

Computer Engineering Department, S.V.N.I.T. Surat.

B Tech (CO) –IInd Year semester-III

Course: Data Structures CO203

Assignment-III

1.) In a classroom of 100 students you have to divide students in 10 sub list of equal students.

Perform the following operation.

1. Insertion of marks.
2. Deletion of marks.
3. Updating of marks.
4. Display marks
5. Replace one sub list with other
6. Compare two sub list
7. Enter nth element in jth list

Code:

```
// In a classroom of 100 students you have to divide students
// in 10 sub list of equal students.

#include <stdio.h>

int student[101], i, j; // global student array

// 1. Insertation of marks.
void fx1()
{
    int cnt = 0;
    printf("Enter the Number of Students whose Data is to be Inserted :\n");
    scanf("%d", &cnt);
    for (int i = 0; i < cnt; i++)
    {
        int rno;
        printf("Enter the Roll Number of Student :\n");
        scanf("%d", &rno);
        if (rno <= 0 && rno >= 101)
        {
            printf("Enter Valid Roll Number!\n");
        }
        else
        {
            int mark = 0;
            printf("Enter the Marks of Student :\n");
            scanf("%d", &mark);
            student[rno] = mark;
        }
    }
}
```

```

    }

    return;
}

// 2. Deletion of marks.
void fx2()
{
    int cnt = 0;
    printf("Enter the Number of Students whose Data is to be Deleted :\n");
    scanf("%d", &cnt);

    for (int i = 0; i < cnt; i++)
    {
        int rno;
        printf("Enter the Roll Number of Student :\n");
        scanf("%d", &rno);
        if (rno <= 0 && rno >= 101)
        {
            printf("Enter Valid Roll Number!\n");
        }
        else
        {
            student[rno] = -1;
        }
    }

    return;
}

// 3. Updation of marks.
void fx3()
{
    int cnt = 0;
    printf("Enter the Number of Students whose Data is to be Updated :\n");
    scanf("%d", &cnt);

    for (int i = 0; i < cnt; i++)
    {
        int rno;
        printf("Enter the Roll Number of Student :\n");
        scanf("%d", &rno);
        if (rno <= 0 && rno >= 101)
        {
            printf("Enter Valid Roll Number!\n");
        }
        else
        {
            int mark = 0;
            printf("Enter the Updated Marks of Student :\n");

```

```

        scanf("%d", &mark);
        student[rno] = mark;
    }
}

return;
}

// 4. Display marks
void fx4()
{
    int cnt = 0;
    printf("Enter the Number of Students whose Data is to be Displayed :\n");
    scanf("%d", &cnt);

    for (int i = 0; i < cnt; i++)
    {
        int rno;
        printf("Enter the Roll Number of Student :\n");
        scanf("%d", &rno);
        if (rno <= 0 && rno >= 101)
        {
            printf("Enter Valid Roll Number!\n");
        }
        else
        {
            if (student[rno] != -1)
                printf("The Marks of Student with Roll No %d is : %d\n", rno, student[rno]);
            else
            {
                printf("The Marks of Student Not Entered by Admin!!\n");
            }
        }
    }
    return;
}

// 5. Replace one sub list with other
void fx5()
{
    int r1;
    printf("Enter Sublist to be Replaced :\n");
    scanf("%d", &r1);
    printf("Enter 10 Students Marks for this SubList\n");
    for (int i = (r1 - 1) * 10 + 1; i <= r1 * 10; i++)
    {
        scanf("%d", &student[i]);
    }
    return;
}

```

```
// 6. Compare two sub List
```

```
void fx6()
{
    int r1, r2;
    printf("Enter Two Sublist to be Compared :\n");
    scanf("%d %d", &r1, &r2);
    int id1 = (r1 - 1) * 10 + 1;
    int ed1 = r1 * 10;
    int id2 = (r2 - 1) * 10 + 1;
    int ed2 = r2 * 10;
    while (id1 <= ed1 && id2 <= ed2)
    {
        if (student[id1] != student[id2])
        {
            printf("Both Sublist are Not Equal\n");
            return;
        }
        id1++;
        id2++;
    }
    printf("Both Sublist are Equal\n");
    return;
}
```

```
// 7. Enter nth element in jth List
```

```
void fx7()
{
    int n, j, mark;
    printf("Enter the jth List Number :\n");
    scanf("%d", &j);
    printf("Enter the nth Element Number :\n");
    scanf("%d", &n);
    printf("Enter the Mark of Student :\n");
    scanf("%d", &mark);

    int idx = (j - 1) * 10 + n;
    if (idx >= 0 && idx <= 100)
    {
        student[idx] = mark;
        printf("Marks Entered Successfully!\n");
    }
    else
    {
        printf("Enter Valid jth List or nth Element!\n");
    }
    return;
}
```

```
int main()
```

```

{
    // Marks of Student Not Initialized = -1
    for (int i = 0; i <= 100; i++)
    {
        student[i] = -1;
    }

    printf("Perform the following operation.\n");

    printf("1 -> Insertation of marks.\n");
    printf("2 -> Deletion of marks.\n");
    printf("3 -> Updation of marks.\n");
    printf("4 -> Display marks\n");
    printf("5 -> Replace one sub list with other\n");
    printf("6 -> Compare two sub list\n");
    printf("7 -> Enter nth element in jth list\n");

    char ch = 'Y';
    while (ch == 'Y' || ch == 'y')
    {
        int choice = 0;

        printf("Enter your Choice : ");
        scanf("%d", &choice);

        switch (choice)
        {

            case 1:
                fx1();
                break;
            case 2:
                fx2();
                break;
            case 3:
                fx3();
                break;
            case 4:
                fx4();
                break;
            case 5:
                fx5();
                break;
            case 6:
                fx6();
                break;
            case 7:
                fx7();
                break;
        }
    }
}

```

```

    default:
        printf("Enter Valid Choice [1-7] Only!");
        break;
    }
    fflush(stdin); // for character input

    printf("Want to Do Another Operation?(Y/N)\n");
    scanf("%c", &ch);
}

return 0;
}

```

OUTPUT ON TEST DATA:

Step 1: Insert Mark of 20 Students:

	1	2	3	4	5	6	7	8	9	10
List 1	80	81	82	83	84	85	86	87	88	89
List 2	90	100	91	92	93	94	95	96	97	98

(Actually Roll Number 12 is Me!! Therefore 100!)

```

1 -> Insertation of marks.
2 -> Deletion of marks.
3 -> Updation of marks.
4 -> Display marks
5 -> Replace one sub list with other
6 -> Compare two sub list
7 -> Enter nth element in jth list
Enter your Choice : 1
Enter the Number of Students whose Data is to be Inserted :
20
Enter the Roll Number of Student :
1
Enter the Marks of Student :
80
Enter the Roll Number of Student :
2
Enter the Marks of Student :
81
Enter the Roll Number of Student :
3
Enter the Marks of Student :
82
Enter the Roll Number of Student :
4
Enter the Marks of Student :
83
Enter the Roll Number of Student :
5
Enter the Marks of Student :
84

```

```
Enter the Roll Number of Student :  
6  
Enter the Marks of Student :  
85  
Enter the Roll Number of Student :  
7  
Enter the Marks of Student :  
86  
Enter the Roll Number of Student :  
8  
Enter the Marks of Student :  
87  
Enter the Roll Number of Student :  
9  
Enter the Marks of Student :  
88  
Enter the Roll Number of Student :  
10  
Enter the Marks of Student :  
89  
Enter the Roll Number of Student :  
11  
Enter the Marks of Student :  
90  
Enter the Roll Number of Student :  
12  
Enter the Marks of Student :  
100  
Enter the Roll Number of Student :  
13  
Enter the Marks of Student :  
91  
Enter the Roll Number of Student :  
14  
Enter the Marks of Student :  
92
```

```

Enter the Roll Number of Student :
15
Enter the Marks of Student :
93
Enter the Roll Number of Student :
16
Enter the Marks of Student :
94
Enter the Roll Number of Student :
17
Enter the Marks of Student :
95
Enter the Roll Number of Student :
18
Enter the Marks of Student :
96
Enter the Roll Number of Student :
19
Enter the Marks of Student :
97
Enter the Roll Number of Student :
20
Enter the Marks of Student :
98

```

Step 2: Delete the Marks of Student with Roll Numbers 1, 2, 3;

	1	2	3	4	5	6	7	8	9	10
List 1	-1	-1	-1	83	84	85	86	87	88	89
List 2	90	100	91	92	93	94	95	96	97	98

(-1 denotes that Admin has not inserted the Student Marks)

```

Want to Do Another Operation?(Y/N)
Y
Enter your Choice : 2
Enter the Number of Students whose Data is to be Deleted :
3
Enter the Roll Number of Student :
1
Enter the Roll Number of Student :
2
Enter the Roll Number of Student :
3
Want to Do Another Operation?(Y/N)

```


Step 3: Update the Marks of Student with Roll Number 1, 2, 3.

	1	2	3	4	5	6	7	8	9	10
List 1	90	85	75	83	84	85	86	87	88	89
List 2	90	100	91	92	93	94	95	96	97	98

```
Enter your Choice : 3
Enter the Number of Students whose Data is to be Updated :
3
Enter the Roll Number of Student :
1
Enter the Updated Marks of Student :
90
Enter the Roll Number of Student :
2
Enter the Updated Marks of Student :
85
Enter the Roll Number of Student :
3
Enter the Updated Marks of Student :
75
Want to Do Another Operation?(Y/N)
```

Step 4: Display of Student Marks from Roll Number 1 to 20

	1	2	3	4	5	6	7	8	9	10
List 1	90	85	75	83	84	85	86	87	88	89
List 2	90	100	91	92	93	94	95	96	97	98

Want to Do Another Operation?(Y/N)

Y

Enter your Choice : 4

Enter the Number of Students whose Data is to be Displayed :
20

Enter the Roll Number of Student :

1

The Marks of Student with Roll No 1 is : 90

Enter the Roll Number of Student :

2

The Marks of Student with Roll No 2 is : 85

Enter the Roll Number of Student :

3

The Marks of Student with Roll No 3 is : 75

Enter the Roll Number of Student :

4

The Marks of Student with Roll No 4 is : 83

Enter the Roll Number of Student :

5

The Marks of Student with Roll No 5 is : 84

Enter the Roll Number of Student :

6

The Marks of Student with Roll No 6 is : 85

Enter the Roll Number of Student :

7

The Marks of Student with Roll No 7 is : 86

Enter the Roll Number of Student :

8

The Marks of Student with Roll No 8 is : 87

Enter the Roll Number of Student :

9

The Marks of Student with Roll No 9 is : 88

Enter the Roll Number of Student :

10

The Marks of Student with Roll No 10 is : 89

```

Enter the Roll Number of Student :
11
The Marks of Student with Roll No 11 is : 90
Enter the Roll Number of Student :
12
The Marks of Student with Roll No 12 is : 100
Enter the Roll Number of Student :
13
The Marks of Student with Roll No 13 is : 91
Enter the Roll Number of Student :
14
The Marks of Student with Roll No 14 is : 92
Enter the Roll Number of Student :
15
The Marks of Student with Roll No 15 is : 93
Enter the Roll Number of Student :
16
The Marks of Student with Roll No 16 is : 94
Enter the Roll Number of Student :
17
The Marks of Student with Roll No 17 is : 95
Enter the Roll Number of Student :
18
The Marks of Student with Roll No 18 is : 96
Enter the Roll Number of Student :
19
The Marks of Student with Roll No 19 is : 97
Enter the Roll Number of Student :
20
The Marks of Student with Roll No 20 is : 98
Want to Do Another Operation?(Y/N)

```

Step 5: Replace the Sub-list 1 with Values of Sub-list 2

	1	2	3	4	5	6	7	8	9	10
List 1	90	100	91	92	93	94	95	96	97	98
List 2	90	100	91	92	93	94	95	96	97	98

```
Want to Do Another Operation?(Y/N)
Y
Enter your Choice : 5
Enter Sublist to be Replaced :
1
Enter 10 Students Marks for this SubList
90 100 91 92 93 94 95 96 97 98
Want to Do Another Operation?(Y/N)
Y
```

Step 6: Comparing Two Sub-Lists 1 & 2 (which we made Equal!)

```
Want to Do Another Operation?(Y/N)
Y
Enter your Choice : 6
Enter Two Sublist to be Compared :
1 2
Both Sublist are Equal
```

Step 7: 2nd List 1st Element = 11 Roll Number whose marks I changed to 95.

```
Want to Do Another Operation?(Y/N)
Y
Enter your Choice : 7
Enter the jth List Number :
2
Enter the nth Element Number :
1
Enter the Mark of Student :
95
Marks Entered Successfully!
Want to Do Another Operation?(Y/N)
Y
Enter your Choice : 4
Enter the Number of Students whose Data is to be Displayed :
1
Enter the Roll Number of Student :
11
The Marks of Student with Roll No 11 is : 95
```

2.) Write a program

(1) To generate sub matrices from the multidimensional matrix.

(2) Take any two (I took all Sub-Matrices) sub matrices and perform the addition of two sub matrices.

For example input Array is A [4] [4] and B [2] [2]

(3) Find the occurrence of B in A.

The rows or columns in A are not required to be consecutive.

Code:

```
// Write a program (1) to generate sub matrices from the multidimensional matrix.
// (2) Take any two(I took all) sub matrices and perform the addition of two sub matrices.
// For example input Array is A[4][4] and B[2][2]
// (3) Find the occurrence of B in A.
#include <stdio.h>

int mat[101][101], B[101][101], add[101][101];

void print(int rst, int cst, int red, int ced)
{
    printf("Sub-Matrix [%d ... %d] [%d ... %d] :\n", rst, red, cst, ced);
    int addrow = 0;
    int addcol = 0;
    for (int i = rst; i <= red; i++)
    {
        for (int j = cst; j <= ced; j++)
        {
            printf("%d ", mat[i][j]);
            add[addrow][addcol] += mat[i][j];
            addcol++;
        }
        printf("\n");
        addrow++;
        addcol = 0;
    }
    return;
}

int occurrences(int rst, int cst, int red, int ced, int B[101][101])
{
    int ans = 0;
    int flag = 1;

    // printf("Sub-
Matrix [%d ... %d] [%d ... %d] is being Compared :\n", rst, red, cst, ced);

    int brow = 0;
    int bcol = 0;
```

```

for (int i = rst; i <= red; i++)
{
    for (int j = cst; j <= ced; j++)
    {
        if (mat[i][j] != B[brow][bcol])
        {
            flag = 0;
            break;
        }
        else
        {
            bcol++;
        }
    }
    brow++;
    bcol = 0;
    if (flag == 0)
    {
        break;
    }
}

if (flag)
    ans = 1;

return ans;
}

int main()
{
    int m, n;
    printf("Enter the Dimensions of Matrix (mXm) (<=100) : \n");
    scanf("%d", &m); // m rows x m columns

    printf("Enter the Values of (mXm) Matrix :\n");

    for (int i = 0; i < m; i++)
    {
        for (int j = 0; j < m; j++)
        {
            printf("mat[%d][%d] = ", i, j);
            scanf("%d", &mat[i][j]);
        }
    }
    printf("\n");

    printf("Task 1 --> Find All Sub-Matrices \n\n");

    printf("Enter the Dimensions of Sub-Matrix (nXn) (<=%d) : \n", m);

```

```

scanf("%d", &n); // n rows x n columns
if (n > m)
{
    printf("Enter Valid n value!!\n");
}
else
{
    // printf("%dX%d Parent Matrixes is :\n", m, m);

    // print(0,0,m-1,m-1);

    printf("%dX%d Sub Matrixes are :\n", n, n);
    int rstart = 0, rend = n - 1;
    int cstart = 0, cend = n - 1;

    for (; rend <= m - 1; rend++)
    {
        rstart = rend - n + 1;
        cend = n - 1;
        for (; cend <= m - 1; cend++)
        {
            cstart = cend - n + 1;
            print(rstart, cstart, rend, cend);
        }
    }
}

printf("Task 2 --> Sum of all Subsets \n\n");

printf("Add Matrix(%d X %d)\n", n, n);
for (int i = 0; i < n; i++)
{
    for (int j = 0; j < n; j++)
    {
        printf("%d ", add[i][j]);
    }
    printf("\n");
}

printf("\n");

printf("Task 3 --> To Find the Occurance of B in A\n\n");

printf("Enter Values of Sub-Matrix B (%dX%d) (%d <= %d):\n", n, n, n, m);

for (int i = 0; i < n; i++)
{
    for (int j = 0; j < n; j++)
    {
        printf("B[%d][%d] = ", i, j);
    }
}

```

```

        scanf("%d", &B[i][j]);
    }
}
printf("\n");

int occur = 0; // count the Number of Occurances

int rstart = 0, rend = n - 1;
int cstart = 0, cend = n - 1;

for (; rend <= m - 1; rend++)
{
    rstart = rend - n + 1;
    cend = n - 1;
    for (; cend <= m - 1; cend++)
    {
        cstart = cend - n + 1;
        occur += occurrences(rstart, cstart, rend, cend, B);
    }
}

printf("The Occurance of B in A is : %d", occur);

return 0;
}

```

TEST CASE:

Row\Column	0	1	2	3
0	1	2	3	4
1	5	6	7	8
2	9	10	11	12
3	13	14	15	16

Enter the Dimensions of Matrix (mXm) (≤ 100) :

4

Enter the Values of (mXm) Matrix :

mat[0][0] = 1

mat[0][1] = 2

mat[0][2] = 3

mat[0][3] = 4

mat[1][0] = 5

mat[1][1] = 6

mat[1][2] = 7

mat[1][3] = 8

mat[2][0] = 9

mat[2][1] = 10

mat[2][2] = 11

mat[2][3] = 12

mat[3][0] = 13

mat[3][1] = 14

mat[3][2] = 15

mat[3][3] = 16

TASK 1: Find all Sub-Matrices of Size 2

Task 1 --> Find All Sub-Matrices

Enter the Dimensions of Sub-Matrix (nXn) (≤ 4) :

2

2X2 Sub Matrixes are :

Sub-Matrix [0 ... 1] [0 ... 1] :

1 2

5 6

Sub-Matrix [0 ... 1] [1 ... 2] :

2 3

6 7

Sub-Matrix [0 ... 1] [2 ... 3] :

3 4

7 8

Sub-Matrix [1 ... 2] [0 ... 1] :

5 6

9 10

Sub-Matrix [1 ... 2] [1 ... 2] :

6 7

10 11

Sub-Matrix [1 ... 2] [2 ... 3] :

7 8

11 12

Sub-Matrix [2 ... 3] [0 ... 1] :

9 10

13 14

Sub-Matrix [2 ... 3] [1 ... 2] :

10 11

14 15

Sub-Matrix [2 ... 3] [2 ... 3] :

11 12

15 16

TASK 2: Sum of all the (2X2) Sub-Matrices

```
Task 2 --> Sum of all Subsets
```

```
Add Matrix(2 X 2)
```

```
54 63
```

```
90 99
```

TASK 3: Find Occurrences of (2X2) Matrix in Parent Matrix

I took one of the Subset from parent Matrix so Answer is 1.

```
Task 3 --> To Find the Occurance of B in A
```

```
Enter Values of Sub-Matrix B (2X2) (2 <= 4):
```

```
B[0][0] = 7
```

```
B[0][1] = 8
```

```
B[1][0] = 11
```

```
B[1][1] = 12
```

```
The Occurance of B in A is : 1
```

Submitted By:

Roll Number: **U19CS012** (D-12)

Name: *Bhagya Rana*