Programming Fundamentals

Lab Manual 10

Instructor:
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Learning Objectives:

- Student should be able to understand n-d arrays
- Student should be able to use n-d arrays with functions

CLO:

- CLO3

Registration Number:

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Name:

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Guidelines/Instructions:

- Use of VS Code is must in this lab.
- Write well commented code.
- Name of variables should be meaningful.
- Code should be well formatted.
- Create meaningful variable names. Add comments for readability. Indent each line of your code.
- Plagiarism/Cheating is highly discouraged by penalizing to both who tried and one who shared his/her code.
- **Do not change the function prototypes.**

Q1: Write C++ program for identifying if given char array is balanced or not.

Input: {}[]() Output: True

Input: {([])} Output: True

Input: Output: True

Input: (){[]}[Output: False

Input: (Output: False

Q2: Write C++ program for adding an element at the start of the array.

Input: 23 Output: {23}

Input: 56 Output: {56, 23}

Input: -1 Output: {56, 23, -1}

Q3: Modify Q2 and add elements at end of array.

Input: 23 Output: {23}

Input: 56 Output: {23, 56}

Input: -1 Output: {23, 56, -1}

Q4: Write C++ program for right rotate shifting the array left up to k-times. For example, if given array is {-2,9,56,78,9,3} then if

Input is 1 Output = {3, -2, 9, 56, 78, 9}

Input is 2 Output = {-2, 9, 56, 78, 9, 3}

Input is -3 Output = {78, 9, 3, -2, 9, 56}

Q5: Write a C++ program which takes a string as input and outputs reverse of that string. For example, if input string "Hello" then output is "olleH". If input is "a", output is "a".

Q6: Write a C++ program which takes a string array of size >= 2 and finds a 2x2 matrix of vowels in the string array. For example, if array is {"abcd", "eikr", "oufi"} the output is "found".

a b c d
e i k r
o u f j

2x2 vowel matrix is [e i; o u]. Therefore, output is "found". If there are multiple 2x2 matrix in the given array, then output is still "found" otherwise "not found.

Q7: You need to find how close (in terms of number of steps) is your enemy placed near you? To accomplish this task, we have a 2D integer of size Z x 4 array and your name is "1" and your enemy name is 2, 3 and so on. You need to find the number of steps your enemy needs to take to reach you. For example, if input is

0 0 0 0
1 0 0 0
0 0 0 2
0 0 0 5

And enemy to be found is 2 then output of the program is 3 as enemy2 needs 4 steps to reach you ("1"). Similarly, for enemy 5, output is 5.

To complete this task, write a function which has the following prototype:

```
int findEnemy(int[][4], int Z, int enemy)
```

where Z is number of rows, enemy is number of enemy

Q 8: (Airplane Seating Assignment) Write a program that can be used to assign seats for a commercial airplane. The airplane has 13 rows, with six seats in each row. Rows 1 and 2 are first class, rows 3 through 7 are business class, and rows 8 through 13 are economy class. Your program must prompt the user to enter the following information:

a. Ticket type (first class, business class, or economy class)
b. Desired seat
Output the seating plan in the following form:

	A	B	C	D	E	F
Row 1	*	*	X	*	X	X
Row 2	*	X	*	X	*	X
Row 3	*	*	X	X	*	X
Row 4	X	*	X	*	X	X
Row 5	*	X	*	X	*	*
Row 6	*	X	*	*	*	X
Row 7	X	*	*	*	X	X
Row 8	*	X	*	X	X	*
Row 9	X	*	X	X	*	X
Row 10	*	X	*	X	X	X
Row 11	*	*	X	*	X	*
Row 12	*	*	X	X	*	X
Row 13	*	*	*	*	X	*

Here, * indicates that the seat is available; X indicates that the seat is occupied. Make this a menu-driven program; show the user's choices and allow the user to make the appropriate choices.

Q9: (Row Echelon form of a matrix) Write a function that takes a matrix A as input and return a matrix from the function which is the row echelon form of matrix A.

Q10: (Total Sales) Use a two-dimensional array to solve the following problem. A company has four salespeople (1 to 4) who sell five different products (1 to 5). Once a day, each salesperson passes in a slip for each different type of product sold. Each slip contains:
a) The salesperson number b) The product number c) The total dollar value of that product sold that day Thus; each salesperson passes in between 0 and 5 sales slips per day. Assume that the information from all the slips for last month is available. Write a program that will read all this information for last month's sales and summarize the total sales by salesperson by product. All totals should be stored in the two-dimensional array sales. After processing all the information for last month, print the results in tabular format with each column representing a salesperson and each row representing a product. Cross total each row to get the total sales of each product for last month; cross total each column to get the total sales by salesperson for last month. Your tabular printout should include these cross totals to the right of the totaled rows and to the bottom of the totaled columns.

Helping Content:

Chapter 8: From Problem Analysis to Program Design by DS Malik
Multi-Dimensional Arrays

What to Submit:

- You are required to submit 10 cpp file named Task1.cpp through Task10.cpp. No other file should be submitted.