**Data structure & Algorithms**

**Assignment-2 (Structure and Dynamic Array)**

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**Lab Assignment: 02**

1. Write a program in C to reverse the contents of a dynamic array of n elements.

Code:-  
*#include*<stdio.h>

*#include*<stdlib.h>

*int* main(){

*int* n;

    printf("Enter the number of elements:-");

    scanf("%d",&n);

*int* \*arr = (*int*\*)calloc(n,sizeof(*int*));

    printf("Enter all the elements spearated by space:- ");

*for*(*int* i=0;i<n;i++) scanf("%d",&arr[i]);

*int* last = n-1;

*for* (*int* j=0;j<n/2;j++){

*int* temp = arr[j];

        arr[j] = arr[last];

        arr[last] = temp;

        last--;

    }

    printf("Reversed array is:- ");

*for*(*int* i=0;i<n;i++) printf("%d ",arr[i]);

}

Output:-  
Enter the number of elements:-5

Enter all the elements spearated by space:- 1 2 3 4 5

Reversed array is:- 5 4 3 2 1

1. Given an unsorted dynamic array of size , WAP to find and display the number of elements between two elements a and b (both inclusive).

**Sample Input:**

**Sample Output:**

Code:-  
*#include*<stdio.h>

*#include*<stdlib.h>

*int* main(){

*int* n;

    printf("Enter the number of elements:-");

    scanf("%d",&n);

*int* \*arr = (*int*\*)calloc(n,sizeof(*int*));

    printf("Enter all the elements spearated by space:- ");

*for*(*int* i=0;i<n;i++) scanf("%d",&arr[i]);

*int* search1,search2;

    printf("Enter starting ending elemnts:- ");

    scanf("%d %d",&search1,&search2);

    printf("Elements between %d and %d are ",search1,search2);

*for*(*int* j=0;j<n;j++){

*if* (arr[j]>=search1 && arr[j]<=search2) printf("%d,",arr[j]);

    }

}

Output:-  
Enter the number of elements:-5

Enter all the elements spearated by space:- 1 2 3 4 5

Enter starting ending elemnts:- 1 5

Elements between 1 and 5 are 1,2,3,4,5,

1. Given a dynamic array, WAP to print the *next greater element (NGE)* for every element. The next greater element for an element x is the first greater element on the right side of x in array. Elements for which no greater element exist, consider next greater element as -1.

**Sample Input:**

Enter the input of an array

**Sample Output:**

The next greater elements for each elements are as follows.

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Code:-  
*#include* <stdio.h>

*#include*<stdlib.h>

*int* main()

{

*int* n;

    printf("Enter the number of elements:-");

    scanf("%d", &n);

*int* \*arr = (*int*\*)calloc(n,sizeof(*int*));

    printf("Enter all the elements spearated by space:- ");

*for* (*int* i = 0; i < n; i++)

        scanf("%d", &arr[i]);

    printf("Element | NGE\n");

*int* nge, i, j;

*for* (i = 0; i < n; i++)

    {

        nge = -1;

*for* (j = i + 1; j < n; j++)

        {

*if* (arr[i] < arr[j])

            {

                nge = arr[j];

*break*;

            }

        }

        printf("%d\t -- %d \n", arr[i], nge);

    }

}

Output:-  
Enter the number of elements:-5

Enter all the elements spearated by space:- 2 3 6 9 7

Element | NGE

2        -- 3

3        -- 6

6        -- 9

9        -- -1

7        -- -1

1. Write a program in C to store employee’s data such as employee name, gender, designation, department, basic pay. Calculate the gross pay of each employees as follows:

Gross pay = basic pay + HR + DA

HR=25% of basic and DA=75% of basic.

Code:-  
*#include*<stdio.h>

*struct* kmm{

*float* km;

*float* m;

};

*void* convert(*struct* kmm\* b){

    printf("The total distance in km is %.2f\n",b->km+(b->m/1000));

    printf("The total distance in meter is %.2f\n",b->m+(1000\*b->km));

}

*int* main(){

*struct* kmm a;

    printf("Enter the distance in km:- ");

    scanf("%f",&a.km);

    printf("Enter the distance in m:- ");

    scanf("%f",&a.m);

    convert(&a);

}

Output:-  
Enter the distance in km:- 5

Enter the distance in m:- 2500

The total distance in km is 7.50

The total distance in meter is 7500.00

1. Write a program in C to add two distances (in km-meter) by passing structure to a function.

Code:-  
*#include* <stdio.h>

*#include* <stdlib.h>

*#include* <string.h>

*struct* emp{

*char* name[20];

*char* gender[5];

*char* designation[20];

*char* department[20];

*float* basic;

*float* gross;

};

*void* display(*struct* emp \*st,*int* n){

*int* i;

*for*(i=0;i<n;i++){

        printf("Details of employee %d\n",i+1);

        printf("Name:- %s \n",st[i].name);

        printf("Gender:- %s\n",st[i].gender);

        printf("Designation:- %s\n",st[i].designation);

        printf("Department:- %s\n",st[i].department);

        printf("Basic Salary:- %.2f\n",st[i].basic);

        printf("Gross Salary:- %.2f\n",st[i].gross);

        printf("\n");

    }

}

*int* main(){

*int* n;

    printf("Enter the number of emoloyees:- ");

    scanf("%d",&n);

*struct* emp\* data = (*struct* emp\*)malloc(n\*sizeof(*struct* emp));

*for*(*int* i=0;i<n;i++){

        printf("Details for employee %d!\n",i+1);

        printf("Enter the name:- ");

        scanf("%s",data[i].name);

        printf("Enter M or F:- ");

        scanf("%s",data[i].gender);

        printf("Enter the designation:- ");

        scanf("%s",data[i].designation);

        printf("Enter the department:- ");

        scanf("%s",data[i].department);

        printf("Enter the basic pay:- ");

        scanf("%f",&data[i].basic);

        data[i].gross = data[i].basic+(data[i].basic\*0.25)+(data[i].basic\*0.75);

    }

    display(data,n);

}

Output:-  
Enter the number of emoloyees:- 2

Details *for* employee 1!

Enter the name:- Aditya

Enter M or F:- M

Enter the designation:- Leader

Enter the department:- Tech

Gross Salary:- 20000000.00

Details of employee 2

Name:- XYZ

Gender:- F

Designation:- Manager

Department:- Tech

Basic Salary:- 10000.00

Gross Salary:- 20000.00

1. Let A be n×n square dynamic matrix.WAP by using appropriate user defined functions for the following:

a) Find the number of nonzero elements in A

b) Find the sum of the elements above the leading diagonal.

c) Swap the major diagonal element to the minor diagonal element.

Code:-  
*#include*<stdio.h>

*#include*<stdlib.h>

*void* non\_zero(*int* n,*int* \*\*p){

*int* count = 0;

*for*(*int* i=0;i<n;i++){

*for*(*int* j=0;j<n;j++){

*if* (p[i][j]==0) count++;

        }

    }

    printf("Number of non-zero elements is %d\n",count);

}

*void* sum\_udiag(*int* n,*int* \*\*p){

*int* sum = 0;

*for*(*int* i=0;i<n;i++){

*for*(*int* j=0;j<n;j++){

*if* (j>i) sum+=\*(\*(p+i)+j);

        }

    }

    printf("Sum of the elements above major diagonal is %d\n",sum);

}

*void* swap\_major\_minor(*int* n,*int*\*\* arr){

*int* j,temp;

*for*(*int* i=0;i<n;i++){

        j = i;

        temp = \*(\*(arr+i)+j);

        \*(\*(arr+i)+j) = \*(\*(arr+i)+(n-j-1));

        \*(\*(arr+i)+(n-j-1)) = temp;

    }

}

*void* print\_mat(*int* n,*int*\*\* arr){

*int* i,j;

*for*(i=0;i<n;i++){

*for*(j=0;j<n;j++){

            printf("%d ",arr[i][j]);

        }

        printf("\n");

    }

}

*int* main(){

*int* n,i,j;

    printf("Enter n of nxn square matrix:- ");

    scanf("%d",&n);

*// int arr[n][n];*

*int* \*\*arr = (*int*\*\*)calloc(n,sizeof(*int*\*));

*for*(i=0;i<n;i++){

        \*(arr+i) = (*int*\*)calloc(n,sizeof(*int*));

     }

*for*(*int* i=0;i<n;i++){

*for*(*int* j=0;j<n;j++){

            scanf("%d",&arr[i][j]);

        }

    }

    printf("The matrix entered by the user is:- \n");

*// for(i=0;i<n;i++){*

*//     for(j=0;j<n;j++){*

*//         printf("%d ",arr[i][j]);*

*//     }*

*//     printf("\n");*

    print\_mat(n,arr);

*// }*

    printf("\n");

    non\_zero(n,arr);

    sum\_udiag(n,arr);

    swap\_major\_minor(n,arr);

    printf("The matrix after the major diagonal matrix and minor diagonal matrix is swapped:- \n");

    print\_mat(n,arr);

}

*// Code by Aditya Choudhury*

Output:-  
Enter n of nxn square matrix:- 3

1 2 3 4 5 6 7 8 9

The matrix entered by the user is:-

1 2 3

4 5 6

7 8 9

Number of non-zero elements is 0

Sum of the elements above major diagonal is 11

The matrix after the major diagonal matrix and minor diagonal matrix is swapped:-

3 2 1

4 5 6

9 8 7