National University of Computer and Emerging Sciences

Lab Manual

for

Object Oriented Programming

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Lab Manual2

Objectives:
After performing this lab, students shall be able to:
- ✓ Dynamically allocate memory of 2D arrays
- ✓ Pass pointers to 2D arrays to functions
- ✓ Use new and delete operators
- ✓ Solve some basic problems related to matrices
- ✓ CString operations.

Important Note:
- **Delete the array when it is no longer needed.**
- **All the data will be given by user.**
- **Pass the pointers to functions instead of [].**
- **Debug your code to find errors/bugs.**

Problem 1

Given 3 sets of integer A, B and C with equal length; you are required to compute A∩B, B∩C and C∩A. The intersection results should be stored in a 2d integer array such that A∩B is in row 0, B∩C is in row 1, and C∩A is in row2 of the resultant array.
Keeping in mind that the intersection results might vary in lengths, you have to make sure that no row should have empty columns.
You'll need the following functions to do the job:
1. Input the three integer Sets
2. Calculate Intersection and return the resultant array
3. Output the resultant 2d array

For Example:
A={1,2,3,4,5,6,7,8,9,10}
B={1,2,5,6,9,10,13,14,18,20}
C={2,4,6,8,10,11,13,15,17,19}
Resultant array:

1	2	5	6	9	10
2	6	10	13		
2	4	6	8	10	

Problem 2

Q1: Write a program to input two strings from user str1 and str2, and perform following tasks on the strings.
For this task you need to develop a function that takes two strings as arguments and returns an integer value i.e., length of the string.

1. Implement a function strcopy such that it takes two arguments i.e., pointer to a C-string where the contents are copied to pointer to a C-string where the contents are copied from. The strcopy() function returns: str1 (the pointer to the destination C-string). prototype of strcopy is char* strcopy(char * str1, char* str2).
    Note: the strcmp() compares two strings character by character. If the strings are equal, the function returns 0.

2. Implement a function char* strconcatenate(char* str1 , char* str2) that will take two strings as argument, this will append the contents of str2 at the end of str1 and return str1.

Q2: Write a program to ask the user for a string and then checks whether it is a palindrome or not.
A palindrome is a word, number, phrase, or other sequence of characters which reads the same backward as forward, such as madam, noon, radar etc.

Problem 3

A square matrix in which all the entries below the main diagonal are zero is called upper triangular. Write a function **IsMatrixUpperTriangular** which takes a matrix and returns true if the matrix is upper triangular and false otherwise.
For example matrix A shown below is upper triangular while matrix B is not upper triangular.

-1	2	7	0
0	5	0	-1
0	0	7	0
0	0	0	0

Matrix A

-1	2	7	0
0	5	0	-1
-9	0	7	0
0	0	0	0

Matrix B