S.No: 1	Exp. Name: *Design a C program which sorts the strings using array of pointers*	Date: 2023-04-24

Aim:

Design a C program that sorts the strings using array of pointers.

Sample input output

```
Sample input-output -1:
Enter the number of strings: 2
Enter string 1: Tantra
Enter string 2: Code
Before Sorting
Tantra
Code
After Sorting
Code
Tantra
Sample input-output -2:
Enter the number of strings: 3
Enter string 1: India
Enter string 2: USA
Enter string 3: Japan
Before Sorting
India
USA
Japan
After Sorting
India
Japan
USA
```

Source Code:

stringssort.c

```c
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
void main()
{
        char * temp;
        int i,j,diff,n;
        char * strarray[10];
        printf("Enter the number of strings: ");
        scanf("%d",&n);
        for(i=0;i<n;i++)
        {
                printf("Enter string %d: ",i+1);
                strarray[i]=(char *)malloc(sizeof(char)*20);
                scanf("%s",strarray[i]);
        }
        printf("Before Sorting\n");
        for(i=0;i<n;i++)
        {
                printf("%s\n",strarray[i]);
        }
        for(i=0;i<n-1;i++)
        {
                for(j=0;j<n-1;j++)
                {
                        diff=strcmp(strarray[j],strarray[j+1]);
                        if(diff>0)
                        {
                                temp=strarray[j];
                                strarray[j]=strarray[j+1];
                                strarray[j+1]=temp;
                        }
                }
        }
        printf("After Sorting\n");
        for(i=0;i<n;i++)
        {
                printf("%s\n",strarray[i]);
        }
}
```

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the number of strings:
2
Enter string 1:
Tantra
Enter string 2:
Code
Before Sorting

Tantra
Code
After Sorting
Code
Tantra

Test Case - 2
User Output
Enter the number of strings:
3
Enter string 1:
Dhoni
Enter string 2:
Kohli
Enter string 3:
Rohit
Before Sorting
Dhoni
Kohli
Rohit
After Sorting
Dhoni
Kohli
Rohit

S.No: 2	Exp. Name: *Write a C program to Search a Key element using Linear search Technique*	Date: 2023-05-07

Aim:

Write a program to search a **key element** with in the given array of elements using `linear search` process.

At the time of execution, the program should print the message on the console as:

```
Enter value of n :
```

For example, if the user gives the **input** as:

```
Enter value of n : 3
```

Next, the program should print the messages one by one on the console as:

```
Enter element for a[0] :
Enter element for a[1] :
Enter element for a[2] :
```

if the user gives the **input** as:

```
Enter element for a[0] : 89
Enter element for a[1] : 33
Enter element for a[2] : 56
```

Next, the program should print the message on the console as:

```
Enter key element :
```

if the user gives the **input** as:

```
Enter key element : 56
```

then the program should **print** the result as:

```
The key element 56 is found at the position 2
```

Similarly if the key element is given as **25** for the above one dimensional array elements then the program should print the output as "**The key element 25 is not found in the array**".

Fill in the missing code so that it produces the desired result.

Source Code:

```
LinearSearch.c
```

Srinivasa Ramanujan Institute of Technology

```c
#include<stdio.h>
void main()
{
        int a[20], i, n, key, flag = 0, pos;
        printf("Enter value of n : ");
        scanf("%d", &n);
        // Write code to read array elements
        for(i=0;i<n;i++)
        {
                printf("Enter element for a[%d] : ",i);
                scanf("%d",&a[i]);
                }
                printf("Enter key element : ");
                scanf("%d", &key);
                // Write code for linear search process
                for(i=0;i<n;i++)
                {
                        if(a[i]==key)
                        {
                                flag = 1;
                                pos = i;
                                }
                                }
                                if (flag!=0 )
                                {
                                        //Write the condition part
                                        printf("The key element %d is found at the position
%d\n",key,pos );

                                        //Complete the statement
                                        }
                                        else
                                        {
                                                printf("The key element %d is not found in
the array\n",key,pos );

                                                //Complete the statement
                                                }

}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :
4
Enter element for a[0] :
1
Enter element for a[1] :
22
Enter element for a[2] :
33

44
Enter key element :
22
The key element 22 is found at the position 1

Test Case - 2
User Output
Enter value of n :
7
Enter element for a[0] :
101
Enter element for a[1] :
102
Enter element for a[2] :
103
Enter element for a[3] :
104
Enter element for a[4] :
105
Enter element for a[5] :
106
Enter element for a[6] :
107
Enter key element :
110
The key element 110 is not found in the array

Aim:

Write a program to **search** a key element in the given array of elements using `binary search`.

At the time of execution, the program should print the message on the console as:

```
Enter value of n :
```

For example, if the user gives the **input** as:

```
Enter value of n : 3
```

Next, the program should print the messages one by one on the console as:

```
Enter element for a[0] :
Enter element for a[1] :
Enter element for a[2] :
```

if the user gives the **input** as:

```
Enter element for a[0] : 89
Enter element for a[1] : 33
Enter element for a[2] : 56
```

Next, the program should print the message on the console as:

```
Enter key element :
```

if the user gives the **input** as:

```
Enter key element : 56
```

then the program should **print** the result as:

```
After sorting the elements in the array are
Value of a[0] = 33
Value of a[1] = 56
Value of a[2] = 89
The key element 56 is found at the position 1
```

Similarly if the key element is given as **25** for the above one dimensional array elements then the program should print the output as "**The Key element 25 is not found in the array**".

Fill in the missing code so that it produces the desired result.

Source Code:

```
BinarySearch.c
```

```c
#include<stdio.h>
void main()
{
        int a[20], i, j, n, key, flag = 0, low, high, mid, temp;
        printf("Enter value of n : ");
        scanf("%d", &n);
        for(i=0;i<n;i++)
        {
                printf("Enter element for a[%d] : ",i);
                scanf("%d",&a[i]);

        }
        printf("Enter key element : ");
        scanf("%d", &key);
        for(i=0;i<n;i++)
        {
                for(j=0;j<n-i-1;j++)
                {
                        if(a[j+1]<a[j])
                        {
                                temp = a[j];
                                a[j] = a[j+1];
                                a[j+1] = temp;
                        }
                }
                }

                printf("After sorting the elements in the array are\n");
                for(i=0;i<n;i++)
                {
                        printf("Value of a[%d] = %d\n",i,a[i]);

                }
                low = 0;

                high = n-1;

                while(low<=high)
                {
                        mid = (high + low)/2;
                        if (a[mid]==key)
                        {
                                flag = 1;
                                break;
                        }
                        else if(a[mid]<key)
                        {
                                low = mid + 1;
                        }
                        else
                        {
                                high = mid -1;
                        }
                        if (flag ==1)
```

```
element %d is found at the position %d\n",key,mid);
                                                    }
                                                    else
                                                    {
                                                        printf("The
Key element %d is not found in the array\n",key,mid);
                                                    }

}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :
3
Enter element for a[0] :
25
Enter element for a[1] :
15
Enter element for a[2] :
23
Enter key element :
45
After sorting the elements in the array are
Value of a[0] = 15
Value of a[1] = 23
Value of a[2] = 25
The Key element 45 is not found in the array

Test Case - 2
User Output
Enter value of n :
2
Enter element for a[0] :
80
Enter element for a[1] :
39
Enter key element :
50
After sorting the elements in the array are
Value of a[0] = 39
Value of a[1] = 80
The Key element 50 is not found in the array

S.No: 4	Exp. Name: *Write a C program to implement Fibonacci Search technique*	Date: 2023-05-08

Aim:

Write a C program to implement **Fibonacci search** technique

Source Code:

FibonacciSearch.c

```c
#include<stdio.h>
void main()
{
        int a[20],i,j,n,flag=0;
        printf("Enter the size of an array: ");
        scanf("%d",&n);
        printf("Enter the %d array elements\n",n);
        for(i=0;i<n;i++)
        {
                scanf("%d",&a[i]);
        }
        printf("Enter the element to be searched: ");
        scanf("%d",&j);
        for(i=0;i<n;i++)
        {
                if(j==a[i])
                {
                        flag++;
                        break;
                }
        }
        if(flag==1)
        printf("Element found at index: %d.\n",i);
        else
        printf("Element not found.\n");
}
```

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the size of an array:
5
Enter the 5 array elements
3 4 5 6 7
Enter the element to be searched:
3
Element found at index: 0.

Test Case - 2

User Output
Enter the size of an array:
5
Enter the 5 array elements
3 4 5 6 7
Enter the element to be searched:
4
Element found at index: 1.

S.No: 5	Exp. Name: *Write a C program to Sort the elements using Insertion Sort Technique*	Date: 2023-05-07

Aim:

Write a program to **sort** the given elements using `insertion sort technique`.

At the time of execution, the program should print the message on the console as:

```
Enter value of n :
```

For example, if the user gives the **input** as:

```
Enter value of n : 3
```

Next, the program should print the messages one by one on the console as:

```
Enter element for a[0] :
Enter element for a[1] :
Enter element for a[2] :
```

if the user gives the **input** as:

```
Enter element for a[0] : 22
Enter element for a[1] : 33
Enter element for a[2] : 12
```

then the program should **print** the result as:

```
Before sorting the elements in the array are
Value of a[0] = 22
Value of a[1] = 33
Value of a[2] = 12
After sorting the elements in the array are
Value of a[0] = 12
Value of a[1] = 22
Value of a[2] = 33
```

Fill in the missing code so that it produces the desired result.

Source Code:

```
InsertionSortDemo3.c
```

```c
#include<stdio.h>
void main()
{
        int a[20], i, n, j, temp;
        printf("Enter value of n : ");
        scanf("%d", &n);
        for(i=0;i<n;i++)
        {
                printf("Enter element for a[%d] : ",i);
                scanf("%d",&a[i]);
                }
        printf("Before sorting the elements in the array are\n");
        for(i=0;i<n;i++)
        {
                printf("Value of a[%d] = %d\n",i,a[i]);
                }
                for(i=1;i<n;i++)
                {
                        temp = a[i];
                        for(j=i;j>0;j--)
                        {
                                if(a[j-1]>temp)
                                {
                                        a[j] = a[j-1];
                                        a[j-1] = temp;
                                        }
                                }
                        }
                                printf("After sorting the elements in the
array are\n");

                                for(i=0;i<n;i++)
                                {
                                        printf("Value of a[%d] =
%d\n",i,a[i]);
                                        }
                                }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :
6
Enter element for a[0] :
5
Enter element for a[1] :
9
Enter element for a[2] :
2
Enter element for a[3] :
5

| Enter element for a[4] : |
| 1 |
| Enter element for a[5] : |
| 3 |
| Before sorting the elements in the array are |
| Value of a[0] = 5 |
| Value of a[1] = 9 |
| Value of a[2] = 2 |
| Value of a[3] = 5 |
| Value of a[4] = 1 |
| Value of a[5] = 3 |
| After sorting the elements in the array are |
| Value of a[0] = 1 |
| Value of a[1] = 2 |
| Value of a[2] = 3 |
| Value of a[3] = 5 |
| Value of a[4] = 5 |
| Value of a[5] = 9 |

| Test Case - 2 |
| **User Output** |
| Enter value of n : |
| 3 |
| Enter element for a[0] : |
| 5 |
| Enter element for a[1] : |
| 9 |
| Enter element for a[2] : |
| 4 |
| Before sorting the elements in the array are |
| Value of a[0] = 5 |
| Value of a[1] = 9 |
| Value of a[2] = 4 |
| After sorting the elements in the array are |
| Value of a[0] = 4 |
| Value of a[1] = 5 |
| Value of a[2] = 9 |

S.No: 6	Exp. Name: ***Write a C program to Sort the elements using Selection Sort - Smallest element method Technique***	Date: 2023-05-07

Aim:

Write a program to **sort** the given array elements using **selection sort smallest element** method.

At the time of execution, the program should print the message on the console as:

```
Enter value of n :
```

For example, if the user gives the **input** as:

```
Enter value of n : 3
```

Next, the program should print the messages one by one on the console as:

```
Enter element for a[0] :
Enter element for a[1] :
Enter element for a[2] :
```

if the user gives the **input** as:

```
Enter element for a[0] : 22
Enter element for a[1] : 33
Enter element for a[2] : 12
```

then the program should **print** the result as:

```
Before sorting the elements in the array are
Value of a[0] = 22
Value of a[1] = 33
Value of a[2] = 12
After sorting the elements in the array are
Value of a[0] = 12
Value of a[1] = 22
Value of a[2] = 33
```

Fill in the missing code so that it produces the desired result.

Source Code:

```
SelectionSortDemo6.c
```

```
#include<stdio.h>
void main()
{
        int a[20], i, n, j, small, index;
        printf("Enter value of n : ");
        scanf("%d", &n);
        // Write the code to read an array elements
        for(i=0;i<n;i++)
        {
                printf("Enter element for a[%d] : ",i);
                scanf("%d",&a[i]);
                }
                printf("Before sorting the elements in the array are\n");
                // Write the code to print the given array elements before sorting
                for(i=0;i<n;i++)
                {
                        printf("Value of a[%d] = %d\n",i,a[i]);
                        }
                        for(i=n-1;i>0;i--)
                        {
                                small = i;
                                for(j=i;j>=0;j--)
                                {
                                        if(a[j]>a[small])
                                        {
                                                small = j;
                                                }
                                        }
                                        index = a[small];
                                        a[small] = a[i];
                                        a[i] = index;
                                        }
                                        // Write the code for selection sort
smallest element method
                                        printf("After sorting the elements in the
array are\n");
                                        // Write the code to print the given array
elements after sorting
                                        for(i=0;i<n;i++)
                                        {
                                                printf("Value of a[%d] =
%d\n",i,a[i]);
                                                }
                                        }
```

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :
4
Enter element for a[0] :

78
Enter element for a[1] :
43
Enter element for a[2] :
99
Enter element for a[3] :
27
Before sorting the elements in the array are
Value of a[0] = 78
Value of a[1] = 43
Value of a[2] = 99
Value of a[3] = 27
After sorting the elements in the array are
Value of a[0] = 27
Value of a[1] = 43
Value of a[2] = 78
Value of a[3] = 99

S.No: 7	Exp. Name: ***Write a C program to sort given elements using shell sort technique.***	Date: 2023-05-13

Aim:

Write a program to `sort` (`ascending order`) the given elements using `shell sort` technique.

At the time of execution, the program should print the message on the console as:

```
Enter array size :
```

For example, if the user gives the **input** as:

```
Enter array size : 5
```

Next, the program should print the following message on the console as:

```
Enter 5 elements :
```

if the user gives the **input** as:

```
Enter 5 elements : 34 67 12 45 22
```

then the program should **print** the result as:

```
Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67
```

Note: Do use the **printf()** function with a **newline** character (`\n`).

Source Code:

```
ShellSort2.c
```

```
#include<stdio.h>
#include<conio.h>
void sort(int [],int );
int main()
{
        int a[20],n,i;
        printf("Enter array size : ");
        scanf("%d",&n);
        printf("Enter %d elements : ",n);
        for(i=0;i<n;i++)
        {
                scanf("%d",&a[i]);
        }
        printf("Before sorting the elements are : ");
        for(i=0;i<n;i++)
        {
                printf("%d ",a[i]);
        }
        sort(a,n);
        printf("\nAfter sorting the elements are : ");
    for(i=0;i<n;i++)
    {
        printf("%d ",a[i]);
    }printf("\n");
}
void sort(int arr[],int n)
{
        int gap,i,j,temp;
        for(gap=n/2;gap>0;gap=gap/2)
        {
                for(i=gap;i<n;i++)
                {
                        temp=arr[i];
                        for(j=i;j>=gap&&arr[j-gap]>temp;j=j-gap)
                        {
                                arr[j]=arr[j-gap];

                        }
                        arr[j]=temp;
                }
        }
}
```

Srinivasa Ramanujan Institute of Technology | 2022-2026-CSE-B | ID: 224G1A0589 | Page No: 19

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter array size :
5
Enter 5 elements :
12 32 43 56 78
Before sorting the elements are : 12 32 43 56 78

```
After sorting the elements are : 12 32 43 56 78
```

S.No: 8	Exp. Name: *Write a C program to Sort the elements using Bubble Sort Technique*	Date: 2023-05-07

Aim:

Write a program to **sort** the given elements using `bubble sort technique`.

At the time of execution, the program should print the message on the console as:

```
Enter value of n :
```

For example, if the user gives the **input** as:

```
Enter value of n : 3
```

Next, the program should print the messages one by one on the console as:

```
Enter element for a[0] :
Enter element for a[1] :
Enter element for a[2] :
```

if the user gives the **input** as:

```
Enter element for a[0] : 22
Enter element for a[1] : 33
Enter element for a[2] : 12
```

then the program should **print** the result as:

```
Before sorting the elements in the array are
Value of a[0] = 22
Value of a[1] = 33
Value of a[2] = 12
After sorting the elements in the array are
Value of a[0] = 12
Value of a[1] = 22
Value of a[2] = 33
```

Fill in the missing code so that it produces the desired result.

Source Code:

```
BubbleSortDemo3.c
```

```c
#include<stdio.h>
void main()
{
        int a[20], i, n, j, temp;
        printf("Enter value of n : ");
        scanf("%d", &n);
        for(i=0;i<n;i++)
        {
                printf("Enter element for a[%d] : ",i);
                scanf("%d",&a[i]);
                }
        printf("Before sorting the elements in the array are\n");
        for(i=0;i<n;i++)
        {
                printf("Value of a[%d] = %d\n",i,a[i]);
                }
                for(i=0;i<n;i++)
                {
                        for(j=0;j<n-i-1;j++)
                        {
                                if(a[j+1]<a[j])
                                {
                                        temp = a[j+1];
                                        a[j+1] = a[j];
                                        a[j] = temp;
                                }
                        }
                }
                                        printf("After sorting the elements in the
array are\n");

                                        for(i=0;i<n;i++)
                                        {
                                                printf("Value of a[%d] =
%d\n",i,a[i]);
                                        }
                }
```

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :
3
Enter element for a[0] :
34
Enter element for a[1] :
25
Enter element for a[2] :
28
Before sorting the elements in the array are
Value of a[0] = 34

Value of a[1] = 25
Value of a[2] = 28
After sorting the elements in the array are
Value of a[0] = 25
Value of a[1] = 28
Value of a[2] = 34

Test Case - 2
User Output
Enter value of n :
5
Enter element for a[0] :
1
Enter element for a[1] :
6
Enter element for a[2] :
3
Enter element for a[3] :
8
Enter element for a[4] :
4
Before sorting the elements in the array are
Value of a[0] = 1
Value of a[1] = 6
Value of a[2] = 3
Value of a[3] = 8
Value of a[4] = 4
After sorting the elements in the array are
Value of a[0] = 1
Value of a[1] = 3
Value of a[2] = 4
Value of a[3] = 6
Value of a[4] = 8

S.No: 9	Exp. Name: ***Write a program to sort Ascending order the given elements using quick sort technique.***	Date: 2023-05-15

Aim:

Write a program to sort (Ascending order) the given elements using quick sort technique.

Note: Pick the first element as pivot. You will not be awarded marks if you do not follow this instruction.

At the time of execution, the program should print the message on the console as:

```
Enter array size :
```

For example, if the user gives the **input** as:

```
Enter array size : 5
```

Next, the program should print the following message on the console as:

```
Enter 5 elements :
```

if the user gives the **input** as:

```
Enter 5 elements : 34 67 12 45 22
```

then the program should **print** the result as:

```
Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67
```

Note: Do use the **printf()** function with a **newline** character (\n).

Source Code:

```
QuickSortMain.c
```

```c
#include<stdio.h>
void quicksort(int [],int ,int );
void main()
{
        int arr[15],i,n;
        printf("Enter array size : ");
        scanf("%d",&n);
        printf("Enter %d elements : ",n);
        for(i=0;i<n;i++)
        {
                scanf("%d",&arr[i]);
        }
        printf("Before sorting the elements are : ");
        for(i=0;i<n;i++)
        {
                printf("%d ",arr[i]);
        }
        quicksort(arr,0,n-1);
        printf("\nAfter sorting the elements are : ");
        for(i=0;i<n;i++)
        {
                printf("%d ",arr[i]);
        }
        printf("\n");
}
void quicksort(int arr[15],int low,int high)
{
        int left,right,pivot,temp;
        left=low;
        right=high;
        pivot=arr[(low+high)/2];
        do
        {
                while(arr[left]<pivot)
                left++;
                while(arr[right]>pivot)
                right--;
                if(left<=right)
                {
                        temp=arr[left];
                        arr[left]=arr[right];
                        arr[right]=temp;
                        right--;
                        left++;
                }
        }
        while(left<=right);
        if(low<right)
        quicksort(arr,low,right);
        if(left<high)
        quicksort(arr,left,high);
}
```

Execution Results - All test cases have succeeded!

Test Case - 1

User Output

Enter array size :

5

Enter 5 elements :

34 67 12 45 22

Before sorting the elements are : 34 67 12 45 22

After sorting the elements are : 12 22 34 45 67

Test Case - 2

User Output

Enter array size :

8

Enter 8 elements :

77 55 22 44 99 33 11 66

Before sorting the elements are : 77 55 22 44 99 33 11 66

After sorting the elements are : 11 22 33 44 55 66 77 99

Test Case - 3

User Output

Enter array size :

5

Enter 5 elements :

-32 -45 -67 -46 -14

Before sorting the elements are : -32 -45 -67 -46 -14

After sorting the elements are : -67 -46 -45 -32 -14

S.No: 10	Exp. Name: *Write a C program to sort the given elements using Heap sort*	Date: 2023-05-15

Aim:

Write a program to sort (ascending order) the given elements using heap sort technique.

Note: Do use the printf() function with a newline character (\n).

Source Code:

```
HeapSortMain.c
```

```c
#include<stdio.h>
void main()
{
        int arr[15],i,n;
        printf("Enter array size : ");
        scanf("%d",&n);
        printf("Enter %d elements : ",n);
        for(i=0;i<n;i++)
        {
                scanf("%d",&arr[i]);
        }
        printf("Before sorting the elements are : ");
        display(arr, n);
        heapsort(arr,n);
        printf("After sorting the elements are : ");
        display(arr, n);
}
int display(int arr[15],int n)
{
        int i;
        for(i=0;i<n;i++)
        {
                printf("%d ",arr[i]);
        }
        printf("\n");
}
int heapsort(int arr[15],int n)
{
        for(int i=n/2-1;i>=0;i--)
        {
                heapify(arr,n,i);
        }
        for(int i=n-1;i>=0;i--)
        {
                int temp=arr[0];
                arr[0]=arr[i];
                arr[i]=temp;
                heapify(arr,i,0);
        }
}
int heapify(int arr[15],int n,int i)
{
        int largest=i;
        int l=2*i+1;
        int r=2*i+2;
        if(l<n&&arr[l]>arr[largest])largest=l;
        if(r<n&&arr[r]>arr[largest])largest=r;
        if(largest!=i)
        {
                int temp=arr[i];
                arr[i]=arr[largest];
                arr[largest]=temp;
                heapify(arr,n,largest);
        }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1

User Output

Enter array size :

5

Enter 5 elements :

23 54 22 44 12

Before sorting the elements are : 23 54 22 44 12

After sorting the elements are : 12 22 23 44 54

Test Case - 2

User Output

Enter array size :

6

Enter 6 elements :

12 65 23 98 35 98

Before sorting the elements are : 12 65 23 98 35 98

After sorting the elements are : 12 23 35 65 98 98

Test Case - 3

User Output

Enter array size :

4

Enter 4 elements :

-23 -45 -12 -36

Before sorting the elements are : -23 -45 -12 -36

After sorting the elements are : -45 -36 -23 -12

Test Case - 4

User Output

Enter array size :

6

Enter 6 elements :

1 -3 8 -4 -2 5

Before sorting the elements are : 1 -3 8 -4 -2 5

After sorting the elements are : -4 -3 -2 1 5 8

S.No: 11	Exp. Name: ***Write a C program to Sort given elements using Merge sort***	Date: 2023-05-18

Aim:

Write a program to `sort` (`Ascending order`) the given elements using `merge sort` technique.

At the time of execution, the program should print the message on the console as:

```
Enter array size :
```

For example, if the user gives the **input** as:

```
Enter array size : 5
```

Next, the program should print the following message on the console as:

```
Enter 5 elements :
```

if the user gives the **input** as:

```
Enter 5 elements : 34 67 12 45 22
```

then the program should **print** the result as:

```
Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67
```

Note: Do use the **printf()** function with a **newline** character (`\n`).

Source Code:

```
MergeSortMain.c
```

```c
#include<stdio.h>
void main()
{
      int arr[15],i,n;
      printf("Enter array size : ");
      scanf("%d",&n);
      printf("Enter %d elements : ",n);
      for(i=0;i<n;i++)
      {
            scanf("%d",&arr[i]);
      }
      printf("Before sorting the elements are : ");
      display(arr, n);
      splitAndMerge(arr, 0, n-1);
      printf("After sorting the elements are : ");
      display(arr, n);
}
void display(int arr[15],int n)
{
      int i;
      for(i=0;i<n;i++)
            printf("%d ",arr[i]);
      printf("\n");
}
void merge(int arr[15],int low,int mid,int high)
{
      int i=low,h=low,j=mid+1,k,temp[15];
      while(h<=mid&&j<=high)
      {
            if(arr[h]<=arr[j])
            {
                  temp[i]=arr[h];
                  h++;
            }
            else
            {
               temp[i]=arr[j];
               j++;
            }
            i++;
      }
      if(h>mid)
      {
            for(k=j;k<=high;k++)
        {
            temp[i]=arr[k];
            i++;
        }
      }
      else
      {
            for(k=h;k<=mid;k++)
            {
                  temp[i]=arr[k];
                  i++;
```

```
            for(k=low;k<=high;k++)
            {
                    arr[k]=temp[k];
            }
    }
    void splitAndMerge(int arr[15],int low,int high)
    {
            if(low<high)
            {
                    int mid=(low+high)/2;
                    splitAndMerge(arr,low,mid);
                    splitAndMerge(arr,mid+1,high);
                    merge(arr,low,mid,high);
            }
    }
```

Execution Results - All test cases have succeeded!

Test Case - 1

User Output

Enter array size :
5

Enter 5 elements :
34 67 12 45 22

Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67

Test Case - 2

User Output

Enter array size :
8

Enter 8 elements :
77 55 22 44 99 33 11 66

Before sorting the elements are : 77 55 22 44 99 33 11 66
After sorting the elements are : 11 22 33 44 55 66 77 99

Test Case - 3

User Output

Enter array size :
5

Enter 5 elements :
-32 -45 -67 -46 -14

Before sorting the elements are : -32 -45 -67 -46 -14
After sorting the elements are : -67 -46 -45 -32 -14

Aim:

Write a program to `sort` (`ascending order`) the given elements using `radix sort` technique.

At the time of execution, the program should print the message on the console as:

```
Enter array size :
```

For example, if the user gives the **input** as:

```
Enter array size : 5
```

Next, the program should print the following message on the console as:

```
Enter 5 elements :
```

if the user gives the **input** as:

```
Enter 5 elements : 34 67 12 45 22
```

then the program should **print** the result as:

```
Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67
```

Note: Do use the **printf()** function with a **newline** character (`\n`).

Source Code:

```
RadixSortMain2.c
```

```c
#include<stdio.h>
#include<conio.h>
int largest(int a[],int n)
{
        int large=a[0],i;
        for(i=1;i<n;i++)
        {
                if(large<a[i])
                large=a[i];
        }
        return large;
}
void printArray(int arr[],int n)
{
        for(int i=0;i<n;i++){
                printf("%d ",arr[i]);}
        printf("\n");
}


        int main()
{
        int size;
        int *arr,i;
        printf("Enter array size : ");
        scanf("%d",&size);
        arr=(int*)malloc(size*sizeof(int));
        printf("Enter %d elements : ",size);
        for(i=0;i<size;i++)
        {
                scanf("%d",&arr[i]);
        }
        printf("Before sorting the elements are : ");
        printArray(arr,size);
        RadixSort(arr,size);
        printf("After sorting the elements are : ");
        printArray(arr,size);
        return 0;
}
void RadixSort(int a[],int n)
{
        int bucket[10][10],bucket_count[10];
        int i,j,k,remainder,NOP=0,divisor=1,large,pass;
        large=largest(a,n);
        while(large>0)
        {
                NOP++;
                large/=10;
        }
        for(pass=0;pass<NOP;pass++)
        {
                for(i=0;i<10;i++)
                {
                        bucket_count[i]=0;
                }
                for(i=0;i<n;i++)
```

```
                    bucket[remainder][bucket_count[remainder]]=a[i];
                    bucket_count[remainder]+=1;
            }
            i=0;
            for(k=0;k<10;k++)
            {
                    for(j=0;j<bucket_count[k];j++)
                    {
                            a[i]=bucket[k][j];
                            i++;
                    }
            }
            divisor*=10;
        }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1

User Output

| Enter array size : |
| 5 |
| Enter 5 elements : |
| 23 |
| 43 |
| 54 |
| 12 |
| 65 |
| Before sorting the elements are : 23 43 54 12 65 |
| After sorting the elements are : 12 23 43 54 65 |

Test Case - 2

User Output

| Enter array size : |
| 7 |
| Enter 7 elements : |
| 23 |
| 54 |
| 136 |
| 85 |
| 24 |
| 65 |
| 76 |
| Before sorting the elements are : 23 54 136 85 24 65 76 |
| After sorting the elements are : 23 24 54 65 76 85 136 |

S.No: 13	Exp. Name: *C program to performs all operations on singly linked list*	Date: 2023-06-29

Aim:

Write a program that uses functions to perform the following **operations on singly linked list**

i) Creation

ii) Insertion

iii) Deletion

iv) Traversal

Source Code:

```
singlelinkedlistalloperations.c
```

```c
#include<stdio.h>
#include<stdlib.h>
struct node
{
        int data;
        struct node *next;
} *head=NULL, *tail=NULL;
void insert();
void Delete();
void display();
void count();
typedef struct node *NODE;
NODE temp,Node,ptr,ptr2;
int value;
void main()
{
        int option=0;
        printf("Singly Linked List Example - All Operations\n");
        while(1)
        {
                printf("Options\n");
                printf("1 : Insert elements into the linked list\n");
                printf("2 : Delete elements from the linked list\n");
                printf("3 : Display the elements in the linked list\n");
                printf("4 : Count the elements in the linked list\n");
                printf("5 : Exit()\n");
                printf("Enter your option : ");
                scanf("%d",&option);
                if(option<=5)
                {
                        switch(option)
                        {
                                case 1:
                                insert();
                                break;
                                case 2:
                                Delete();
                                break;
                                case 3:
                                display();
                                break;
                                case 4:
                                count();
                                break;
                                case 5:
                                exit(0);
                        }
                }
                else
                {
                        printf("Enter options from 1 to 5\n");
                        break;
                }
        }
}
```

```c
        printf("Enter elements for inserting into linked list : ");
        scanf("%d",&value);
        Node=(NODE)malloc(sizeof(struct node));
        Node->data=value;
        Node->next=NULL;
        if(head==NULL)
        {
                head=Node;
                tail=Node;
        }
        else
        {
                tail->next=Node;
                tail=Node;
        }
}
void Delete()
{
        int i=1,j=1,pos,spot,count=0;
        temp=head,ptr2=head;
        while(ptr2!=NULL)
        {
                count++;
                ptr2=ptr2->next;
        }
        printf("Enter position of the element for deleteing the element : ");
        scanf("%d",&spot);
        while(i<=count)
        {
                if(i==spot)
                {
                        pos=spot;
                        break;
                }
                i++;
        }
        if(pos!=spot)
        printf("Invalid Positiion.\n");
        else
        {
                if(pos==1)
                {
                        head=head->next;
                        free(temp);
                }
                else
                {
                        while(j<pos)
                        {
                                ptr=temp;
                                temp=temp->next;
                                j++;
                        }
                        if(temp->next==NULL)
                        {
```

```
                }
                else
                {
                        ptr->next=temp->next;
                        free(temp);
                }
        }
        printf("Deleted successfully\n");
    }
}
void display()
{
    temp=head;
    printf("The elements in the linked list are : ");
    while(temp!=NULL)
    {
        printf("%d ",temp->data);
        temp=temp->next;
    }
    printf("\n");
}
void count()
{
    int count=0;
    temp=head;
    while(temp!=NULL)
    {
        count++;
        temp=temp->next;
    }
    printf("No of elements in the linked list are : %d\n",count);
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Singly Linked List Example - All Operations
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
111
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list

| 3 : Display the elements in the linked list |
| 4 : Count the elements in the linked list |
| 5 : Exit() |
| Enter your option : |
| 1 |
| Enter elements for inserting into linked list : |
| 222 |
| Options |
| 1 : Insert elements into the linked list |
| 2 : Delete elements from the linked list |
| 3 : Display the elements in the linked list |
| 4 : Count the elements in the linked list |
| 5 : Exit() |
| Enter your option : |
| 1 |
| Enter elements for inserting into linked list : |
| 333 |
| Options |
| 1 : Insert elements into the linked list |
| 2 : Delete elements from the linked list |
| 3 : Display the elements in the linked list |
| 4 : Count the elements in the linked list |
| 5 : Exit() |
| Enter your option : |
| 1 |
| Enter elements for inserting into linked list : |
| 444 |
| Options |
| 1 : Insert elements into the linked list |
| 2 : Delete elements from the linked list |
| 3 : Display the elements in the linked list |
| 4 : Count the elements in the linked list |
| 5 : Exit() |
| Enter your option : |
| 3 |
| The elements in the linked list are : 111 222 333 444 |
| Options |
| 1 : Insert elements into the linked list |
| 2 : Delete elements from the linked list |
| 3 : Display the elements in the linked list |
| 4 : Count the elements in the linked list |
| 5 : Exit() |
| Enter your option : |
| 2 |
| Enter position of the element for deleteing the element : |
| 2 |
| Deleted successfully |
| Options |
| 1 : Insert elements into the linked list |
| 2 : Delete elements from the linked list |

Srinivasa Ramanujan Institute of Technology

| 4 : Count the elements in the linked list |
| 5 : Exit() |
| Enter your option : |
| 3 |
| The elements in the linked list are : 111 333 444 |
| Options |
| 1 : Insert elements into the linked list |
| 2 : Delete elements from the linked list |
| 3 : Display the elements in the linked list |
| 4 : Count the elements in the linked list |
| 5 : Exit() |
| Enter your option : |
| 4 |
| No of elements in the linked list are : 3 |
| Options |
| 1 : Insert elements into the linked list |
| 2 : Delete elements from the linked list |
| 3 : Display the elements in the linked list |
| 4 : Count the elements in the linked list |
| 5 : Exit() |
| Enter your option : |
| 5 |

Test Case - 2
User Output
Singly Linked List Example - All Operations
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
001
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
010
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list

4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
100
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
101
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
3
The elements in the linked list are : 1 10 100 101
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
2
Enter position of the element for deleteing the element :
3
Deleted successfully
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
3
The elements in the linked list are : 1 10 101
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list

Enter your option :
4
No of elements in the linked list are : 3
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
5

Srinivasa Ramanujan Institute of Technology   2022-2026-CSE-B

S.No: 14	Exp. Name: *C program which performs all operations on double linked list.*	Date: 2023-06-29

Aim:

Write a C program that uses functions to perform the following **operations on double linked list**

i) Creationii) Insertioniii) Deletioniv) Traversal

Source Code:

AllOperationsDLL.c

```c
#include<stdio.h>
#include<stdlib.h>
void insert();
void rem();
void display();
struct node
{
        int data;
        struct node *next;
        struct node *prev;
} *head=NULL,*tail=NULL;
typedef struct node *NODE;
void main()
{
        int option=0;
        while(1)
        {
                printf("Operations on doubly linked list\n");
                printf("1. Insert \n");
                printf("2.Remove\n");
                printf("3. Display\n");
                printf("0. Exit\n");
                printf("Enter Choice 0-4? : ");
                scanf("%d",&option);
                switch(option)
                {
                        case 1 :
                        insert();
                        break;
                        case 2 :
                        rem();
                        break;
                        case 3 :
                        display();
                        break;
                        case 0 :
                        exit(0);
                }
        }
}
void insert()
{
        NODE temp,Node;
        int value;
        Node=(NODE)malloc(sizeof(struct node));
        printf("Enter number: ");
        scanf("%d",&value);
        Node->data=value;
        if(head==NULL)
        {
                Node->next=NULL;
                Node->prev=NULL;
                head=Node;
                tail=Node;
        }
```

```c
                tail->next=Node;
                Node->prev=tail;
                Node->next=NULL;
                tail=Node;
        }
}
void rem()
{
        int devalue,item;
        NODE temp,ptr;
        printf("Enter number to delete: ");
        scanf("%d",&item);
        ptr=head;
        while(ptr!=NULL)
        {
                if(ptr->data==item)
                {
                        devalue=item;
                        break;
                }
                ptr=ptr->next;
        }
        if(devalue!=item)
        printf("%d not found.\n",item);
        else
        {
                if(devalue==head->data)
                {
                        temp=head;
                        head=head->next;
                        head->prev=NULL;
                        free(temp);
                }
                else
                {
                        temp=head;
                        while(temp->data!=devalue)
                        {
                                temp=temp->next;
                        }
                        temp->prev->next=temp->next;
                        temp->next->prev=temp->prev;
                        free(temp);
                }
        }
}
void display()
{
        NODE temp;
        temp=head;
        while(temp!=NULL)
        {
                printf("%d\t",temp->data);
                temp=temp->next;
        }
```

```
        printf("\n");
}
```

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
1
Enter number:
15
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
1
Enter number:
16
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
1
Enter number:
17
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
1
Enter number:
18
Operations on doubly linked list
1.Insert
2.Remove
3.Display

Enter Choice 0-4?:
3
15   16   17   18
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
2
Enter number to delete:
19
19 not found
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
3
15   16   17   18
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
2
Enter number to delete:
16
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
0

S.No: 15	Exp. Name: *C program to which performs all operations on Circular linked list.*	Date: 2023-06-29

<u>**Aim:**</u>

Write a program that uses functions to perform the following **operations on Circular linked list**
i)Creationii)insertioniii)deletioniv) Traversal

<u>**Source Code:**</u>

AlloperationsinCLL.c

```c
#include<stdio.h>
#include<stdlib.h>
struct node
{
        int data;
        struct node *next;
};
void insert();
void deletion();
void find();
void print();
struct node *head=NULL;
int main()
{
        int choice;
        printf("CIRCULAR LINKED LIST IMPLEMENTATION OF LIST ADT\n");
        while(1)
        {
                printf("1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT\n");
                printf("Enter the choice: ");
                scanf("%d", &choice);
                switch(choice)
                {
                        case 1:insert();break;
                        case 2:deletion();break;
                        case 3:find();break;
                        case 4:print();break;
                        case 5:exit(0);
                }
        }
}
void insert()
{
        int x,n;
        struct node *newnode,*temp=head,*prev;
        newnode=(struct node*)malloc(sizeof(struct node));
        printf("Enter the element to be inserted: ");
        scanf("%d", &x);
        printf("Enter the position of the element: ");
        scanf("%d", &n);
        newnode->data=x;
        newnode->next=NULL;
        if(head==NULL)
        {
                head=newnode;
                newnode->next=newnode;
        }
        else if(n==1)
        {
                temp=head;
                newnode->next=temp;
                while(temp->next!=head)
                temp=temp->next;
                temp->next=newnode;
                head=newnode;
```

```c
        {
                for(int i=1;i<n-1;i++)
                {
                        temp=temp->next;
                }
                newnode->next=temp->next;
                temp->next=newnode;
        }
}
void deletion()
{
        struct node *temp=head,*prev,*temp1=head;
        int key,count=0;
        printf("Enter the element to be deleted: ");
        scanf("%d", &key);
        if(temp->data==key)
        {
                prev=temp->next;
                while(temp->next!=head)
                {
                        temp=temp->next;
                }
                temp->next=prev;
                free(temp);
                head=prev;
                printf("Element deleted\n");
        }
        else
        {
                while(temp->next!=head)
                {
                        if(temp->data==key)
                        {
                                count+=1;
                                break;
                        }
                        prev=temp;
                        temp=temp->next;
                }
                if(temp->data==key)
                {
                        prev->next=temp->next;
                        free(temp);
                        printf("Element deleted\n");
                }
                else
                {
                        printf("Element does not exist...!\n");
                }
        }
}
void find()
{
        struct node *temp=head;
        int key,count=0;
```

```
                while(temp->next!=head)
                {
                        if(temp->data==key)
                        {
                                count=1;
                                break;
                        }
                        temp=temp->next;
                }
                if(count==1)
                printf("Element exist...!\n");
                else
                {
                        if(temp->data==key)
                        printf("Element exist...!\n");
                        else
                        printf("Element does not exist...!\n");
                }
}
void print()
{
        struct node *temp=head;
        printf("The list element are: ");
        while(temp->next!=head)
        {
                printf("%d -> ",temp->data);
                temp=temp->next;
        }
        printf("%d -> ", temp->data);
        printf("\n");
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
CIRCULAR LINKED LIST IMPLEMENTATION OF LIST ADT
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
1
Enter the element to be inserted:
12
Enter the position of the element:
1
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
1
Enter the element to be inserted:
14
Enter the position of the element:

1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
1
Enter the element to be inserted:
15
Enter the position of the element:
3
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
4
The list element are: 12 -> 14 -> 15 ->
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
2
Enter the element to be deleted:
14
Element deleted
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
4
The list element are: 12 -> 15 ->
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
3
Enter the element to be searched:
12
Element exist...!
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
5

Test Case - 2
User Output
CIRCULAR LINKED LIST IMPLEMENTATION OF LIST ADT
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
1
Enter the element to be inserted:
54
Enter the position of the element:
1
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
2
Enter the element to be deleted:
1
Element does not exist...!
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT

4
The list element are: 54 ->
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
1
Enter the element to be inserted:
65
Enter the position of the element:
2
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
4
The list element are: 54 -> 65 ->
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
5

Aim:

Write a program to implement `circular queue` using **dynamic array**.

Aim:

Write a program to implement `circular queue` using **dynamic array**.

```
Sample Input and Output:
    Enter the maximum size of the circular queue : 3
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Circular queue is underflow.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 3
    Circular queue is empty.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 1
    Enter element : 111
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 1
    Enter element : 222
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 1
    Enter element : 333
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 1
    Enter element : 444
    Circular queue is overflow.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 3
    Elements in the circular queue : 111 222 333
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Deleted element = 111
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 1
    Enter element : 444
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 3
    Elements in the circular queue : 222 333 444
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Deleted element = 222
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Deleted element = 333
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Deleted element = 444
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 3
    Circular queue is empty.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 4
```

Source Code:

CQueueUsingDynamicArray.c

```c
#include<stdio.h>
#include<stdlib.h>
int *cqueue;
int front,rear;
int maxSize;
void initCircularQueue()
{
        cqueue=(int *)malloc(maxSize * sizeof(int));
        front=rear=-1;
}
void dequeue()
{
        if(front==-1)
                printf("Circular queue is underflow.\n");
        else
        {
                printf("Deleted element = %d\n",*(cqueue+front));
                if(front==rear)
                {
                        rear=front=-1;
                }
                else if(front==maxSize-1)
                {
                        front=0;
                }
                else
                {
                        front++;
                }
        }
}
void enqueue(int x)
{
        if(((rear==maxSize-1)&&(front==0))||(rear+1==front))
        {
                printf("Circular queue is overflow.\n");
        }
        else
        {
                if(rear==maxSize-1)
                {
                        rear=-1;
                }
                else if(front==-1)
                {
                        front=0;
                }
                rear++;
                cqueue[rear]=x;
                printf("Successfully inserted.\n");
        }
}
void display()
{
        int i;
```

```c
                printf("Circular queue is empty.\n");
        }
        else
        {
                printf("Elements in the circular queue : ");
                if(front<=rear)
                {
                        for(i=front;i<=rear;i++)
                        {
                                printf("%d ",*(cqueue+i));
                        }
                }
                else
                {
                        for(i=front;i<=maxSize-1;i++)
                        {
                                printf("%d ",*(cqueue+i));
                        }
                        for(i=0;i<=rear;i++)
                        {
                                printf("%d ",*(cqueue+i));
                        }
                }
                printf("\n");
        }
}
int main()
{
        int op,x;
        printf("Enter the maximum size of the circular queue : ");
        scanf("%d",&maxSize);
        initCircularQueue();
        while(1)
        {
                printf("1.Enqueue 2.Dequeue 3.Display 4.Exit\n");
                printf("Enter your option : ");
                scanf("%d",&op);
                switch(op)
                {
                        case 1:
                        printf("Enter element : ");
                        scanf("%d",&x);
                        enqueue(x);
                        break;
                        case 2:
                        dequeue();
                        break;
                        case 3:
                        display();
                        break;
                        case 4:
                        exit(0);
                }
        }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1

User Output
Enter the maximum size of the circular queue :
3
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Circular queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3
Circular queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
111
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
222
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
333
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
444
Circular queue is overflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3
Elements in the circular queue : 111 222 333
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Deleted element = 111
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1

444
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3
Elements in the circular queue : 222 333 444
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Deleted element = 222
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Deleted element = 333
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Deleted element = 444
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3
Circular queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
4

S.No: 17	Exp. Name: ***Write a C program to implement different Operations on Stack using Array representation***	Date: 2023-06-29

Aim:

Write a program to implement `stack` using **arrays**.

```
Sample Input and Output:
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 4
    Stack is empty.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 2
    Stack is underflow.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 3
    Stack is empty.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 5
    Stack is underflow.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 1
    Enter element : 25
    Successfully pushed.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 1
    Enter element : 26
    Successfully pushed.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 3
    Elements of the stack are : 26 25
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 2
    Popped value = 26
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 4
    Stack is not empty.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 5
    Peek value = 25
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 6
```

Source Code:

StackUsingArray.c

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```c
#include<stdio.h>
#include<stdlib.h>
#define STACK_MAX_SIZE 10
int a[STACK_MAX_SIZE];
int top=-1;
void push(int element)
{
        if(top==STACK_MAX_SIZE-1)
        {
                printf("Stack is overflow.\n");
        }
        else
        {
                top=top+1;
                a[top]=element;
                printf("Successfully pushed.\n");
        }
}
void display()
{
        if(top<0)
        {
                printf("Stack is empty.\n");
        }
        else
        {
                printf("Elements of the stack are : ");
                for(int i=top;i>=0;i--)
                        printf("%d ",a[i]);
                printf("\n");
        }
}
void pop()
{
        int x;
        if(top<0)
        {
                printf("Stack is underflow.\n");
        }
        else
        {
                x=a[top];
                top=top-1;
                printf("Popped value = %d\n",x);
        }
}
void peek()
{
        int x;
        if(top<0)
        {
                printf("Stack is underflow.\n");
        }
        else
        {
```

```c
        }
}
void isEmpty()
{
        if(top<0)
        {
                printf("Stack is empty.\n");
        }
        else
        {
                printf("Stack is not empty.\n");
        }
}
int main()
{
        int op,x;
        while(1)
        {
                printf("1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit\n");
                printf("Enter your option : ");
                scanf("%d",&op);
                switch(op)
                {
                        case 1:
                        printf("Enter element : ");
                        scanf("%d",&x);
                        push(x);
                        break;
                        case 2:
                        pop();
                        break;
                        case 3:
                        display();
                        break;
                        case 4:
                        isEmpty();
                        break;
                        case 5:
                        peek();
                        break;
                        case 6:
                        exit(0);
                }
        }
}
```

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :

| Enter element : |
| 10 |
| Successfully pushed. |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 1 |
| Enter element : |
| 20 |
| Successfully pushed. |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 1 |
| Enter element : |
| 30 |
| Successfully pushed. |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 3 |
| Elements of the stack are : 30 20 10 |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 5 |
| Peek value = 30 |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 2 |
| Popped value = 30 |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 2 |
| Popped value = 20 |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 3 |
| Elements of the stack are : 10 |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 5 |
| Peek value = 10 |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 4 |
| Stack is not empty. |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 2 |
| Popped value = 10 |
| 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit |
| Enter your option : |
| 3 |

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
4
Stack is empty.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
6

S.No: 18	Exp. Name: *Write a C program to implement different Operations on Stack using Linked Lists*	Date: 2023-06-29

Aim:

Write a program to implement stack using **linked lists**.

```
Sample Input and Output:
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 1
    Enter element : 33
    Successfully pushed.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 1
    Enter element : 22
    Successfully pushed.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 1
    Enter element : 55
    Successfully pushed.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 1
    Enter element : 66
    Successfully pushed.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 3
    Elements of the stack are : 66 55 22 33
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 2
    Popped value = 66
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 2
    Popped value = 55
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 3
    Elements of the stack are : 22 33
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 5
    Peek value = 22
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 4
    Stack is not empty.
    1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
    Enter your option : 6
```

Source Code:

StackUsingLList.c

```c
#include<stdio.h>
#include<stdlib.h>
struct stack
{
        int data;
        struct stack*next;
};
typedef struct stack*stk;
stk top=NULL;
stk push(int x)
{
        stk temp;
        temp=(stk)malloc(sizeof(struct stack));
        if(temp==NULL)
        {
                printf("Stack is overflow.\n");
        }
        else
        {
                temp->data=x;
                temp->next=top;
                top=temp;
                printf("Successfully pushed.\n");
        }
}
void display()
{
        stk temp=top;
        if(temp==NULL)
        {
                printf("Stack is empty.\n");
        }
        else
        {
                printf("Elements of the stack are : ");
                while(temp!=NULL)
                {
                        printf("%d ",temp->data);
                        temp=temp->next;
                }
                printf("\n");
        }
}
stk pop()
{
        stk temp;
        if(top==NULL)
        {
                printf("Stack is underflow.\n");
        }
        else
        {
                temp=top;
                top=top->next;
                printf("Popped value = %d\n",temp->data);
```

```c
}
void peek()
{
        stk temp;
        if(top==NULL)
        {
                printf("Stack is underflow.\n");
        }
        else
        {
                temp=top;
                printf("Peek value = %d\n",temp->data);
        }
}
void isEmpty()
{
        if(top==NULL)
        {
                printf("Stack is empty.\n");
        }
        else
        {
                printf("Stack is not empty.\n");
        }
}
int main()
{
        int op,x;
        while(1)
        {
                printf("1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit\n");
                printf("Enter your option : ");
                scanf("%d",&op);
                switch(op)
                {
                        case 1:
                        printf("Enter element : ");
                        scanf("%d",&x);
                        push(x);
                        break;
                        case 2:
                        pop();
                        break;
                        case 3:
                        display();
                        break;
                        case 4:
                        isEmpty();
                        break;
                        case 5:
                        peek();
                        break;
                        case 6:
                        exit(0);
                }
```

```
        }
}
```

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
1
Enter element :
33
Successfully pushed.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
1
Enter element :
22
Successfully pushed.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
1
Enter element :
55
Successfully pushed.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
1
Enter element :
66
Successfully pushed.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
3
Elements of the stack are : 66 55 22 33
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
2
Popped value = 66
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
2
Popped value = 55
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
3
Elements of the stack are : 22 33

Enter your option :
5
Peek value = 22
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
4
Stack is not empty.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
6

Test Case - 2
User Output
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
2
Stack is underflow.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
3
Stack is empty.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
5
Stack is underflow.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
4
Stack is empty.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
1
Enter element :
23
Successfully pushed.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
1
Enter element :
24
Successfully pushed.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
3
Elements of the stack are : 24 23
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
5

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
2
Popped value = 24
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
2
Popped value = 23
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
2
Stack is underflow.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
4
Stack is empty.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option :
6

S.No: 19	Exp. Name: *Write a C program to implement different Operations on Queue using Array representation*	Date: 2023-06-29

Srinivasa Ramanujan Institute of Technology

Aim:

Write a program to implement queue using **arrays**.

```
Sample Input and Output:
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 1
    Enter element : 23
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 1
    Enter element : 56
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 3
    Elements in the queue : 23 56
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 4
    Queue is not empty.
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 5
    Queue size : 2
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 2
    Deleted element = 23
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 2
    Deleted element = 56
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 4
    Queue is empty.
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 6
```

Source Code:

```
QUsingArray.c
```

```c
#include<stdio.h>
#include<conio.h>
#define MAX 10
int queue[MAX];
int front=-1,rear=-1;
void enqueue(int x)
{
        if(rear==MAX-1)
        {
                printf("Queue is overflow.\n");
        }
        else
        {
                rear++;
                queue[rear]=x;
                printf("Successfully inserted.\n");
        }
        if(front==-1)
        {
                front++;
        }
}
void dequeue()
{
        if(front==-1)
        {
                printf("Queue is underflow.\n");
        }
        else
        {
                printf("Deleted element = %d\n",queue[front]);
                if(front==rear)
                {
                        front=rear=-1;
                }
                else
                {
                        front++;
                }
        }
}
void display()
{
        if(front==-1&&rear==-1)
        {
                printf("Queue is empty.\n");
        }
        else
        {
                printf("Elements in the queue : ");
                for(int i=front;i<=rear;i++)
                        printf("%d ",queue[i]);
                printf("\n");
        }
}
```

```c
        if(front==-1&&rear==-1)
        {
                printf("Queue size : 0\n");
        }
        else
        {
                printf("Queue size : %d\n",rear-front+1);
        }
}
void isEmpty()
{
        if(front==-1&&rear==-1)
        {
                printf("Queue is empty.\n");
        }
        else
        {
                printf("Queue is not empty.\n");
        }
}
void main()
{
        int op,x;
        while(1)
        {
                printf("1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit\n");
                printf("Enter your option : ");
                scanf("%d",&op);
                switch(op)
                {
                        case 1:
                        printf("Enter element : ");
                        scanf("%d",&x);
                        enqueue(x);
                        break;
                        case 2:
                        dequeue();
                        break;
                        case 3:
                        display();
                        break;
                        case 4:
                        isEmpty();
                        break;
                        case 5:
                        size();
                        break;
                        case 6:
                        exit(0);
                }
        }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1

User Output

1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
2
Queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
3
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
4
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
5
Queue size : 0
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1
Enter element :
14
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1
Enter element :
78
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1
Enter element :
53
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
3
Elements in the queue : 14 78 53
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
5
Queue size : 3
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
6

Srinivasa Ramanujan Institute of Technology

Test Case - 2

User Output

| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 1 |
| Enter element : |
| 25 |
| Successfully inserted. |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 2 |
| Deleted element = 25 |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 2 |
| Queue is underflow. |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 3 |
| Queue is empty. |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 1 |
| Enter element : |
| 65 |
| Successfully inserted. |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 3 |
| Elements in the queue : 65 |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 4 |
| Queue is not empty. |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 2 |
| Deleted element = 65 |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 4 |
| Queue is empty. |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |
| 5 |
| Queue size : 0 |
| 1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit |
| Enter your option : |

Enter element :
63
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
5
Queue size : 1
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
6

S.No: 20	Exp. Name: *Write a C program to implement different Operations on Queue using Dynamic Array*	Date: 2023-06-29

Aim:

Write a program to implement queue using **dynamic array**.

In this queue implementation has

1. a pointer 'queue' to a dynamically allocated array (used to hold the contents of the queue)
2. an integer 'maxSize' that holds the size of this array (i.e the maximum number of data that can be held in this array)
3. an integer 'front' which stores the array index of the first element in the queue
4. an integer 'rear' which stores the array index of the last element in the queue.

```
Sample Input and Output:
    Enter the maximum size of the queue : 3
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Queue is underflow.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 3
    Queue is empty.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 1
    Enter element : 15
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 1
    Enter element : 16
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 1
    Enter element : 17
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 1
    Enter element : 18
    Queue is overflow.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 3
    Elements in the queue : 15 16 17
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Deleted element = 15
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Deleted element = 16
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 3
    Elements in the queue : 17
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Deleted element = 17
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 3
    Queue is empty.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 2
    Queue is underflow.
    1.Enqueue 2.Dequeue 3.Display 4.Exit
    Enter your option : 4
```

Source Code:

```c
#include<stdio.h>
#include<conio.h>
int *queue;
int front,rear;
int maxSize;
void initQueue()
{
        queue=(int *)malloc(maxSize*sizeof(int));
        front=-1;
        rear=-1;
}
void enqueue(int x)
{
        if(rear==maxSize-1)
        {
                printf("Queue is overflow.\n");
        }
        else
        {
                rear++;
                queue[rear]=x;
                printf("Successfully inserted.\n");
        }
        if(front==-1)
        {
                front++;
        }
}
void dequeue()
{
        if(front==-1)
        {
                printf("Queue is underflow.\n");
        }
        else
        {
                printf("Deleted element = %d\n",*(queue+front));
                if(front==rear)
                {
                        front=rear=-1;
                }
                else
                {
                        front++;
                }
        }
}
void display()
{
        if(front==-1&&rear==-1)
        {
                printf("Queue is empty.\n");
        }
        else
        {
```

```
                {
                        printf("%d ",*(queue+i));
                }
                printf("\n");
        }
}
int main()
{
        int op,x;
        printf("Enter the maximum size of the queue : ");
        scanf("%d", &maxSize);
        initQueue();
        while(1)
        {
                printf("1.Enqueue 2.Dequeue 3.Display 4.Exit\n");
                printf("Enter your option : ");
                scanf("%d",&op);
                switch(op)
                {
                        case 1:
                        printf("Enter element : ");
                        scanf("%d",&x);
                        enqueue(x);
                        break;
                        case 2:
                        dequeue();
                        break;
                        case 3:
                        display();
                        break;
                        case 4:
                        exit(0);
                }
        }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the maximum size of the queue :
3
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Exit

1

Enter element :

15

Successfully inserted.

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

1

Enter element :

16

Successfully inserted.

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

1

Enter element :

17

Successfully inserted.

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

1

Enter element :

18

Queue is overflow.

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

3

Elements in the queue : 15 16 17

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

2

Deleted element = 15

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

2

Deleted element = 16

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

3

Elements in the queue : 17

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

2

Deleted element = 17

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

3

Queue is empty.

1.Enqueue 2.Dequeue 3.Display 4.Exit

Enter your option :

2

Queue is underflow.

Enter your option :
4

Test Case - 2
User Output
Enter the maximum size of the queue :
2
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
34
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
56
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
45
Queue is overflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3
Elements in the queue : 34 56
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Deleted element = 34
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Deleted element = 56
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3

1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
56
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3
Elements in the queue : 56
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
4

S.No: 21	Exp. Name: *Write a C program to implement different Operations on Queue using Linked Lists*	Date: 2023-07-08

Aim:

Write a program to implement queue using **linked lists**.

```
Sample Input and Output:
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 1
    Enter element : 57
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 1
    Enter element : 87
    Successfully inserted.
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 5
    Queue size : 2
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 3
    Elements in the queue : 57 87
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 2
    Deleted value = 57
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 2
    Deleted value = 87
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 3
    Queue is empty.
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 5
    Queue size : 0
    1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
    Enter your option : 6
```

Source Code:

QUsingLL.c

```c
#include <conio.h>
#include <stdio.h>
struct queue
{
        int data;
        struct queue *next;
};
typedef struct queue *Q;
Q front = NULL, rear = NULL;
void enqueue(int element)
{
        Q temp = NULL;
        temp = (Q)malloc(sizeof(struct queue));
        if(temp == NULL)
        {
                printf("Queue is overflow.\n");
        }
        else
        {
                temp -> data = element;
                temp -> next = NULL;
                if(front == NULL)
                {
                        front = temp;
                }
                else
                {
                        rear -> next = temp;
                }
                rear = temp;
                printf("Successfully inserted.\n");
        }
}
void dequeue()
{
        Q temp = NULL;
        if(front == NULL)
        {
                printf("Queue is underflow.\n");
        }
        else
        {
                temp = front;
                if (front == rear)
                {
                        front = rear = NULL;
                }
                else
                {
                        front = front -> next;
                }
                printf("Deleted value = %d\n", temp -> data);
                free(temp);
        }
}
```

```c
        if(front == NULL)
        {
                printf("Queue is empty.\n");
        }
        else
        {
                Q temp = front;
                printf("Elements in the queue : ");
                while(temp != NULL)
                {
                        printf("%d ", temp -> data);
                        temp = temp -> next;
                }
                printf("\n");
        }
}
void size()
{
        int count =0;
        if(front == NULL)
        {
                printf("Queue size : 0\n");
        }
        else
        {
                Q temp = front;
                while(temp != NULL)
                {
                        temp = temp -> next;
                        count = count + 1;
                }
                printf("Queue size : %d\n",count);
        }
}
void isEmpty()
{
        if(front == NULL )
        {
                printf("Queue is empty.\n");
        }
        else
        {
                printf("Queue is not empty.\n");
        }
}
int main()
{
        int op, x;
        while(1)
        {
                printf("1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit\n");
                printf("Enter your option : ");
                scanf("%d",&op);
                switch(op)
                {
```

```
                    scanf("%d",&x);
                    enqueue(x);
                    break;
                    case 2:
                    dequeue();
                    break;
                    case 3:
                    display();
                    break;
                    case 4:
                    isEmpty();
                    break;
                    case 5:
                    size();
                    break;
                    case 6: exit(0);
                }
            }
        }
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
2
Queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
3
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
4
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
5
Queue size : 0
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1
Enter element :
44
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1

55
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1
Enter element :
66
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1
Enter element :
67
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
3
Elements in the queue : 44 55 66 67
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
2
Deleted value = 44
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
2
Deleted value = 55
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
5
Queue size : 2
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
4
Queue is not empty.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
6

Test Case - 2
User Output
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1
Enter element :
23
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :

Enter element :
234
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1
Enter element :
45
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
1
Enter element :
456
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
2
Deleted value = 23
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
3
Elements in the queue : 234 45 456
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
2
Deleted value = 234
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
3
Elements in the queue : 45 456
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
4
Queue is not empty.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
5
Queue size : 2
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
3
Elements in the queue : 45 456
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option :
6

Aim:

Write a C program to reverse the links (not just displaying) of a linked list.

Note: Add node at the beginning.

Source Code:

reverseLinkedList.c

```c
#include <stdio.h>
#include <stdlib.h>

struct Node
{
        int data;
         struct Node* next;
};

static void reverse(struct Node** head_ref)
{
        struct Node* prev = NULL;
         struct Node* current = *head_ref;
          struct Node* next = NULL;
           while (current != NULL)
             {
                next = current->next;
                 current->next = prev;
                 prev = current;
                 current = next;
             }
              *head_ref = prev;
}

void push(struct Node** head_ref, int new_data)
{
        struct Node* new_node = (struct Node*) malloc(sizeof(struct Node));
         new_node->data = new_data;
          new_node->next = (*head_ref);
           (*head_ref) = new_node;
}

void printList(struct Node* head)
{
        struct Node* temp = head;
         while (temp != NULL)
          {
                printf("%d", temp->data);
                 if ( temp -> next != NULL)
                  {
                        printf("->");
                  }
                   temp = temp->next;
          }
}

int main()
{
        struct Node* head = NULL;
         int i, count = 0, num = 0;
          printf("How many  numbers you want to enter:");
           scanf(" %d", &count);
            for (i = 0; i < count; i++)
              {
                printf("Enter number %d:", i+1);
```

```
            }
        printf("Given linked list:");
         printList(head);
          reverse(&head);
           printf("\nReversed linked list:");
            printList(head);
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
How many numbers you want to enter:
4
Enter number 1:
6
Enter number 2:
1
Enter number 3:
8
Enter number 4:
5
Given linked list:5->8->1->6
Reversed linked list:6->1->8->5

Test Case - 2
User Output
How many numbers you want to enter:
2
Enter number 1:
5
Enter number 2:
9
Given linked list:9->5
Reversed linked list:5->9

Aim:

Write a program to create a binary search tree of integers and perform the following operations using linked list.

    5. Insert a node

    6. In-order traversal

    7. Pre-order traversal

    8. Post-order traversal

Source Code:

BinarySearchTree.c

```c
#include<stdio.h>
#include<stdlib.h>
struct node
{
        int data;
        struct node *left, *right;
};

typedef struct node *BSTNODE;
BSTNODE newNodeInBST(int item)
{
        BSTNODE temp = (BSTNODE)malloc(sizeof(struct node));
        temp->data = item;
        temp->left = temp->right = NULL;
        return temp;
}

void inorderInBST(BSTNODE root)
{
        if (root != NULL)
        {
                inorderInBST(root->left);
                printf("%d ", root->data);
                inorderInBST(root->right);
        }
}
void preorderInBST(BSTNODE root)
{
        if (root != NULL)
        {
                printf("%d ", root->data);
                preorderInBST(root->left);
                preorderInBST(root->right);
        }
}
void postorderInBST(BSTNODE root)
{
         if (root != NULL)
          {
                postorderInBST(root->left);
                 postorderInBST(root->right);
                  printf("%d ", root->data);
          }
}
BSTNODE insertNodeInBST(BSTNODE node, int ele)
{
        if (node == NULL)
        {
                printf("Successfully inserted.\n");
                return newNodeInBST(ele);
        }
        if (ele < node->data)
        node->left = insertNodeInBST(node->left,ele);
        else if (ele > node->data)
        node->right = insertNodeInBST(node->right,ele);
```

```
        return node;
}
void main()
{
        int x, op;
        BSTNODE root = NULL;
        while(1)
        {
                printf("1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder
Traversal 5.Exit\n");
                printf("Enter your option : ");
                scanf("%d", &op);
                switch(op)
                {
                        case 1:
                        printf("Enter an element to be inserted : ");
                        scanf("%d", &x);
                        root = insertNodeInBST(root,x);
                        break;
                        case 2:
                        if(root == NULL)
                        {
                                printf("Binary Search Tree is empty.\n");
                        }
                        else
                        {
                                printf("Elements of the BST (in-order traversal): ");
                                inorderInBST(root);
                                printf("\n");
                        }
                        break;
                        case 3:
                        if(root == NULL)
                        {
                                printf("Binary Search Tree is empty.\n");
                        }
                        else
                        {
                                printf("Elements of the BST (pre-order traversal): ");
                                preorderInBST(root);
                                printf("\n");
                        }
                        break;
                        case 4:
                        if(root == NULL)
                        {
                                printf("Binary Search Tree is empty.\n");
                        }
                        else
                        {
                                printf("Elements of the BST (post-order traversal): ");
                                postorderInBST(root);
                                printf("\n");
                        }
                        break;
```

        int x, op;
        BSTNODE root = NULL;

```
            }
        }
    }
}
```

Execution Results - All test cases have succeeded!

Srinivasa Ramanujan Institute of Technology

Test Case - 1
User Output
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
100
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
20
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
200
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
10
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
30
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
150
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1

300
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
2
Elements of the BST (in-order traversal): 10 20 30 100 150 200 300
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
3
Elements of the BST (pre-order traversal): 100 20 10 30 200 150 300
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
4
Elements of the BST (post-order traversal): 10 30 20 150 300 200 100
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
5

Test Case - 2
User Output
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
25
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
63
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
89
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
45
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :

Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1
Enter an element to be inserted :
28
Successfully inserted.
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
4
Elements of the BST (post-order traversal): 28 45 65 89 63 25
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
3
Elements of the BST (pre-order traversal): 25 63 45 28 89 65
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
2
Elements of the BST (in-order traversal): 25 28 45 63 65 89
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
5

S.No: 24	Exp. Name: *Write a Program to Search an element using Binary Search and Recursion*	Date: 2023-07-10

Aim:

Write a program to `search` the given element from a list of elements with `binary search` technique using **recursion**.

At the time of execution, the program should print the message on the console as:

```
Enter value of n :
```

For example, if the user gives the **input** as:

```
Enter value of n : 5
```

Next, the program should print the following messages one by one on the console as:

```
Enter 5 elements :
```

if the user gives the **input** as:

```
Enter 5 elements : 33 55 22 44 11
```

then the program should **print** the result as:

```
After sorting the elements are : 11 22 33 44 55
```

Next, the program should print the message on the console as:

```
Enter key element :
```

if the user gives the **input** as:

```
Enter key element : 11
```

then the program should **print** the result as:

```
The given key element 11 is found at position : 0
```

Similarly, if the key element is given as `18` for the above example then the program should print the output as:

```
The given key element 18 is not found
```

Note: Write the functions **read()**, **bubbleSort()**, **display()** and **binarySearch()** in `BinarySearch.c`

Source Code:

```
BinarySearch.c
```

```c
#include <stdio.h>
void read(int a[20], int n)
{
        int i;
        printf("Enter %d elements : ", n);
        for (i = 0; i < n; i++)
        {
                scanf("%d", &a[i]);
        }
}
void bubbleSort(int a[20], int n)
{
        int i, j, temp;
        for (i = 0; i < n - 1; i++)
        {
                for (j = 0; j < n - i - 1; j++)
                {
                        if (a[j] > a[j+1])
                        {
                                temp = a[j];
                                a[j] = a[j+1];
                                a[j+1] = temp;
                        }
                }
        }
}
void display(int a[20], int n)
{
        int i;
        for (i = 0; i < n; i++)
        {
                printf("%d ", a[i]);
        }
        printf("\n");
}
int binarySearch(int a[20], int low, int high, int key)
{
        int mid;
        if (low <= high)
        {
                mid = (low + high) / 2;
                if (a[mid] == key)
                return mid;
                else if (key < a[mid])
                binarySearch(a, low, mid - 1, key);
                else if (key > a[mid])
                binarySearch(a, mid + 1, high, key);
        }
        else
        {
                return -1;
        }
}
void main()
{
```

```
        scanf("%d", &n);
        read(a, n);
        bubbleSort(a, n);
        printf("After sorting the elements are : ");
        display(a, n);
        printf("Enter key element : ");
        scanf("%d", &key);
        flag = binarySearch(a, 0, n - 1, key);
        if (flag == -1)
        {
                printf("The given key element %d is not found\n", key);
        }
        else
        {
                printf("The given key element %d is found at position : %d\n", key, flag);
        }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :
5
Enter 5 elements :
33 55 22 44 11
After sorting the elements are : 11 22 33 44 55
Enter key element :
11
The given key element 11 is found at position : 0

Test Case - 2
User Output
Enter value of n :
4
Enter 4 elements :
23 9 45 18
After sorting the elements are : 9 18 23 45
Enter key element :
24
The given key element 24 is not found

S.No: 25	Exp. Name: *Graph traversals implementation - Breadth First Search*	Date: 2023-07-10

Aim:

Write a program to implement Breadth First Search of a graph.

Source Code:

```
GraphsBFS.c
```

```c
#include <stdio.h>
#include <stdlib.h>
#define MAX 99
struct node
{
        struct node *next;
        int vertex;
};
typedef struct node * GNODE;
GNODE graph[20];
int visited[20];
int queue[MAX], front = -1,rear = -1;
int n;
void insertQueue(int vertex)
{
        if(rear == MAX-1)
        printf("Queue Overflow.\n");
        else
        {
                if(front == -1)
                front = 0;
                rear = rear+1;
                queue[rear] = vertex ;
        }
}
int isEmptyQueue()
{
        if(front == -1 || front > rear)
        return 1;
        else
        return 0;
}
int deleteQueue()
{
        int deleteItem;
        if(front == -1 || front > rear)
        {
                printf("Queue Underflow\n");
                exit(1);
        }
        deleteItem = queue[front];
        front = front+1;
        return deleteItem;
}
void BFS(int v)
{
        int w;
        insertQueue(v);
        while(!isEmptyQueue())
        {
                v = deleteQueue( );
                printf("\n%d",v);
                visited[v]=1;
                GNODE g = graph[v];
                for(;g!=NULL;g=g->next)
```

Srinivasa Ramanujan Institute of Technology

```
                        if(visited[w]==0)
                        {
                                insertQueue(w);
                                visited[w]=1;
                        }
                }
        }
}
void main()
{
        int N, E, s, d, i, j, v;
        GNODE p, q;
        printf("Enter the number of vertices : ");
        scanf("%d",&N);
        printf("Enter the number of edges : ");
        scanf("%d",&E);
        for(i=1;i<=E;i++)
        {
                printf("Enter source : ");
                scanf("%d",&s);
                printf("Enter destination : ");
                scanf("%d",&d);
                q=(GNODE)malloc(sizeof(struct node));
                q->vertex=d;
                q->next=NULL;
                if(graph[s]==NULL)
                {
                        graph[s]=q;
                }
                else
                {
                        p=graph[s];
                        while(p->next!=NULL)
                        p=p->next;
                        p->next=q;
                }
        }
        for(i=1;i<=n;i++)
        visited[i]=0;
        printf("Enter Start Vertex for BFS : ");
        scanf("%d", &v);
        printf("BFS of graph : ");
        BFS(v);
        printf("\n");
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the number of vertices :
5

| Enter the number of edges : |
| 5 |
| Enter source : |
| 1 |
| Enter destination : |
| 2 |
| Enter source : |
| 1 |
| Enter destination : |
| 4 |
| Enter source : |
| 4 |
| Enter destination : |
| 2 |
| Enter source : |
| 2 |
| Enter destination : |
| 3 |
| Enter source : |
| 4 |
| Enter destination : |
| 5 |
| Enter Start Vertex for BFS : |
| 1 |
| BFS of graph : |
| 1 |
| 2 |
| 4 |
| 3 |
| 5 |

Test Case - 2
User Output
Enter the number of vertices :
4
Enter the number of edges :
3
Enter source :
1
Enter destination :
2
Enter source :
2
Enter destination :
3
Enter source :
3

4
Enter Start Vertex for BFS :
2
BFS of graph :
2
3
4

Srinivasa Ramanujan Institute of Technology

S.No: 26	Exp. Name: *Graph traversals implementation - Depth First Search*	Date: 2023-07-03

Aim:
Write a program to implement Depth First Search for a graph.

Source Code:

```
GraphsDFS.c
```

Srinivasa Ramanujan Institute of Technology

```c
#include<stdio.h>
#include<stdlib.h>
struct node
{
        struct node *next;
         int vertex;
};
typedef struct node * GNODE;
GNODE graph[20];
int visited[20];
int n;
void DFS(int i)
{
        GNODE p;
         printf("\n%d",i);
          p=graph[i];
           visited[i]=1;
            while(p!=NULL)
             {
                i=p->vertex;
                 if(!visited[i])
                  DFS(i);
                   p=p->next;
             }

}
void main()
{
        int N,E,i,s,d,v;
         GNODE q,p;
         printf("Enter the number of vertices : ");
         scanf("%d",&N);
         printf("Enter the number of edges : ");
         scanf("%d",&E);
         for(i=1;i<=E;i++)
         {
             printf("Enter source : ");
             scanf("%d",&s);
             printf("Enter destination : ");
             scanf("%d",&d);
             q=(GNODE)malloc(sizeof(struct node));
              q->vertex=d;
               q->next=NULL;
                if(graph[s]==NULL)
                 graph[s]=q;
                  else
                  {
                      p=graph[s];
                       while(p->next!=NULL)
                        p=p->next;
                         p->next=q;
                  }
         }
          for(i=0;i<n;i++)
           visited[i]=0;
```

```
                printf("DFS of graph : ");
                DFS(v);
                 printf("\n");
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the number of vertices :
6
Enter the number of edges :
7
Enter source :
1
Enter destination :
2
Enter source :
1
Enter destination :
4
Enter source :
4
Enter destination :
2
Enter source :
2
Enter destination :
3
Enter source :
4
Enter destination :
5
Enter source :
1
Enter destination :
3
Enter source :
3
Enter destination :
6
Enter Start Vertex for DFS :
1
DFS of graph :

1
2
3
6
4
5

Test Case - 2
User Output
Enter the number of vertices :
5
Enter the number of edges :
5
Enter source :
1
Enter destination :
2
Enter source :
1
Enter destination :
4
Enter source :
4
Enter destination :
2
Enter source :
2
Enter destination :
3
Enter source :
4
Enter destination :
5
Enter Start Vertex for DFS :
1
DFS of graph :
1
2
3
4
5

Aim:

Write a C program to implement **Travelling Sales Person** problem using **Dynamic programming**.

Source Code:

TSP.c

```c
#include<stdio.h>
int ary[10][10], completed[10], n, cost = 0;
void takeInput()
{
        int i, j;
         printf("Number of villages: ");
          scanf("%d", & n);
           for (i = 0; i < n; i++)
             {
                 for (j = 0; j < n; j++)
                   scanf("%d", & ary[i][j]);
                    completed[i] = 0;
               }
              printf("The cost list is:");
              for (i = 0; i < n; i++)
                {
                  printf("\n");
                   for (j = 0; j < n; j++)
                     printf("\t%d", ary[i][j]);
                }
}
void mincost(int city)
{
        int i, ncity;
         completed[city] = 1;
          printf("%d-->", city + 1);
           ncity = least(city);
            if (ncity == 999)
              {
                  ncity = 0;
                   printf("%d", ncity + 1);
                    cost += ary[city][ncity];
                     return;
              }
               mincost(ncity);
}
int least(int c)
{
        int i, nc = 999;
         int min = 999, kmin;
          for (i = 0; i < n; i++)
            {
                if ((ary[c][i] != 0) && (completed[i] == 0))
                if (ary[c][i] + ary[i][c] < min)
                  {
                        min = ary[i][0] + ary[c][i];
                         kmin = ary[c][i];
                          nc = i;
                  }
            }
           if (min != 999)
            cost += kmin;
             return nc;
}
int main()
```

```
            printf("\nThe Path is:\n");
          mincost(0);
           printf("\nMinimum cost is %d", cost);
             return 0;
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Number of villages:
3
0 10 15
10 0 35
15 35 0
The cost list is:
0   10   15
10   0   35
15   35   0
The Path is:
1-->2-->3-->1
Minimum cost is 60

Srinivasa Ramanujan Institute of Technology

S.No: 28	Exp. Name: *Write a C program to Open a File and to Print its contents on the screen*	Date: 2023-07-03

Aim:

Follow the instructions given below to write a program to `open` a file and to `print` its **contents** on the screen.

- Open a new file "`SampleText1.txt`" in write mode
- Write the content in the file
- Close the file
- Open the same file in read mode
- Read the content from file and print them on the screen
- Close the file

Source Code:

file1.c

```c
#include<stdio.h>
void main()
{
        FILE *fp;
        char ch;
        fp=fopen("Sample Text1.txt","w");
        printf("Enter the text with @ at end : ");
        while((ch =getchar())!= '@')
        {
                putc(ch,fp);
        }
        putc(ch,fp);
        fclose(fp);
        fp=fopen("Sample Text1.txt", "r");
        printf("Given message is : ");
        while((ch=getc(fp)) != '@')
        {
                putchar(ch);
        }
        printf("\n");
        fclose(fp);
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the text with @ at end :
CodeTantra is a
Startup Company recognized by Government of India@
Given message is : CodeTantra is a
Startup Company recognized by Government of India

User Output

```
Enter the text with @ at end :
```

CodeTantra is

increasing development of Languages Year

by Year@

```
Given message is : CodeTantra is
```

```
increasing development of Languages Year
```

```
by Year
```

S.No: 29	Exp. Name: *Write a C program to Copy contents of one File into another File*	Date: 2023-07-03

Aim:

Write a program to `copy` contents of one file into another file. Follow the instructions given below to write a program to copy the contents of one file to another file:

- Open a new file "`SampleTextFile1.txt`" in write mode
- Write the content onto the file
- Close the file
- Open an existing file "`SampleTextFile1.txt`" in read mode
- Open a new file "`SampleTextFile2.txt`" in write mode
- Copy the content from existing file to new file
- Close the files
- Open the copied file in read mode
- Read the text from file and print on the screen
- Close the file

Source Code:

CopyFile.c

```c
#include<stdio.h>
int main()
{
        FILE *fp1;
        FILE *fp2;
        char ch,c;
        fp1=fopen("SampleText1.txt","w");
        printf("Enter the text with @ at end : ");
        while((ch=getchar()) != '@')
        {
                putc(ch,fp1);
        }
        putc(ch,fp1);
        fclose(fp1);
        fp1=fopen("SampleText1.txt","r");
        fp2=fopen("SampleText2.txt","w");
        while((ch=getc(fp1)) != '@')
        {
                fputc(c,fp2);
        }
        fclose(fp1);
        fclose(fp2);
        fp2=fopen("SampleText1.txt","r");
        printf("Copied text is : ");
        while((ch=getc(fp1))!='@')
        {
                putchar(ch);
        }
        printf("\n");
        fclose(fp1);
}
```

Execution Results - All test cases have succeeded!

Test Case - 1

User Output

```
Enter the text with @ at end :
```

CodeTantra started in the year 2014@

```
Copied text is : CodeTantra started in the year 2014
```

Test Case - 2

User Output

```
Enter the text with @ at end :
```

CodeTantra received

best Startup award from Hysea in 2016@

```
Copied text is : CodeTantra received
```

```
best Startup award from Hysea in 2016
```

S.No: 30	Exp. Name: ***Write a C program to Merge two Files and stores their contents in another File***	Date: 2023-07-03

Aim:

Write a program to `merge` two files and stores their contents in another file.

- Open a new file "`SampleDataFile1.txt`" in write mode
- Write the content onto the file
- Close the file
- Open another new file "`SampleDataFile2.txt`" in write mode
- Write the content onto the file
- Close the file
- Open first existing file "`SampleDataFile1.txt`" in read mode
- Open a new file "`SampleDataFile3.txt`" in write mode
- Copy the content from first existing file to new file
- Close the first existing file
- Open another existing file "`SampleDataFile2.txt`" in read mode
- Copy its content from existing file to new file
- Close that existing file
- Close the merged file

Source Code:

Merge.c

```c
#include <stdio.h>
void main()
{
        FILE *fp1, *fp2, *fp3;
        char ch;
        fp1 = fopen("SampleDataFile1.txt", "w");
        printf("Enter the text with @ at end for file-1 :\n");
        while ((ch = getchar()) != '@')
        {
                putc(ch, fp1);
        }
        putc(ch, fp1);
        fclose(fp1);
        fp2 = fopen("SampleDataFile2.txt", "w");
        printf("Enter the text with @ at end for file-2 :\n");
        while ((ch = getchar()) != '@')
        {
                putc(ch, fp2);
        }
        putc(ch, fp2);
        fclose(fp2);
        fp1 = fopen("SampleDataFile1.txt", "r");
        fp3 = fopen("SampleDataFile3.txt", "w");
        while ((ch = getc(fp1)) != '@')
        {
                putc(ch, fp3);
        }
        fclose(fp1);
        fp2 = fopen("SampleDataFile2.txt", "r");
        while ((ch = getc(fp2)) != '@')
        {
                putc(ch, fp3);
        }
        putc(ch, fp3);
        fclose(fp2);
        fclose(fp3);
        fp3 = fopen("SampleDataFile3.txt", "r");
        printf("Merged text is : ");
        while ((ch = getc(fp3)) != '@')
        {
                putchar(ch);
        }
        printf("\n");
        fclose(fp3);
}
```

Srinivasa Ramanujan Institute of Technology   2022-2026-CSE-B

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the text with @ at end for file-1 :

| CodeTantra developed an interactive tool |
| in the year 2014 |
| CodeTantra got best Startup award in 2016@ |
| Enter the text with @ at end for file-2 : |
| Now lot of Companies and Colleges using CodeTantra Tool@ |
| Merged text is : CodeTantra developed an interactive tool |
| in the year 2014 |
| CodeTantra got best Startup award in 2016 |
| Now lot of Companies and Colleges using CodeTantra Tool |

S.No: 31	Exp. Name: *Write a C program to Delete a File*	Date: 2023-07-03

Aim:

Write a program to `delete` a **file**.

Note: Use the `remove(fileName)` function to delete an existing file.

Source Code:

Delete.c

```c
#include <stdio.h>
void main()
{
        FILE *fp;
        int status;
        char fileName[40], ch;
        printf("Enter a new file name : ");
        gets(fileName);
        fp = fopen(fileName, "w");
        printf("Enter the text with @ at end : ");
        while ((ch = getchar()) != '@')
        {
                putc(ch, fp);
        }
        putc(ch, fp);
        fclose(fp);
        fp = fopen(fileName, "r");
        printf("Given message is : ");
        while ((ch = getc(fp)) != '@')
        {
                putchar(ch);
        }
        printf("\n");
        fclose(fp);
        status = remove(fileName);
        if (status == 0)
        printf("%s file is deleted successfully\n", fileName);
        else
        {
                printf("Unable to delete the file -- ");
                perror("Error\n");
        }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter a new file name :
Text1.txt
Enter the text with @ at end :

This is CodeTantra@
Given message is : This is CodeTantra
Text1.txt file is deleted successfully

<table>
<tr><td align="center">Test Case - 2</td></tr>
<tr><td>User Output</td></tr>
<tr><td>Enter a new file name :</td></tr>
<tr><td>Text2.txt</td></tr>
<tr><td>Enter the text with @ at end :</td></tr>
<tr><td>C developed by Dennis Ritchie@</td></tr>
<tr><td>Given message is : C developed by Dennis Ritchie</td></tr>
<tr><td>Text2.txt file is deleted successfully</td></tr>
</table>

S.No: 32	Exp. Name: ***Write a C program to Copy last n characters from one File to another File***	Date: 2023-07-10

Aim:

Write a program to `copy` last `n` characters from **file-1** to **file-2**.

- open a new file " `TestDataFile1.txt` " in write mode
- write the content onto the file
- close the file
- open an existing file " `TestDataFile1.txt` " in read mode
- open a new file " `TestDataFile2.txt` " in write mode
- read the number of characters to copy
- set the cursor position by using fseek()
- copy the content from existing file to new file
- close the files
- open the copied file " `TestDataFile2.txt` " in read mode
- read the text from file and print on the screen
- close the file

Source Code:

`Copy.c`

```c
#include <stdio.h>
void main()
{
        FILE *fp, *fp1, *fp2;
        int num, length;
        char ch;
        fp = fopen("TestDataFile1.txt", "w");
        printf("Enter the text with @ at end : ");
        while ((ch = getchar()) != '@')
        {
                putc(ch, fp);
        }
        putc(ch, fp);
        fclose(fp);
        fp1 = fopen("TestDataFile1.txt", "r");
        fp2 = fopen("TestDataFile2.txt", "w");
        printf("Enter number of characters to copy : ");
        scanf("%d", &num);
        fseek(fp1, 0L, SEEK_END);
        length = ftell(fp1);
        fseek(fp1, (length - num - 1), SEEK_SET);
        while ((ch = getc(fp1)) != '@')
        {
                putc(ch, fp2);
        }
        putc(ch, fp2);
        fclose(fp1);
        fclose(fp2);
        fp2 = fopen("TestDataFile2.txt", "r");
        printf("Copied text is : ");
        while ((ch = getc(fp2)) != '@')
        {
                putchar(ch);
        }
        printf("\n");
        fclose(fp2);
}
```

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the text with @ at end :
We should not give up
and we should not allow the problem to
defeat us@
Enter number of characters to copy :
15
Copied text is : em to defeat us

Test Case - 2
User Output
Enter the text with @ at end :
You have to dream
before
Your dreams can come true@
Enter number of characters to copy :
20
Copied text is : dreams can come true

Srinivasa Ramanujan Institute of Technology

S.No: 33	Exp. Name: *Write a C program to Reverse first n characters in a File*	Date: 2023-07-03

Aim:

Write a program to reverse the first n characters in a file.
- open a new file "TestDataFile3.txt" in read/write mode
- write the content onto the file
- read the number of characters to copy
- copy the specified number of characters into a string
- reverse the string
- overwrite the entire string into the file from the begining
- close the file
- open the copied file "TestDataFile3.txt" in read mode
- read the text from file and print on the screen
- close the file

Source Code:

Program1506.c

```c
#include <stdio.h>
#include <string.h>
void stringReverse(char[]);
void main()
{
        FILE *fp;
        int num, i;
        char ch, data[100];
        fp = fopen("TestDataFile3.txt", "w+");
        printf("Enter the text with @ at end : ");
        while ((ch = getchar()) != '@')
        {
                putc(ch, fp);
        }
        putc(ch, fp);
        printf("Enter number of characters to copy : ");
        scanf("%d", &num);
        i = 0;
        rewind(fp);
        while (i < num)
        {
                data[i] = getc(fp);
                i++;
        }
        data[i] = '\0';
        rewind(fp);
        stringReverse(data);
        fputs(data, fp);
        fclose(fp);
        fp = fopen("TestDataFile3.txt", "r");
        printf("Result is : ");
        while ((ch = getc(fp)) != '@')
        {
                putchar(ch);
        }
        printf("\n");
        fclose(fp);
}
void stringReverse(char data[100])
{
        int i, j;
        char temp;
        i = j = 0;
        while (data[j] != '\0')
        {
                j++;
        }
        j--;
        while (i < j)
        {
                temp = data[i];
                data[i] = data[j];
                data[j] = temp;
                i++;
                j--;
```

```
        }
    }
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the text with @ at end :
Teaching is a
very noble profession that shapes the
character, caliber and future of an individual@
Enter number of characters to copy :
18
Result is : yrev
a si gnihcaeT noble profession that shapes the
character, caliber and future of an individual

Test Case - 2
User Output
Enter the text with @ at end :
Small aim
is a crime; have great aim@
Enter number of characters to copy :
11
Result is : i
mia llamSs a crime; have great aim

S.No: 34	Exp. Name: *Write a C program to Append data to an existing File*	Date: 2023-07-10

Aim:

Write a program to `append` data to an existing file and **display** its contents.
- open a new file "`DemoTextFile1.txt`" in write mode
- write the content onto the file
- close the file
- open a new same file in append mode
- write the content onto the file
- close the file
- open the same file in read mode
- read the text from file and print them on the screen
- close the file

Source Code:

appendDataToFile.c

```c
#include <stdio.h>
void main()
{
        FILE *fp;
        char ch;
        fp = fopen("DemoTextFile1.txt", "w");
        printf("Enter the text with @ at end : ");
        while ((ch = getchar()) != '@')
        {
                putc(ch, fp);
        }
        fclose(fp);
        fp = fopen("DemoTextFile1.txt", "a");
        printf("Enter the text to append to a file with @ at end : ");
        while ((ch = getchar()) != '@')
        {
                putc(ch, fp);
        }
        putc(ch, fp);
        fclose(fp);
        fp = fopen("DemoTextFile1.txt", "r");
        printf("File content after appending : ");
        while ((ch = getc(fp)) != '@')
        {
                putchar(ch);
        }
        printf("\n");
        fclose(fp);
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output

Enter the text with @ at end :
I am studying@
Enter the text to append to a file with @ at end :
Life skills in University@
File content after appending : I am studying
Life skills in University

Test Case - 2
User Output
Enter the text with @ at end :
CodeTantra
developed@
Enter the text to append to a file with @ at end :
an interactive tool
to learn Programming@
File content after appending : CodeTantra
developed
an interactive tool
to learn Programming

Srinivasa Ramanujan Institute of Technology

S.No: 35	Exp. Name: *Write a C program to Count number of Characters, Words and Lines of a given File*	Date: 2023-07-03

Aim:

Write a program to count number of **characters**, **words** and **lines** of given text file.
- open a new file "DemoTextFile2.txt" in write mode
- write the content onto the file
- close the file
- open the same file in read mode
- read the text from file and find the characters, words and lines count
- print the counts of characters, words and lines
- close the file

Source Code:

countCharWordLines.c

```c
#include <stdio.h>
void main() {
        FILE *fp;
        char ch;
        int charCount = 0, wordCount = 0, lineCount = 0;
        fp = fopen("DemoTextFile2.txt", "w");
        printf("Enter the text with @ at end : ");
        while ((ch = getchar()) != '@')
        {
                putc(ch, fp);
        }
        putc(ch, fp);
        fclose(fp);
        fp = fopen("DemoTextFile2.txt", "r");
        do
        {
                if ((ch == ' ') || (ch == '\n') || (ch == '@'))
                wordCount++;
                else
                charCount++;
                if (ch == '\n' || ch == '@')
                lineCount++;
        } while ((ch = getc(fp)) != '@');
        fclose(fp);
        printf("Total characters : %d\n", charCount);
        printf("Total words : %d\n", wordCount);
        printf("Total lines : %d\n", lineCount);
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the text with @ at end :

Arise! Awake!
and stop not until
the goal is reached@
`Total characters : 43`
`Total words : 10`
`Total lines : 3`

Test Case - 2
User Output
`Enter the text with @ at end :`
All power is with in you
you can do anything
and everything@
`Total characters : 48`
`Total words : 12`
`Total lines : 3`

S.No: 36	Exp. Name: *Linked list Female gender first*	Date: 2023-07-03

Aim:

Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.

Note: Add node at the beginning.

Source Code:

```
rearrangeList.c
```

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

struct Node
{
        int data;
         char name[20];
          char gender;
           struct Node *next;
};


void segregateEvenOdd(struct Node **head_ref)
{
        struct Node *end = *head_ref;
         struct Node *prev = NULL;
          struct Node *curr = *head_ref;

          while (end->next != NULL)
           end = end->next;

            struct Node *new_end = end;

            while (curr->data %2 != 0 && curr != end)
             {
                     new_end->next = curr;
                      curr = curr->next;
                       new_end->next->next = NULL;
                        new_end = new_end->next;
             }

              if (curr->data%2 == 0)
               {
                     *head_ref = curr;

                      while (curr != end)
                       {
                             if ( (curr->data)%2 == 0 )
                              {
                                    prev = curr;
                                     curr = curr->next;
                              }
                               else
                                {
                                     prev->next = curr->next;

                                      curr->next = NULL;

                                       new_end->next = curr;

                                        new_end = curr;

                                         curr = prev->next;
                                }
                       }
```

```c
                    prev = curr;
                     if (new_end!=end && (end->data)%2 != 0)
                      {
                          prev->next = end->next;
                         end->next = NULL;
                          new_end->next = end;
                      }
                       return;
}
void push(struct Node** head_ref, char new_name[20], char new_gender)
{
        struct Node* new_node = (struct Node*) malloc(sizeof(struct Node));
         strcpy(new_node->name, new_name);
         new_node->gender = new_gender;
          if (new_gender == 'F')
          new_node->data = 0;
           else if (new_gender == 'M')
           new_node->data = 1;
            new_node->next = (*head_ref);
             (*head_ref) = new_node;
}
void printList(struct Node *node)
{
        while (node!=NULL)
         {
                printf("%s (%c)", node->name, node->gender);
                 node = node->next;
                  if (node!=NULL)
                  printf(" --> ");
         }
}

int main()
{
        struct Node* head = NULL;
         char name[20];
          char gender;
           int noOfInputs, i;
            int option;
             printf("Insert Data\n");
              do
               {
                       printf("Enter Name: ");
                        scanf(" %s", name);
                         printf("Enter Gender: ");
                          scanf(" %c", &gender);
                           push(&head, name, gender);
                            printf("1 : Insert into Linked List\n");
                             printf("0 : Exit\n");
                              printf("Enter your option: ");
                               scanf(" %d", &option);

               } while(option == 1);

                printf("Original Linked list \n");
```

```
                    printf("\nModified Linked list \n");
                 printList(head);
                  printf("\n");
                    return 0;
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Insert Data
Enter Name:
Ganga
Enter Gender:
F
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Yamuna
Enter Gender:
F
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Raj
Enter Gender:
M
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Veer
Enter Gender:
M
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Narmada

F
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Amar
Enter Gender:
M
1 : Insert into Linked List
0 : Exit
Enter your option:
0
Original Linked list
Amar (M) --> Narmada (F) --> Veer (M) --> Raj (M) --> Yamuna (F) --> Ganga (F)
Modified Linked list
Narmada (F) --> Yamuna (F) --> Ganga (F) --> Amar (M) --> Veer (M) --> Raj (M)

Test Case - 2
User Output
Insert Data
Enter Name:
Ganga
Enter Gender:
F
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Yamuna
Enter Gender:
F
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Narmada
Enter Gender:
F
1 : Insert into Linked List
0 : Exit
Enter your option:
0
Original Linked list
Narmada (F) --> Yamuna (F) --> Ganga (F)
Modified Linked list

Test Case - 3
User Output
Insert Data
Enter Name:
Raj
Enter Gender:
M
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Veer
Enter Gender:
M
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Amar
Enter Gender:
M
1 : Insert into Linked List
0 : Exit
Enter your option:
0
Original Linked list
Amar (M) --> Veer (M) --> Raj (M)
Modified Linked list
Amar (M) --> Veer (M) --> Raj (M)

S.No: 37	Exp. Name: *Indexing of a file*	Date: 2023-07-10

Aim:

Write a C program to illustrate **Indexing of a file**.

Take an array of integers and find whether the given integer is present or not using **file indexing** method and print the output as shown in the sample output.

Source Code:

fileIndexing.c

```c
#include <stdio.h>
#define MAX 25
struct indexfile
{
        int indexId;
         int kIndex;
};
int main()
{
        int numbers[MAX];
        struct indexfile index[MAX];
         int i, num, low, high, br = 4;
         int noOfStudents;
         printf("How many numbers do you want to enter:");
     scanf(" %d", &noOfStudents);
         printf("Enter %d numbers:", noOfStudents);
         for (i = 0; i < noOfStudents; i++)
              {
                      scanf("%d", &numbers[i]);
              }

          for (i = 0; i < (noOfStudents / 5); i++)
               {
                      index[i].indexId = numbers[br];
                       index[i].kIndex = br;
                        br = br + 5;
               }
         printf("Enter a number to search:");
         scanf("%d", &num);
         for (i = 0; (i < noOfStudents / 5) && (index[i].indexId <= num); i++);
                  if(i != 0)
                  low = index[i - 1].kIndex;
                   else
                   low = 0;
                    if(index[i].kIndex != 0 && index[i].kIndex <= noOfStudents)
                    high = index[i].kIndex;
                     else
                     high = noOfStudents;
                      for (i = low; i <= high; i++)
                      {
                              if (num == numbers[i])
                               {
                                  printf("Number found at position:%d", i);

                             return 0;
                              }
                      }
 printf("\nNumber not found.");
  return 0;
  }
```

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1

User Output

How many numbers do you want to enter:
5
Enter 5 numbers:
1 5 6 9 12
Enter a number to search:
6
Number found at position:2

Test Case - 2

User Output

How many numbers do you want to enter:
7
Enter 7 numbers:
2 3 6 9 12 20 25
Enter a number to search:
20
Number found at position:5

S.No: 38	Exp. Name: *Write a C program to Convert an Infix expression into Postfix expression*	Date: 2023-07-11

Aim:

Write a program to convert an `infix` expression into `postfix` expression.

Source Code:

Infix2PostfixMain.c

Srinivasa Ramanujan Institute of Technology

Write a program to convert an `infix` expression into `postfix` expression.

```c
#include<stdlib.h>
#include<string.h>
#include<stdio.h>
#include<ctype.h>
#define STACK_MAX_SIZE 20
char stack [STACK_MAX_SIZE];
int top = -1;
//Return 1 if stack is empty else return 0.
int isEmpty() {
        if(top<0)
        return 1;
        else
        return 0;
}
//Push the character into stack
void push(char x) {
        if(top == STACK_MAX_SIZE - 1) {
                printf("Stack is overflow.\n");
        } else {
                top = top + 1;
                stack[top] = x;
        }
}
//pop a character from stack
char pop() {
        if(top < 0) {
                printf("Stack is underflow : unbalanced parenthesis\n");
                 exit(0);
        }
         else
          return stack[top--];
}
// Return 0 if char is '('
// Return 1 if char is '+' or '-'
// Return 2 if char is '*' or '/' or '%'
int priority(char x) {
        if(x == '(')
         return 0;
          if(x == '+' || x == '-')
           return 1;
            if(x == '*' || x == '/' || x == '%')
             return 2;
}
void convertInfix(char * e) {
int x;
int k=0;
char * p = (char *)malloc(sizeof(char)*strlen(e));
while(*e != '\0') {
        if(isalnum(*e))
         p[k++]=*e;
          else if(*e == '(')
           push(*e);
            else if(*e == ')') {
                 while(!isEmpty() && (x = pop()) != '(')
                  p[k++]=x;
```

```c
{
                        while(priority(stack[top]) >= priority(*e))
                   p[k++]=pop();
                   push(*e);
                  }
                    else {
                  printf("Invalid symbols in infix expression. Only alphanumeric
and { '+', '-','*', '%%', '/' } are allowed.\n");
                        exit(0);
                   }
                 e++;
                }
               while(top != -1) {
                  x=pop();
                  if(x == '(') {
                           printf("Invalid infix expression :
unbalanced parenthesis.\n");
                              exit(0);
                    }
                   p[k++] = x;
                  }
                 p[k++]='\0';
                  printf("Postfix expression :
%s\n",p);

                 }
                 int main() {
                  char exp[20];
                  char *e, x;
                  printf("Enter the expression : ");
                  scanf("%s",exp);
                  e = exp;
                  convertInfix(e);
                 }
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the expression :
A+B*(C-D)
Postfix expression : ABCD-*+

Test Case - 2
User Output
Enter the expression :
A+B*C
Postfix expression : ABC*+

Aim:

Write a C program to convert an Infix expression to Prefix expression.

Source Code:

infixToPrefix.c

Aim:

Write a C program to convert an Infix expression to Prefix expression.

Source Code:

infixToPrefix.c

```c
#define SIZE 50
#include<string.h>
#include<ctype.h>
#include<stdio.h>
char *strrev(char*str)
{
        char c,*front,*back;
        if(!str||!*str)
        {
                return str;
        }
        for(front=str,back=str+strlen(str)-1;front<back;front++,back--)
        {
                c =*front;
                *front=*back;
                *back=c;
        }
        return str;
}
char s[SIZE];
int top=-1;
void push(char elem)
{
        s[++top]=elem;
}
char pop()
{
        return(s[top--]);
}
int pr(char elem)
{
        switch(elem)
        {
                case'#':
                return 0;
                case')':
                return 1;
                case'+':
                case'-':
                return 2;
                case'*':
                case'/':
                return 3;
        }
}
void main()
{
        char infx[50],prfx[50],ch,elem;
        int i=0,k=0;
        printf("Enter Infix Expression:");
        scanf("%s",infx);
        push('#');
        strrev(infx);
        while((ch=infx[i++])!='\0')
        {
```

```
else if(isalnum(ch))
prfx[k++]=ch;
else if(ch=='(')
{
        while(s[top]!=')')
        {
                prfx[k++]=pop();
        }
                elem=pop();
    }
      else
        {
                while(pr(s[top])>=pr(ch))
                {
                        prfx[k++]=pop();
                }
                push(ch);
        }
}
while(s[top] !='#')
{
        prfx[k++]=pop();
}
prfx[k]='\0';
strrev(prfx);
strrev(infx);
printf("Prefix Expression:%s\n",prfx);
    }
```

Srinivasa Ramanujan Institute of Technology

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter Infix Expression:
A+B
Prefix Expression:+AB

Test Case - 2
User Output
Enter Infix Expression:
A/B+C/D
Prefix Expression:+/AB/CD

S.No: 40	Exp. Name: *Postfix to Infix Conversion*	Date: 2023-07-03

Aim:

Write a C program to convert a Postfix expression to Infix expression.

Source Code:

postfixToInfix.c

```c
#include<stdio.h>
#include<conio.h>
#include<string.h>
#include<stdlib.h>
# define MAX 20
char str[MAX],stack[MAX];
int top=-1;
void push(char c)
{
        stack[++top]=c;
}
char pop()
{
        return stack[top--];
}
char *strrev(char *str)
{
        char c, *front, *back;
         if(!str || !*str)
          return str;
           for(front=str,back=str+strlen(str)-1;front < back;front++,back--)
            {
                c=*front;*front=*back;*back=c;
            }
             return str;
}
void postfix()
{
        int n,i,j=0;
         char a,b,op,x[20];
          printf("Enter a Postfix expression:");
           fflush(stdin);
            scanf("%s", str);
             strrev(str);
              n=strlen(str);
               for(i=0;i<MAX;i++)
                {
                        stack[i]='\0';
                }
                 printf("Infix expression:");
                  for(i=0;i<n;i++)
                   {
                        if(str[i]=='+'||str[i]=='-'||str[i]=='*'||str[i]=='/')
                         {
                                push(str[i]);
                         }
                          else
                           {
                                x[j]=str[i]; j++;
                                 x[j]=pop(); j++;
                           }
                   }
                    x[j]=str[top--];
                     strrev(x);
                      printf("%s\n",x);
```

```
{
        postfix();
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter a Postfix expression:
AB+
Infix expression:A+B

Test Case - 2
User Output
Enter a Postfix expression:
ABC*+D+
Infix expression:A+B*C+D

Srinivasa Ramanujan Institute of Technology

Aim:

Write a C program to convert a Prefix expression to Infix expression.

Source Code:

prefixToInfix.c

Aim:

Write a C program to convert a Prefix expression to Infix expression.

Source Code:

prefixToInfix.c

```c
#include<stdio.h>
#include<conio.h>
#include<string.h>
#include<stdlib.h>
#define MAX 20
char str[MAX],stack[MAX];
int top=-1;
void push(char c)
{
        stack[++top]=c;
}
char pop()
{
        return stack[top--];
}
void prefix()
{
        int n,i;
        char a,b,op;
        printf("Enter a Prefix expression:");
        fflush(stdin);
        scanf("%s",str);
        n=strlen(str);
        for(i=0;i<MAX;i++)
        {
                stack[i]='\0';
        }
        printf("Infix expression:");
        for(i=0;i<n;i++)
        {
                if(str[i]=='+'||str[i]=='-'||str[i]=='*'||str[i]=='/')
                {
                        push(str[i]);
                }
                else
                {
                        op=pop();
                        a=str[i];
                        if(op=='\0')
                        {
                                printf("%c",a);
                        }
                        else
                        {
                                printf("%c%c",a,op);
                        }
                }
        }
        if(top>=0)
        {
                printf("%c\n",str[top--]);
        }
        else
        {
                printf("\n");
```

```
void main()
{
    prefix();
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter a Prefix expression:
+AB
Infix expression:A+B

Test Case - 2
User Output
Enter a Prefix expression:
+/AB/CD
Infix expression:A/B+C/D

S.No: 42	Exp. Name: *Postfix to Prefix Conversion*	Date: 2023-07-03

Aim:

Write a C program to convert a Postfix expression to Prefix expression.

Source Code:

postfixToPrefix.c

Aim:

Write a C program to convert a Postfix expression to Prefix expression.

Source Code:

postfixToPrefix.c

```c
#include<stdio.h>
#include<conio.h>
#include<string.h>
#include<stdlib.h>
#define MAX 20
char *strrev(char *str)
{
char c, *front,*back;
if(!str || !*str)
return str;
for(front=str,back=str+strlen(str)-1;front < back;front++,back--)
{
        c=*front;
        *front=*back;
        *back=c;
}
return str;
}
char str[MAX],stack[MAX];
int top = -1;
void push(char c)
{
        stack[++top]=c;
}
char pop()
{
        return stack[top--];
}
void post_pre()
{
        int n,i,j=0; char c[20];
        char a,b,op;
        printf("Enter the postfix expression:");
        scanf("%s",str);
        n=strlen(str);
        for(i=0;i<MAX;i++)
        stack[i]='\0';
        printf("Prefix expression is:");
        for(i=n-1;i>=0;i--)
        {
            if(str[i]=='+' ||str[i]=='-'||str[i]=='*'||str[i]=='/')
            {
                push(str[i]);
            }
            else
            {
                c[j++]=str[i];
                while((top!=-1)&&(stack[top]=='@'))
                {
                        a=pop(); c[j++]=pop();
                }
                push('@');
            }
        }
        c[j]='\0';
```

```
}
void main()
{
        post_pre();
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the postfix expression:
AB+
Prefix expression is:+AB

Test Case - 2
User Output
Enter the postfix expression:
ABC*+D+
Prefix expression is:++A*BCD

Srinivasa Ramanujan Institute of Technology

Aim:

Write a C program to convert a Prefix expression to Postfix expression.

Source Code:

prefixToPostfix.c

```c
#include<stdio.h>
#include<conio.h>
#include<string.h>
#include<stdlib.h>
#define MAX 20
char str[MAX], stack[MAX];
int top = -1;
void  push(char c) {
        stack[++top] = c;
}
char pop(){
        return stack[top--];
}
void pre_post(){
        int n,i,j = 0;
        char c[20],a, b, op;
        printf("Enter a Prefix expression:");
        gets(str);
        n = strlen(str);
        for(i=0;i<MAX;i++)
        stack[i] = '\0';
        printf("Postfix expression is:");
        for(i=0;i<n;i++){
                if(str[i] == '+' || str[i] == '-' || str[i] == '*' || str[i] == '/'){
                push(str[i]);
                }
                else{
                        c[j++] = str[i];
                        while((top!=-1)&&(stack[top]=='0')) {
                                a = pop();
                                c[j++] = pop();
                        }
                        push('0');
                }
        }
        c[j]= '\0';
        printf("%s" ,c);
        printf("\n");
}
void main() {
        pre_post();
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter a Prefix expression:
+AB
Postfix expression is:AB+

Test Case - 2
User Output
Enter a Prefix expression:
+/AB/CD
Postfix expression is:AB/CD/+

Srinivasa Ramanujan Institute of Technology