National Institute of Technology, Calicut
Department of Computer Science and Engineering
CS2094 - Data Structures Lab

Assignment #1

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1. Given an array of integers, write a C program to reverse the array in-place using **recursion**. *Note: The reversal operation should be done in the same array itself. The program should have separate functions to print the original array first, reverse it, and then print the reversed array.*

   Input : An array of integers, *array can be of any arbitrary size* N
   Output : Reverse of the given array
   Example
   Input :
   Enter the value for n
   7
   Enter the elements of array
   1 2 3 4 5 6 7
   Output :
   7 6 5 4 3 2 1

2. Given a word *str* and a paragraph, write a program to find the total number of occurrences of *str* in the given paragraph.
   Note : str will consist only of letters from the English alphabet [a-zA-Z]
   Input : A paragraph of words consisting only letters from [a-zA-Z],spaces and period symbol(.). A string *str* to be searched
   Output : Total number of occurrences of *str* in in the paragraph.

   Example
   Input :
   Enter a paragraph

   Every great magic trick consists of three parts or acts. The first part is called The Pledge. The magician shows you something ordinary a deck of cards a bird or a man. He shows you this object. Perhaps he asks you to inspect it to see if it is indeed real unaltered normal. But of course it probably isnt. The second act is called The Turn. The magician takes the ordinary something and makes it do something extraordinary. Now youre looking for the secret. but you wont find it because of course youre not really looking. You dont really want to know. You want to be fooled. But you wouldnt clap yet. Because making something disappear isnt enough you have to bring it back. Thats why every magic trick has a third act the hardest part the part we call The Prestige .

   Enter the string to be searched
   magic

   Output :
   Number of occurrences : 2

3. Given a file name(or path) *fname* and two other strings *s1* and *s2*, write a program to find all occurrences of *s1* in the file *fname* and replace all of them with *s2*. *s1 and s2* can contain letters from the English alphabet [a-zA-Z] or digits [0-9]. The file may contain space, comma, period, and other exclamation marks in addition to words and numbers.

   Input : file name *fname*, two strings *s1* and *s2*
   Output : modified file with all the occurrences of *s1* in the file replaced with *s2*

   Example
   Input :
   Enter file name : abc.txt
   Enter two strings : health
   fitness

   Note: file content
   health is the level of functional or metabolic efficiency of a living organism. In humans, it is the general condition of a person's mind and body, usually meaning to be free from illness, injury or pain (as in"good health" or "healthy")

   Output
   Note: modified file content
   ***fitness** is the level of functional or metabolic efficiency of a living organism. In humans, it is the general condition of a person's mind and body, usually meaning to be free from illness, injury or pain (as in "good **fitness**" or "healthy")*

4. Given two strings, say *s1* and *s2*, write a program to concatenate the two strings. The final string is to be stored as *s1*, and should have the contents of given *s1* followed by *s2*. The program must use pointers to access the strings.

   Note: Program should have three functions, one each to read the strings, concatenate the strings and to print the concatenated string. No new string should be created or used.

   Input : Two strings, s1 and s2.
   Output : Concatenated string in s1.

   Example
   Input :
   Enter first string : Hello
   Enter second string : world

   Output :
   Concatenated String : Helloworld

5. Given a positive integer n, write a program to find all the distinct prime factors of n.

   Input : An integer, n.
   Output : All distinct prime factors of n.

   Example
   Input :
   Enter n : 140

   Output :
   2 5 7

6. Write a program to create a union with the following fields.
   1: height : float
   2: age: int
   The program should ask for the gender(F/M). If input gender is female, the program should ask for the height and store it in the union. If input gender is male, the program should ask for the age and store it in the union. Print both the values

   Input : gender and based on it either height or age
   Output : Age and height

   Example
   Input : Enter the gender : M
   Enter age: 44

   Output :
   Height = *garbage value*
   Age = 44

7. Write a program to calculate sum and difference of two integers using two functions. The program should ask for a choice and based on choice, corresponding function should be called using a function pointer.

   Note: Choice=1 for sum, Choice=2 for difference.

   Input : Two integers and a choice for selecting the operation
   Output : Result of the selected operation

   Example
   Input : Enter two numbers : 24 12
   Enter the choice : 2

   Output : Selected operation is $difference$ and the result is *12*