child object and print the details in Package 2

(9) A Mediation centre wants to encourage young generation to practice yoga and meditation. It offers 15% discount for youth below 21 years, 30% discount for those who are below 14 years. Define a class to store the member details along with discount they get, if any. Store atleast three member objects in a File. The coordinator of the centre reads the file and wants to know the number of people who got discounts 0%, 15% and 30% respectively. Develope Java program to display the counts after reading the file.