Lab Session 5: Arrays and Pointers

Exercise 1: 2D arrays

Write a C program that takes user input to define an n x n matrix and the operation to be performed on it (+, -, *). Then ask the user to enter the elements of each matrix. Perform the requested operation and print the value.

String operations

- <ctype.h> header provides several functions for handling characters.
- <string.h> header provides a set of functions for manipulating strings.
- <stdbool.h> header provides support for the Boolean data type.

Read about the various functions available in these headers from the provided hyperlinks.

Exercise 2: String operations

Write a C program that performs the following tasks:

1. Accepts two strings from the user as input.
2. Compares the two strings and checks if they are equal or not.
3. If they are equal, concatenate the two strings and display the concatenated string.
4. If they are not equal, display both strings in alphabetical order.

Exercise 3: Word count

Write a C program that takes a sentence as input and counts the number of words in the sentence. Assume that words in the sentence are separated by spaces. The program should then print the number of words found.

Exercise 4: Pass by reference

You already wrote the C program for the following in Lab 4:

Write a C program that has functions to calculate area of a square, a circle and a rectangle. Ask user for which area is need to be calculated, parameter (length or side of square, radius of circle, etc), and print the resulting area. Use switch to handle the three area conditions.

Now update this code to use pointers. Use void for function returns instead. Pass the parameters by reference to their respective functions. And print their updated value in main using pointers.

Exercise 5: Palindrome

Write a function in C that checks whether a given string is a palindrome. A phrase is considered a palindrome if, after converting all uppercase letters to lowercase and removing all non-alphanumeric characters, it reads the same forward and backward. Alphanumeric characters include letters and numbers. The function should return true if the given string is a palindrome and false otherwise.

(a) Give the solution without the use of pointers.
(b) Give the solution with the use of pointers.

Example 1:

Input: s = "A man, a plan, a canal: Panama"

Output: true

Explanation: "amanaplanacanalpanama" is a palindrome.

Example 2:

Input: s = "race a car"

Output: false

Explanation: "raceacar" is not a palindrome.

Important: Palindrome exercise solution must be shown to a PGTA and marked as done in the lab session of 13 Nov.