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Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 1, Semester 1 (2023)

IT1010–Introduction to Programming
Session 2B

Duration: 3 Hours

November 2023

Instructions to Candidates:

- This paper has 4 questions. Attempt all four questions.
- The total mark for the paper is 100.
- This paper contains 9 pages, including the cover page.
- Save all the programs in the given folder on your desktop with the given file names.
- Include your IT number in all your programs.
- DO NOT TAKE THIS PAPER FROM THE EXAMINATION HALL

Question 1 **(20 marks)**

Write a C program requesting users to enter any two positive integers. Please find the sum of all odd numbers between those two numbers.
Your program should validate that both numbers are positive. If it is not so, inform the user until he enters a positive integer. The user can enter a larger number as the first integer and a smaller number as the second integer.

```
Enter the first positive integer: 54
Enter the second positive integer: 34
Odd numbers between 34 and 54 are: 35 37 39 41 43 45 47 49 51 53
Sum of odd numbers between 34 and 54 is: 440
```

Save your program as **2BQ1.c**

Question 2 **(30 marks)**

Part 1

Write a C program to perform the tasks related to 1-D arrays.

a) Create three 1-D integer arrays **array1**, **array2**, and **array3** with the length of 7. **array1** should be initialized with the data given below and all the elements in **array2**, **array3** should be initialized to zero.

2	4	6	8	10	12	14

Use **for** repetition statements to perform the tasks in part b, c, and d.

b) Square each element in **array1** and store the results in **array2**.

c) Add the elements in **array1** and **array2** according to the following algorithm and store the results in **array3**.
array3[i] = array1[i] + array2[i], where i = 0,1,2,3,4,5,6.

d) Find the maximum value of the stored numbers in **array3** and its index, and display those according to the following format.

```
MaxIndex  Value
       6    210
```

Save your program as **2BQ2a.c**

Part 2

Write a C Program to perform a search in a 2D array.

a) Declare a 2D integer array called ***myArr*** of size 4 by 4.
b) Input set of **positive** numbers and store in the array.
   Enter 1,1 :.....
   Enter 1,2 :.....
   Enter 1,3 :.....
c) Display the array in the tabular format.

5	4	3	7
8	1	2	9
7	3	4	1
3	6	9	2

d) Input a number from the keyboard. Perform a search in the myArr array and display the location/s of the number.

   Input a number: 9
   You can find 9 at [1,3], [3,2]

   Input a number: 0
   Number not found.

Save your program as **2BQ2b.c**

Question 3 **(30 marks)**

Suwasetha hospital provides different types of accommodation facilities for their inpatients. The details are given below.

Accommodation Type	Description	The Charge Per Day (Rs.)
1	Deluxe Room	15000/=
2	Grand Deluxe	20000/=
3	Grand Suite	25000/=

a) Write a function called `calcPayment()` to calculate and return the payment of an inpatient when the medical charge, the accommodation type and no. of days stayed are passed as the parameters of the function.

Payment = Medical charge + Accommodation facility charge

The function prototype is given below.

```
float calcPayment(int type, int days, float medicalCharge)
```

b) The hospital has decided to offer several discounts for their inpatients.

- If the inpatient is a senior citizen, a discount of 10% will be given.
- If the inpatient is a loyalty member of the hospital, a discount of 20% will be given.

Write a function called `calcDiscount()` to calculate and return the discount amount when the following are passed as the parameters.

- If the inpatient is a senior citizen, value **Y** will be passed to the function and otherwise, value **N** will be passed.
- If the inpatient is a loyalty member of the hospital, value **Y** will be passed to the function and otherwise, value **N** will be passed.

*Discount = Payment * Total discount / 100*

Function prototype is given below.

```
float calcDiscount(char loyaltyMember, char seniorCitizen)
```

c) Write a function called `testCalcPayment()` which contains two assert statements to debug the implemented `calcPayment()` function.

d) In your main function do the following,

i. Call `testCalcPayment()` function.

ii. Allow the user to enter the medical charge, the accommodation type, and no. of days stayed from the keyboard. Call function `calcPayment()`

iii. From the keyboard, allow the user to enter whether the inpatient is a senior citizen and whether the inpatient is a loyalty member of the hospital. Call function `calcDiscount()`.

iv. Calculate and display the net hospital payment of an inpatient.

Net hospital payment = Payment – Discount amount

v. Input the relevant details of three inpatients from the keyboard, calculate and print the net hospital payment of each inpatient.

Save your program as **2BQ3.c**

Question 4 **(20 marks)**

a) Items sold by a sales representative are stored in a file called ***sales.txt.*** Write a C program to get the sales details (item no, description, items sold, price of one item) from the keyboard and store them in the file.

Save your program as **2BQ4a.c**

Sample input

Item no	Description	items sold	Price of one item (Rs)
100	Blender	1	18000
203	Cooker	1	15000
455	Kettle	6	9000
134	Knife	10	750

b) Write a program to read the details from ***sales.txt.*** Display the Item no, Description, the sales amount of each item, and the total sales amount.

Save your program as **2BQ4b.c**

Sample output

Item No.	Description	Amount earned
100	Blender	18000.00
203	Cooker	15000.00
455	Kettle	54000.00
134	Knife	7500.00

Total amount : 94500.00

Grading Sheet

Question 1

Compile correctly	1.0
Executes correctly	
- Input	0.5
- Output	1.0
Validate (check) whether inputs are positive integer	4.0
Correct the order if a higher positive integer enters as the first number	3.0
Find the numbers between the two integers	5.0
Take the summation (Total) of the above numbers	3.0
Display output	0.5
Coding conventions	2.0

Question 2 – Part 1

Compile correctly	0.5
Execute correctly	
- Find the maximum value and its index of array3 and display	2.0
1D array	
- Create and initialize arrays	2.5
- Squaring elements in array1 and store in array2	4.0
- Add the elements in array1 and array2 and store the results in array3	3.0
- Find Maximum	2.0
Coding conventions	1.0

Question 2 – Part 2

Compiles Correctly	0.5
Execute Correctly	
Input	1.0
Output	2.0
Correct array declaration	0.5
Insert values	3.0
Display original array	1.0
Perform the search	6.0
Coding Standards	1.0

Question 3

Compile correctly	1.0
Execute correctly	
- Inputs	1.0
- Outputs	2.0
Implement function 1	6.0
Implement function 2	4.0
Implement test function	4.0
In main program	
- Take inputs	1.0
- Call functions in correct order	5.0
- Display output	2.0
- Correct use of repetition	2.0
Coding conventions	2.0

Question 4

Compile correctly	1.0
Execute correctly	
- Data is available in the file	1.0
- Display Amount earned	1.0
- Display total Amount	1.0
Writing to file	
- Open file for writing	1.0
- Input several records from keyboard	2.0
- Write them to the file	3.0
Reading from file	
- Open file for reading	1.0
- Read all the records	4.0
- Calculate amount earned	2.0
- Display amount earned	1.0
- Calculate and display total amount earned	1.0
Proper coding standards are used	1.0