Department of computer Science and Engineering

National Institute of Technology Calicut

Monsoon Semester-2022-23

Assignment:7 CS 4097D Object-Oriented Systems Lab Date:26/09/2022

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1. Write a program to create Room class (assume shape of room as Rectangle), and the attributes of this class are length and breadth. The member functions are area and perimeter. Inside your Main class, read the values for length and breadth; create a Room object, and finally display your calculated area and perimeter by accessing the member functions.

   Sample Input:

   Enter the length:10
   Enter the breadth:20

   Sample Output:

   Area of Room :200
   Perimeter of Room :60

2. Create a class Employee that has employee Id (empId) and employee name (name) as fields. Define the getter and setter methods for the fields. Write a program to read the values to the N employee objects repeatedly and display the contents of the employee object as per the given sample output.

   Sample Input:

   Enter value for N: 2
   Enter EmpId of Object 1: CSE011
   Enter Name of Object 1: Anu
   Enter EmpId of Object 2: CSE012
   Enter Name of Object 2: Riya

   Sample Output:

   The Employees are:
   Anu (ID: CSE011)
   Riya (ID: CSE012)

3. Using a Java program read an integer array, and put the even and odd elements in two separate arrays in the increasing sorted order.

   Sample Input:
   Enter the array elements:7 6 9 2 4 1

Sample Output:
Even array: 2 4 6
Odd array: 1 7 9

4. Write a JAVA program to read an integer array, and find element that has the maximum and minimum value in the array

   Sample Input:
   25, 14, 56, 15, 36, 56, 77, 18, 29, 49

   Sample Output:
   Maximum value = 77
   Minimum value = 14

5. Create a Java program that can process the modified string to retrieve its original form. A string is converted to its modified form by taking the mid letter from the original string, placing it in the modified string, and deleting that letter from the original string. This process is repeated until all the letters from the original string get deleted. The modified string is filled from left to right. For a string of even length, choose the left letter as a mid-letter.

   For example:
   In the string OKAY, the middle letter will be K.
   In the string HEY, the middle letter will be E.

   For example:
   Input (i.e., Modified string) = RIOTGHLMAS
   Output (i.e., Original form) = ALGORITHMS

6. You are given a string S and its length n and you need to sort its characters based on their frequency. The characters in the output will be ordered based on their frequency in S, characters with higher frequency come first. If multiple characters have the same frequency, then display the character which comes first in the entered string.
   For example,

   Sample Input1:
   halalelluejah

   Sample Output1:
   llllaaahheeuj

   Sample Input2:
   aaaabeebccccc

Sample Output2:
cccccaaaabbee

7. Given that an integer x and an array of positive integers, write a JAVA program to find the numbers which appear more than x times and print them in decreasing order. If no number appears more than x times then print NULL.

   Sample Input:
   x = 1
   2 2 3 3 4 4

   Sample Output:
   4 3 2

8. Write a JAVA program to simulate a calculator where the user enters two integer numbers and an operator (+, -, *, /, %). The program then carries out the specified operation and displays the result. Use switch statements for implementing the program.

9. Joy is a faculty member working in xyz college. Joy is teaching numbers ordering. joy given a task, the task is to print the pattern if a number n is given. If n = 5, the pattern is as follows. Write a Java program to help Joy on this task.

   1
   2 6
   3 7 10
   4 8 11 13
   5 9 12 14 15

10. Write a menu-driven program to encode and decode a message(containing letters of alphabet only) using a key '***k***' and following the given rules:
    1. Encode the message by replacing each letter in the message by the next k^{th} letter in a circular way and converting its case.
    2. Decode the message by replacing each letter by the previous k^{th} letter in a circular way and converting its case.
    3. Keep the space as such.

    convertCase( ) - Convert the letter to the opposite case.
    circularEncode( ) - Read the message and the value for k and encode the message.
    circularDecode( ) - Read the message and the value for k and decode the message.

    Input format:

Input consists of multiple lines. Each line may contain a character from {e,d,t}
Character e: To encode the message and display the encoded message. The next two lines contain message and ***k***.
Character d: To decode the message and display the decoded message. The next two lines contain message and ***k***.
Character t : terminate the program.

Sample input:
e
Life is BeauTiful
3
d
dGUV yKUJGU
2
t

Sample output:
oLIH LV eHDXwLIXO
Best Wishes

11. Write a program to read a sentence (there should not be any digit character) and find the frequencies of vowels present in the sentence. Print the most frequent vowel along with its frequency. Assumption: There won't be more than one vowel having the highest frequency in the given sentence.

    Input format:
    A single line containing the sentence without any digit character.

    Output format:
    - If the input sentence does not contain any digit, then display the most frequent vowel in lowercase and its frequency separated by a single space. Otherwise, display "INVALID".
    - If there is no vowel character in the sentence, then display "NoVowel"

    Sample input:
    Honesty is the best policy.

    Sample output:
    e 3

12. Write a program to calculate tax paid by employees in a company. The employees having annual income less than 2.5 lakh per annum need not pay the tax (i.e, tax is 0). Others will be charged to pay tax (annual income*TaxPercentage). Identify the class, it's attributes and member functions; design accordingly.

Range of annual income (shown in lakhs)	TaxPercentage
2.5<= income< 10	10 %
income >= 10	20 %

Input format:

The first line specifies the number of employees, N (an integer greater than zero)
The next N lines specify the employee details (name and annual income) separated by a colon.

Output format:

- If the number of employees N given in input is not greater than zero, then display "INVALID"
- Otherwise display the name of the employee and the tax amount (rounded to 2 decimal places) separated by colon in each line.

Sample input:

3
Jennifer Sebastian:750000
Rahul Ram P:500000
Sanju Alex:25000

Sample output:

Jennifer Sebastian:75000.00
Rahul Ram P:50000.00
Sanju Alex:0.00