Navrachana University, Vadodara

School of Engineering and Technology
Department of Computer Science and Engineering
Course: CS348/CS350 Core Java Programming/Lab
Practical Assignment

Date : 10th Aug 2022

Instructions

- Implement the given Questions using Object Oriented concepts in Java programming language.
- Use meaningful and descriptive variable/identifier names:
  Good variable names (camelCase): rollNo, studentName, empSalary, salesPrice, taxRate,
  Every Program should have header and footer having following information in multi-line comments
  '''
  @author: RollNo Firstname Lastname
  @description: Program No. - write short purpose/ description here
  '''
- Every Program should be with output of the Program in multi-line comment after the code of respective program.

- **Submission details:** Submit your assignment on **lms.nuv.edu.in** before the given submission date. Create one **.ZIP file** containing **all Java programs** (.py files) and **one word file.** Keep filename as **RollNo-Name-Assignment1.zip**.
- Programs submitted by a student should be the result of individual work based on his/her own efforts. Full or part of the code should not be copied from internet or from peer students or other sources. A student should not share/circulate the code/programs developed by them (for individual assignments) with their peers in any form. Violation of above will be considered as academic dishonesty and any such case will be strictly dealt with and liable to get zero in the evaluation.

1. Write a program to input roll no, student name, marks of physics, chemistry and maths out of 100. (0-100). Calculate total, percentage, calculate STATUS (pass, fail) if students scores above 40 in all the 3 subjects the STATUS should be pass otherwise fail. Calculate GRADE if STATUS is pass.
   Grade must be based on percentage value
   if percentage is above 70, then grade must be DISTINCTION
   if percentage is above 60, then grade must be FIRST CLASS
   if percentage is above 50, then grade must be SECOND CLASS
   if percentage is above 40, then grade must be PASS CLASS

2. Write a program which inputs a number. Display that number in word format.
   Eg.
   459 – Four Five Nine
   7091 – Seven Zero Nine One
   26 - Two Six
3. Write a program in Java to input n elements from keyboard. Store it to an array and sort in ascending or descending order as per user preference.
4. Write a Java Program to accept data from keyboard. Remove duplicates elements from an array.
5. Write an Object Oriented Program to perform following calculations for an 2-D array.
   Create a function which accepts data into 5x5 matrix. Input data to 4x4 matrix leaving last row and last column blank.
   Create a function to Calculate sum of corressponding row and columns in last row and column.

Create a function to display 5x5 matrix.
eg
1 3 2 1 7
2 1 4 6 13
1 1 1 1 4
2 3 4 1 10
6 8 11 9 34

6. Write an OOP to calculate exponent from inputted base and power value.
   Eg. Enter a base value : 3
   Enter a power value : 4
   For base 3 and power 4, the answer is 81
   Driver code:
   Base=MyNumber(3)
   Power=MyNumber(4)
   Exponent=Base^Power
   Exponent.display() #81
7. Design a class Number with only one variable. Add constructor, getter-setter for an instance variable. Write a member function which adds two values from two different objects storing answer to third object. Also add a function which performs exponents of base and power values stored in different objects.

```
eg Driver code below
Number n1=new Number(5);
Number n2=new Number();
n2.setX(3);
Number objsum=new Number();
n1.display();//5
n2.display();//3
objsum=n1.add(n2)
objsum.display();//output is 8

Number expo=new Number();
expo=n1.raisedTo(n2);
System.out.println(n1.getX()+" raised to "+n2.getX()+" is
"+expo.getX());
```

8. Program to print binary form a any number using 16 bit representation. (without library function) (You can use list for 16 bit representation)
   Eg. Enter any number : 20
   0000000000010100
   Enter any number -5
   1000000000000101
9. Write a OOP in Java to input empid, name, basic salary, no. of experience in yrs. Calculate hra(35% of basic), da (58% of basic) and pf (9.5% of basic).
   Also calculate bonus based on experience in years.
   If experience in years is >= 30, bonus must be 59% of basic,
   If experience in years is >=23, bonus must be 51% of basic,
   If experience in years is >=15, bonus must be 45% of basic,
   If experience in years is >=7, bonus must be 33% of basic,
   If experience in years is <7, bonus must be 16% of basic
   Calculate netsalary as basic+da+hra-pf+bonus.
10. Write a OOP program to input Customer id , Customer name, electricity unit charges used.

Calculate electricity bill according to the given condition:
For first 50 units Rs. 0.50/unit
For next 100 units Rs. 0.75/unit
For next 100 units Rs. 1.20/unit
For unit above 250 Rs. 1.50/unit
An additional surcharge of 20% is added to the bill

11. Q. Write an OOP program to accept two numbers and one mathematical operator. Calculate and display appropriate answer.
    Eg output
    Enter first number : 45
    Enter mathematical operator : +
    Enter second number : 60
    45 60 = 105
12. Write a program to check whether number is prime or not.
    Enter a number : 13
    13 is prime
    Enter a number : 45
    45 is not a prime number
13. Write a program to display set of prime numbers between the given input range from user.
    Enter start number : 10
    Enter end number : 30
    11,13,17,19,23,29
14. A program to check whether inputted string is palindrome or not.
    Eg Enter a name : liril
    Liril is a palindrome
15. Write a OO program to find Euclidean Distance. Also overload minus (operator) to find the same.
16. Write a OO program which have list with 10 elements.
17. Input data from keyboard in first 5 element. The last five elements must be
    a[5]=count of odd nos
    a[6]=count of even nos
    a[7]=sum of even nos
    a[8]=sum of odd nos
    a[9]=sum of first five
    Display the whole list.
18. Write an OOP program to with list of 5 elements. Find the max from inputted numbers without using any library function.

19. Write an OOP program with list of 5 elements. Add a function in class to sort the elements in ascending / descending order. [Note : Don't use any library function to Sort the list elements]

20. Calculate the area of triangle given its three sides.
    The formula or algorithm used is:
    Area = sqrt(s(s – a)(s – b)(s – c)), where s = (a + b + c) / 2 or perimeter / 2 and a, b & c are the sides of triangle.

21. An equation of the form is known as the quadratic equation. The values of x that satisfy the equation are known as the roots of the equation. A quadratic equation has two roots which are given by the following two formula

$$root1 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

$$root2 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

Write a program that requests the user to input the values of a,b, and c and outputs **root1** and **root2**.

22. Write a program to print following pattern. (hint: nested for loop)
Input number required no. of lines and pattern character from user.

```
@@@@@@
@@@@@
@@@@
@@@
@@
@
```

23. Write a OOP program to print following pattern. (hint: nested for loop)
Input number required no. of lines and pattern character from user.

```
          @
        @@@
      @@@@@
    @@@@@@@
  @@@@@@@@@
@@@@@@@@@@@
```

24. Write a program to print following pattern. (hint: nested for loop)
Input number required no. of lines.

```
      1
    121
  12321
 1234321
123454321
12345654321
```

25. Create a class Numerics in Java which contains
    a. Function to calculate factorial of a number.
    b. Function to display multiplication table of given number.
    NOTE : Do not use any library function.

26. Create a class in Java which contains
    a. Function to reverse a number.
    b. Function to check whether number is palindrome or not.

27. Write a program for lottery simulation. Generate 6 digit random number.

Allow user to input only 6 digit number.
If all the 6 digits matches then user wins 100000,
if 5 digits match in sequence then user wins 85000,
if 4 digits match in sequence then user wins 50000,
if 3 digits matches in sequence then user wins 20000,
if 2 digit matches user wins 2000.

28. Write a program which accepts the data of 5 cricket players (batsman) as follows.
    a) Name of the player
    b) Number of ODI's played/batted
    c) Total Runs scored by player in ODI

    Calculate the batting averages of all the players and display them.
    Also display the details of the players having maximum batting average and minimum batting average.

29. Design a voting application which imitates the current EVM's used in elections. In an EVM, add atleast 4 candidates with necessary details like id, name of candidate, name of the party, no. of votes, etc. .The voters can cast their votes in queue one by one. At the end provide facility to display results from EVM. Design appropriate classes for the required system.
30. Write a Java Class "MyArray". Create a function to find maximum from an array. Create another function which copies one array to another. Also add third function which sorts array in ascending or descending order. The format of sort function must be sort(String order)(Note : Do not use library functions for finding maximum, copying array and sorting.)

31. Write a program to create a class BankAccount, Inherit BankAccount to SavingsAccount and FixedDepositAccount. The savings account should allow customer to deposit and withdraw. The fixed-deposit account must calculate the due amount by inputting principal, rate of interest and no. of years value. (Note : Decide on your own the static variables, member variables, constructors, methods/functions to be created withing a program)

    Output flow:
        Bank of ABCD
    Enter Account Number :
    Enter Name of the accountholder :
    Choose your service from below option (Enter your choice)
    SavingsAccount
    Fixed Deposit
    Enter your choice : 1
    Your balance is: 50000
    Enter your transaction type
    Withdrawal
    Deposit
    Enter your choice 1
    Enter withdrawal amount : 20000
    Now your balance is 30000
    //////////////
    Bank of ABCD
    Choose your service from below option (Enter your choice)
    SavingsAccount

Fixed Deposit
Enter your choice : 2
Enter Principal amount : 30000
Enter no. of years : 6
The bank rate currently 6.7%, you will receive 52000 after 6 years.
(Formula : $A=P(1+R/100)^N$

32. Create abstract superclass Figure having abstract method def area ( ). Create concrete subclasses Rectangle and Circle of Figure which provide specific implementation of area ( ) method. Rectangle has length and breadth data-members while circle has radius data-member. Define parameterized constructors in both classes. In driver part create objects of Rectangle and Circle classes with suitable length, breadth and radius.

33. Write an Object-Oriented Program which reads texts from a file. It must display file statistics a below.
    a. No. of sentences.
    b. No. of words.
    c. No. of total characters (Does not include whitespace)
    d. No. of whitespaces
    e. Total no. of digits, uppercase and lowercase letters.
34. Write an Object Oriented Program which copies the content of one file to another file in uppercase.
35. Write an Object Oriented Program which creates vocabulary of words and also counts each word in a document.
    Eg. Content
    The birds are flying. The boy is walking. The Ganges are great river system. The Narmada river flows from rift valley.
    output :
    [(The,3), (birds,1), (are,1), (birds,1), (are,2), (flying,1), (boy,1), (river,2)]
36. Write an Object Oriented Program which imitates Banking Transaction for a Saving account on an ATM machine. Store BankCustomer details permanently in a file. The Software is operated by a Bank Customer through an ATM. After entering username and password(instead of card and pin), customer is allowed to view his details, Change his pin number, withdraw, deposit into his account. He must be able to transfer amount from his account to other also. (Use JSON data to handle a file)
    Below is the example flow
    Enter Username : Vrund
    Enter password : 123
    ////////////////////////////
    Name : Vrund
    Account no : 12345
    Balance : 45000
    Your Transaction
    1. Withdraw in-self
    2. Deposit in-self
    3. Deposit to Others
    4. password change
    Enter your choice : 1
    Enter Withdrawal Amount : 30000

20000 is a limit at one go
Now your balance is 28000
Your Transaction
1. Withdraw
2. Deposit
3. Deposit to Others
4. password change
Enter your choice : 1
Enter Withdrawal Amount : 7000
Transaction Successfull
Now your balance is 38000
Your Transaction
1. Withdraw
2. Deposit
3. Deposit to Others
4. password change
Enter your choice : 3
Enter amount to be deposited to Others account : 10000
Enter account no of your beneficiary : 12323434

37. Design an online examination for only 10 questions. Allow user to login, on success should start examination. There is no time limit. After last question result should be displayed. Maintain result user wise in database.
    [Note- Add 10 question and its option directly in database and also add 3 to 4 users]

38. Create a phone book to store name and contact no. Allow user to add, delete, update and insert details. Design proper interface for the same.

39. Design an StationaryItem class containing data members like itemid, itemname, itemprice, quantity in stock. The created instance of this class must be added to database tables. Design proper interface to interact with tables for performing all CRUD operation.
40. Write an OO program for surveying internet users for spending their time in minutes per day on YouTube, WhatsApp, Instagram, e-commerce sites and browsing. Display maximum, minimum and average time spent by users on each category. [Note : Use database for storage of data]
41. Write a Java program which finds sum, average, maximum, minimum value entered through command line arguments.

42. Using Database file, design a voting application which imitates the current EVM's used in elections. In an EVM, add atleast 4 candidates with necessary details like id, name of candidate, name of the party, no. of votes, etc. The voters can cast their votes in queue one by one. At the end provide facility to display results from EVM. Design appropriate classes for the required system. Store all information in MySQL Database file.

    Welcome to EVM
    1. Add Candidates
    2. Start Voting
    Enter your choice : 1

Enter Candidate ID: 111
Enter Candidate Name : Nayan
Enter Party Name : KJP
Candidate Added Successfully
1. Add Candidates
2. Start Voting
Enter your choice : 2

Voting Started
111 Nayan KJP
222 Pallavi CJP
333 Taral YJP
Enter id to vote : 222
Thank you for Voting, You may leave now
Voting Started
111 Nayan KJP
222 Pallavi CJP
333 Taral YJP
Enter id to vote : 111
Thank you for Voting, You may leave now
Voting Started
111 Nayan KJP
222 Pallavi CJP
333 Taral YJP

39. Create user defined exception named “CenturyException” which should be thrown if user inputs value is equal to or more than 100. (Note : Design it as a unchecked exception)
43. Create a child thread spawned from main thread which generates prime no. series starting from 2 upto limit value inputted from keyboard. Input limit value will be fetched by main thread.
44. Create a 3 child threads each printing multiplication table of a number. Manage threading system in such a manner that main thread terminates at last.
45. Create 3 child threads each printing multiplication table of a distinct number. Manage execution of thread in a synchronous manner. Input number from keyboard using main thread.
46. Write a Java program which creates 3 child threads where one thread prints uppercase letters, the second one prints lower case letters and last one 0 to 9. Manage thread execution in a manner that main thread ends at completion of task by child threads.
47. Synchronize above thread execution system to avoid context switching between child threads ie thread interruption and yielding does not takes place until running threads completes its whole task. (Extend question no. 4).
48. Using thread display digital clock in the format hour:minute:second format using thread which periodically refreshed every one second.

49. Write program to demo use of thread priority by creating two threads, one with high and other with low. Allow two threads to execute for some time and display its counter value.

50. Write a Java program which reads text file. File name should be passed as command line argument.
51. Write a Java program which counts
    - no. of characters (including spaces)
    - no. of white spaces
    - no. of digits
    - no. of symbols
    - no. of upper/lower case characters
    - no. of lines
    - no. of words
    - search and count of a word inputted by user from a text file.

52. Write a Java Program which accepts input from keyboard and save it to a text file.
53. Write a Java program which copies content of one file to another using stream.
54. Write a Java program which stores numeric values to a file and also display the stored data including sum of all the values.
55. Find maximum value from data stored in a file.
56. Write a program where one thread writes data to a file. After write operation gets over, other thread reads the file to display data. (Note : Use Synchronization, wait(), notify(), notifyAll() methods.
57. Write a java code to store Employee class objects in a file and also display the same. (Note : Use Serialization utilizing ObjectInput/Output streams.
58. Modifying the code for above program ie que 15 also display Employee details depending upon input made by user as employee id.
59. Write a menu driven program to Add, Delete, Update and display Employee records stored in a file.
60. Design an applet to display digital clock at top right corner of applet window using separate thread of execution.
61. Write an applet which displays vertical and horizontal moving banner using thread. Banner text must be passed as parameters from applet tag embedded in a html code.
62. Design an applet which have command buttons like Line, Circle, Rectangle. Clicking and drawing on which draws the shape also provide facility to draw shapes using selected colors using buttons controls.
63. Write a Desktop application which performs CRUD operation on Employee records stored in database.
64. Write a program to authenticate user login using database which registers new user, if already registered allow him to login and display appropriate message.
65. Write a menu driven program which displays, student details. Also facilitate to add, delete and update student details.
66. Design a calculator which have all standard functionalities.
67. Design a servlet which performs addition, subtraction and multiplication of two numbers entered in a textbox.
68. Design a servlet which performs CRUD operations on a Students database.