CPNM Lab Assignment Day 5

# Structures & Pointers

Date – 11-01-2023

1. Write a C program to dynamically create an array of size “n” (given by user) and then input n elements. Display the value and address of each array element.  
   Example-  
   How many numbers? 4

Enter 4 numbers:

1

2

3

4

1 is located at d3aa32c0

2 is located at d3aa32c4

3 is located at d3aa32c8

4 is located at d3aa32cc

1. Write a C program to calculate the area of a triangle when length of three sides are given by the user. Create a function to calculate the area using **call by reference** technique.  
   Example-  
   Enter length of side 1: 7  
   Enter length of side 2: 6  
   Enter length of side 3: 5  
   The area is: 14.6969384567
2. Write a menu driven C program to compare two dates entered by the user. Make a **structure** named Date to store the elements day, month and year to store the dates. Check if the dates entered are valid or not. If the dates are equal, display "Dates are equal" otherwise display “***x*** comes earlier than ***y***” where x and y are the two given dates. Show date in the format – “dd/mm/yyyy”.  
   Example:  
   Press 1 to compare dates  
   Press 2 to quit  
   1  
   Enter date 1: 11/01/2023  
   Enter date 2: 11/01/2023  
   Dates are equal  
   Press 1 to compare dates  
   Press 2 to quit  
   1  
   Enter date 1: 11/11/2023  
   Enter date 2: 11/01/2023  
   11/01/2023 comes before 11/11/2023  
   Press 1 to compare dates  
   Press 2 to quit  
   1  
   Enter date 1: 11/21/2023  
   You have entered invalid date  
   Press 1 to compare dates  
   Press 2 to quit  
   2
3. Write a C program which **dynamically allocates memory for two matrices**, orders of which is given by the user, and reads the values of elements of the matrices from the user. The program creates a third matrix which is obtained by multiplying the two input matrices. Your *program should check for conformity of multiplication of the two matrices* given by the user.  
   Example Case 1:  
   Enter dimensions of first matrix: 2 4  
   Enter dimensions of second matrix: 4 3  
   Enter values of first matrix:  
   10 20 10 20  
   20 10 20 10  
   Enter values of second matrix:  
   10 20 10  
   20 10 20  
   30 40 30  
   40 30 40  
   Product:  
   1600 1400 1600  
   1400 1600 1400  
     
   Example Case 2:  
   Enter dimensions of first matrix: 2 4  
   Enter dimensions of second matrix: 3 4  
   The above two matrices cannot be multiplied.
4. Write a program which accepts names, rolls and marks of ‘n’ students in 5 subjects from the user and stores it in an **array of student structures**. The array of structures *must be dynamically allocated*. Marks should be between 0 and 100. Write a separate function which prints the name and average of 5 subjects for each student. [*Access structure members using pointers*]  
   Example-  
   How many students? 3  
   Enter name of student 1: Harry  
   Enter roll number of student 1: 10  
   Enter marks in 5 subjects of student 1: 80 70 80 70 90  
   Enter name of student 2: Ron  
   Enter roll number of student 2: 12  
   Enter marks in 5 subjects of student 2: 50 50 50 50 50  
   Enter name of student 3: Hermione  
   Enter roll number of student 3: 15  
   Enter marks in 5 subjects of student 3: 100 90 85 88 95  
   Name Average  
   Harry 78  
   Ron 50  
   Hermionie 91.6
5. Write a C program to implement cyclic swapping of 4 variables a, b, c and d using functions and pointers. The program should ask the user to swap or quit after every swap. [Optional]  
   Example:  
   Enter a, b, c and d respectively: 1 2 3 4

Value before swapping:

a = 1

b = 2

c = 3

d = 4

Value after swapping:

a = 4

b = 1

c = 2

d = 3

Press 1 to cyclic swap

Press 2 to quit

Value before swapping:

a = 4

b = 1

c = 2

d = 3

Value after swapping:

a = 3

b = 4

c = 1

d = 2

Press 1 to cyclic swap

Press 2 to quit

Value before swapping:

a = 3

b = 4

c = 1

d = 2

Value after swapping:

a = 2

b = 3

c = 4

d = 1

Press 1 to cyclic swap

Press 2 to quit

Value before swapping:

a = 2

b = 3

c = 4

d = 1

Value after swapping:

a = 1

b = 2

c = 3

d = 4

Press 1 to cyclic swap

Press 2 to quit

2