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C++ PRACTICAL ASSIGNMENT – 20 JAN 2022

1. **Write a program that performs addition, subtraction, multiplication and transpose using 2D arrays:**

```
#include <iostream>
#include <iomanip>
using namespace std;

int inputMatrix(int m[][3]){
    for (int i=0; i<3; i++){
        cout<<"Enter the elements for row "<<i+1<<" : ";
        for (int j=0; j<3; j++)
        cin>>m[i][j];
    }
}
int addition(int m1[][3], int m2[][3], int sum[][3]){
    for (int i=0; i<3; i++){
        for (int j=0; j<3; j++)
            sum[i][j]=m1[i][j]+m2[i][j];
    }
}

int subtraction(int m1[][3], int m2[][3], int difference[][3]){
    for (int i=0; i<3; i++){
        for (int j=0; j<3; j++)
            difference[i][j]=m1[i][j]-m2[i][j];
    }
}
int multiplication(int m1[][3], int m2[][3], int prod[][3]){
    for (int i=0; i<3; i++){
        for (int j=0; j<3; j++)
            prod[i][j]=m1[i][j]*m2[i][j];
    }
}
int transpose(int m[][3], int trans[][3]){
    for (int i=0; i<3; i++){
        for (int j=0; j<3; j++){
            trans[j][i]=m[i][j];
        }
    }
}

int displayMatrix(int m[][3]){
    cout<<endl<<"============================="<<endl<<endl;
    for (int i=0; i<3; i++){
```

```
        for (int j=0; j<3; j++)
        cout<<setw(5)<<m[i][j];
        cout<<endl;
    }
    cout<<endl<<"============================"<<endl<<endl;
}
int main(){
    cout<<"\t * MATRIX OPERATIONS (3x3) *" <<endl<<endl;

    cout<<"======================"<<endl;
    cout<<"\t SELECT : "<<endl<<endl;
    cout<<" 1. MATRIX ADDITION "<<endl;
    cout<<" 2. MATRIX SUBTRACTION "<<endl;
    cout<<" 3. MATRIX MULTIPLICATION "<<endl;
    cout<<" 4. MATRIX TRANSPOSE "<<endl;
    cout<<"======================"<<endl;

    int choice, size;
    int matrix1[3][3];
    int matrix2[3][3];
    int difference[3][3];
    int sum[3][3];
    int prod[3][3];
    int trans[3][3];

    char ch='y';
    while (ch=='y'){
        cout<<"What operation do you want to perform (1,2,3 or 4)?? ";
        cin>>choice;

        cout<<endl<<"\t * ENTER ELEMENTS FOR MATRIX 1 *"<<endl;
        inputMatrix(matrix1);
        cout<<endl<<"\t * ENTER ELEMENTS FOR MATRIX 2 *"<<endl;
        inputMatrix(matrix2);

    switch(choice){
        case 1: addition(matrix1, matrix2, sum);
                cout<<endl<<setw(20)<<"* SUM OF MATRIX *";
                displayMatrix(sum);
                break;
        case 2: subtraction(matrix1, matrix2, difference);
                cout<<endl<<setw(20)<<" * DIFFERENCE OF MATRIX *";
                displayMatrix(difference);
                break;

        case 3: multiplication(matrix1, matrix2, prod);
                cout<<endl<<setw(20)<<" * PRODUCT OF MATRIX *";
                displayMatrix(prod);
```

```
                break;

        case 4: transpose(matrix1, trans);
                cout<<endl<<setw(20)<<" * TRANSPOSE OF MATRIX 1 *";
                displayMatrix(trans);
                transpose(matrix2, trans);
                cout<<endl<<setw(20)<<" * TRANSPOSE OF MATRIX 2 *";
                displayMatrix(trans);
                break;
        default : cout<<"INVALID CHOICE! "<<endl;
    }
    cout<<"Do you want to continue(y/n)? ";
    cin>>ch;
    }
    return 0;
}
```

```
========================
         SELECT :

 1. MATRIX ADDITION
 2. MATRIX SUBTRACTION
 3. MATRIX MULTIPLICATION
 4. MATRIX TRANSPOSE
========================
What operation do you want to perform (1,2,3 or 4)?? 1

         * ENTER ELEMENTS FOR MATRIX 1 *
Enter the elements for row 1 : 12 13 14
Enter the elements for row 2 : 0 0 0
Enter the elements for row 3 : 11 22 33

         * ENTER ELEMENTS FOR MATRIX 2 *
Enter the elements for row 1 : 12 0 0
Enter the elements for row 2 : 1 2 3
Enter the elements for row 3 : 23 24 25

   * SUM OF MATRIX *
============================

   24   13   14
    1    2    3
   34   46   58

============================
```

```
Do you want to continue(y/n)? y

What operation do you want to perform (1,2,3 or 4)?? 2

         * ENTER ELEMENTS FOR MATRIX 1 *
Enter the elements for row 1 : 11 22 33
Enter the elements for row 2 : 22 33 44
Enter the elements for row 3 : 0 0 0

         * ENTER ELEMENTS FOR MATRIX 2 *
Enter the elements for row 1 : 12 13 14
Enter the elements for row 2 : 17 18 9
Enter the elements for row 3 : 11 22 33

 * DIFFERENCE OF MATRIX *
============================

   -1    9   19
    5   15   35
  -11  -22  -33

============================

Do you want to continue(y/n)? y

What operation do you want to perform (1,2,3 or 4)?? 3

         * ENTER ELEMENTS FOR MATRIX 1 *
Enter the elements for row 1 : 1 1 1
Enter the elements for row 2 : 0 3 0
Enter the elements for row 3 : -2 3 5
```

```
         * ENTER ELEMENTS FOR MATRIX 2 *
Enter the elements for row 1 : 12 13 14
Enter the elements for row 2 : -1 -2 -3
Enter the elements for row 3 : 6 7 8

 * PRODUCT OF MATRIX *
============================

   12   13   14
    0   -6    0
  -12   21   40

============================

Do you want to continue(y/n)? y

What operation do you want to perform (1,2,3 or 4)?? 4

         * ENTER ELEMENTS FOR MATRIX 1 *
Enter the elements for row 1 : 11 22 33
Enter the elements for row 2 : 44 55 66
Enter the elements for row 3 : 77 88 99

         * ENTER ELEMENTS FOR MATRIX 2 *
Enter the elements for row 1 : 12 13 14
Enter the elements for row 2 : 14 15 16
Enter the elements for row 3 : 16 17 18
```

```
 * TRANSPOSE OF MATRIX 1 *
============================

   11   44   77
   22   55   88
   33   66   99

============================


 * TRANSPOSE OF MATRIX 2 *
============================

   12   14   16
   13   15   17
   14   16   18

============================

Do you want to continue(y/n)?
n
```

2. **Write a program that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.**

```
#include<iostream>
#include<iomanip>
#include<string.h>
using namespace std;

int main(){
    char array[20];
    int count;

    cout<<endl;

    cout<<"\t *DISPLAY OCCURENCES OF THE ALPHABETS* "<<endl<<endl;
    //take input string and display
    cout<<"Enter the string : ";
    cin>>array;

    cout<<endl<<"\t -> The input string is : "<<array<<endl;
    cout<<endl<<"\t -> The length of string is : "<<strlen(array)<<endl;

    //finding occurences of alphabets
    cout<<endl;
    cout<<"============================"<<endl;
    for(char j='A'; j<='z';j++){
        count=0;

        for (int i=0; i<strlen(array); i++){
```

```
            if (array[i]==j){
                count+=1;
            }
        }
        if (count!=0)
        cout<<setw(5)<<j<<setw(5)<<" occurs "<<setw(5)<<count<<" times"<<endl;
    }
    cout<<"============================"<<endl;
    cout<<endl<<endl;
    return 0;
}
```

```
          *DISPLAY OCCURENCES OF THE ALPHABETS*

Enter the string : banana

          -> The input string is : banana

          -> The length of string is : 6

============================
    a occurs     3 times
    b occurs     1 times
    n occurs     2 times
============================
```

3. **Write a menu driven program to perform following operations on strings (without using inbuilt string functions):**
   a) **Show address of each character in string**

```
#include<iostream>
#include<iomanip>
#include<string.h>
using namespace std;

int main(){
    char array[20];
    int count;

    cout<<endl;

    cout<<"\t *DISPLAY ADDRESS OF THE STRING CHARACTERS* "<<endl<<endl;
    //take input string and display
    cout<<"Enter the string : ";
    cin>>array;

    cout<<endl<<setw(20)<<" -> The input string is : "<<array<<endl;
    cout<<endl<<setw(20)<<" -> The length of string is : "<<strlen(array)<<endl;
```

```
    //printing address of alphabets
    cout<<endl;
    cout<<"\t============================"<<endl;
    cout<<setw(15)<<"*APHABET*"<<setw(15)<<"*ADDRESS*"<<endl;
    void *p;
    for (int i=0; i<strlen(array); i++){
        cout<<"\t"<<array[i];

        p=&array[i];
        cout<<"\t \t"<<p<<endl;
    }
    cout<<"\t============================"<<endl;
    cout<<endl<<endl;
    return 0;
}
```

```
         *DISPLAY ADDRESS OF THE STRING CHARACTERS*

Enter the string : computer

 -> The input string is : computer

 -> The length of string is : 8

        ============================
      *APHABET*       *ADDRESS*
        c               0x26165ff720
        o               0x26165ff721
        m               0x26165ff722
        p               0x26165ff723
        u               0x26165ff724
        t               0x26165ff725
        e               0x26165ff726
        r               0x26165ff727
        ============================
```

b) Calculate length of the string (use pointers)

```
#include<iostream>
#include<iomanip>
#include<string.h>
using namespace std;

int length(char*p){
    int i=0;
    while (*p){
        i++;
        p=p+1;
```

```
    }
return i;
}//function to find string length

int main(){
    char array[20];
    int count;

    cout<<"\t *DISPLAY LENGTH OF STRING USING POINTERS* "<<endl<<endl;
    //take input string and display
    cout<<"Enter the string : ";
    cin>>array;
    int len=length(array);
    cout<<endl<<"\t -> The input string is : "<<array<<endl;
    cout<<endl<<"\t -> The length of string is : "<<len<<endl;
    return 0;
}
```

```
          *DISPLAY LENGTH OF STRING USING POINTERS*

Enter the string : computer science

          -> The input string is : computer

          -> The length of string is : 8
```