Pimpri Chinchwad College of Engineering
Department of MCA

Data Structure Lab

Assignment No. 01 : Assignment based on Array Data Structure, Operations of Array Data Structure, Searching and Sorting, Application of Array

Date of Submission : 19th February 2021

Write a menu driven program using C language to perform following operations on Array :

1) Insert
2) Delete
3) View
4) Update
5) Search

Search operation will have sub menus as : a) Linear Search b) Binary Search

Solution :

```
#include <stdio.h>
#include <stdlib.h>
#define MAX 50

int i,j,e,p,c,ne;
int main()
{
   int n,arr[MAX];
   printf("Enter the Number of Elements : ");
   scanf("%d",&n);

   printf("Enter the %d Elements : \n",n);
   for(i=0;i<n;i++)
      scanf("%d",&arr[i]);

   printf("\n Elements are : ");
```

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

    while(1){
        printf("\n\n ===== MAIN-MENU =====");
        printf("\n 1.Insert");
        printf("\n 2.Delete");
        printf("\n 3.View");
        printf("\n 4.Update");
        printf("\n 5.Search");
        printf("\n 6.Exit");

        printf("\n\n Enter Your Choice : ");
        scanf("%d",&c);
        printf("================\n\n");

        switch(c){
            case 1 : n=InsertAt(arr,n);
            break;
            case 2 : n=DeleteAt(arr,n);
            break;
            case 3 : Display(arr,n);
            break;
            case 4 : n=UpdateAt(arr,n);
            break;
            case 5 : SearchAt(arr,n);
            break;
            case 6 : exit(0);
            break;
            default : printf("Please Enter Valid Choice");
            break;
        }

        }

    return 0;
}

void Display(int arr[MAX],int n){
    printf("Elements are : ");
    for(i=0;i<n;i++)
        printf("%d ",arr[i]);
}
```

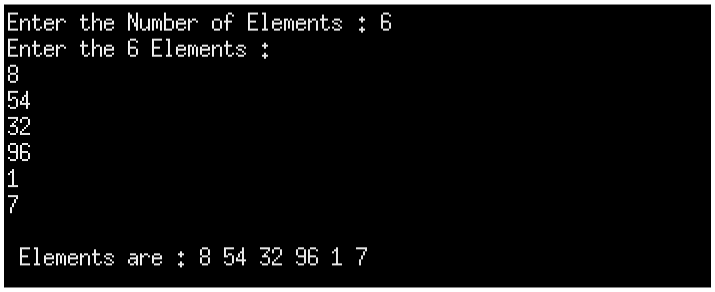
```
int InsertAt(int arr[MAX],int n){
    printf("Enter the Element to be Insert : ");
    scanf("%d",&e);
    printf("Enter the Position between %d and %d : ",1,n+1);
    scanf("%d",&p);
    if(p>0 && p<=n+1){
        for(i=n;i>=p;i--)
            arr[i] = arr[i-1];
        arr[p-1] = e;
        printf("\n Element Inserted!");
        return ++n;
    }else{
        printf("\n Position Invalid!");
        return n;
    }

}

int DeleteAt(int arr[MAX],int n){
    int cnt = 0;
    while(1){
        printf("\n ===== SUB-MENU =====");
        printf("\n 1.Delete The Specific Element : ");
        printf("\n 2.Delete the Element at Specific Position : ");
        printf("\n 3.Back to Main Menu");
        printf("\n 4.Exit");
        printf("\n Enter the choice : ");
        scanf("%d",&c);
        printf("================\n\n");

        switch(c){
            case 1 :printf("Enter the Element : ");
                    scanf("%d",&e);
                    int flag = 0;
                    for(i=0;i<n;i++){
                        if(arr[i]==e){
                            flag = 1;
                            for(j=i;j<n;j++){
                                arr[j] = arr[j+1];
                            }
                            cnt++;
                            printf("\n Element Deleted!");
                        }
                    }
```

```
                if(flag==0)
                    printf("\n element %d not found",e);
                n-=cnt;
                return n;
            break;
            case 2 :printf("Enter the Postion between %d and %d : ",1,n);
                scanf("%d",&p);
                if(p>0 && p<=n){
                    if(n==p){
                        printf("Element Deleted!");
                        return --n;
                    }else{
                        for(i=p;i<n;i++){
                           arr[i-1] = arr[i];
                        }
                        printf("\n Element Deleted!");
                        return --n;
                    }
                }else{
                    printf("\n Position Invalid!");
                    return n;
                }
            break;
            case 3 : return 0;
            break;
            case 4 : exit(0);
            break;
            default : printf("Please Enter Valid Choice");
            break;
        }
    }
}

int UpdateAt(int arr[MAX],int n){
    int flag = 0;
    int cnt = 0 ;
    while(1){
        printf("\n ===== SUB-MENU =====");
        printf("\n 1.Update The Specific Element : ");
        printf("\n 2.Update the Element at Specific Position : ");
        printf("\n 3.Back to Main Menu");
        printf("\n 4.Exit");
        printf("\n Enter the choice : ");
        scanf("%d",&c);
        printf("================\n\n");

        switch(c){
           case 1 :printf("Enter the Element to be update : ");
                 scanf("%d",&e);
                 printf("Enter the New Element to be replaced : ");
                 scanf("%d",&ne);
                 for(i=0;i<n;i++){
                    if(arr[i]==e){
                       arr[i] = ne;
                       cnt++;
                       flag = 1;
                    }
                 }
                 if(flag == 1)
                    printf("\n %d Element Updated !",cnt);
                 else
                    printf("\n Element Not Found");

                 return n;
           break;
           case 2 :printf("Enter the Postion between %d and %d : ",1,n);
                 scanf("%d",&p);
                 if(p>0 && p<=n){
                    printf("Enter the New Element to be replaced : ");
                    scanf("%d",&ne);
                    arr[p-1] = ne;
                    printf("\n Element Updated!");
                    return n;

                 }else{
                    printf("Position Invalid!");
                    return n;
                 }
           break;
           case 3 : return 0;
           break;
           case 4 : exit(0);
           break;
           default : printf("Please Enter Valid Choice");
           break;
        }
     }
  }
```

```
void SearchAt(int arr[MAX],int n){
    while(1){
        printf("\n\n===== SUB-MENU =====");
        printf("\n 1.Linear Search : ");
        printf("\n 2.Binary Search : ");
        printf("\n 3.Back to Main Menu");
        printf("\n 4.Exit");
        printf("\n Enter the choice : ");
        scanf("%d",&c);
        printf("================\n\n");

        switch(c){
            case 1 : LinearSearch(arr,n);
            break;
            case 2 :printf("Enter the Element to be search : ");
                    scanf("%d",&e);
                    int result = binarySearch(arr,0,n-1,e);
                    if(result == -1)
                        printf("\n Element is not Found");
                    else
                        printf("\n Element is found at %d index",result);
            break;
            case 3 : return 0;
            break;
            case 4 : exit(0);
            break;
            default : printf("Please Enter Valid Choice");
            break;
        }
    }
}

void LinearSearch(int arr[],int n){
    printf("Enter the Element to be search : ");
    scanf("%d",&e);
    int flag = 0;
    for(i=0;i<n;i++){
        if(arr[i]==e){
            flag = 1;
            printf("\n element %d found at index %d",e,i);
        }
    }
    if(flag == 0){
        printf("\n Element Not Found");
    }
}

int binarySearch(int arr[],int f,int l,int e){
    int temp;
    for(i=0;i<l+1;i++){
        for(j=i+1;j<l+1;j++){
            if(arr[i]>arr[j]){
                temp = arr[i];
                arr[i] = arr[j];
                arr[j] = temp;
            }
        }
    }
    while(f<=l){
        int m = f + (l-f)/2;

        if(arr[m]==e)
            return m;

        if(arr[m]<e)
            f = m+1;
        else
            l = m-1;
    }
    return -1;
}

void sort(int arr[MAX],int n){
    int temp;
    while(1){
        printf("\n\n ===== SUB-MENU =====");
        printf("\n 1.Ascending : ");
        printf("\n 2.Descending : ");
        printf("\n 3.Back to Main Menu");
        printf("\n 4.Exit");
        printf("\n Enter the choice : ");
        scanf("%d",&c);
        printf("================\n\n");

        switch(c){
            case 1 : ascending(arr,n);
            break;
            case 2 : descending(arr,n);
            break;
            case 3 : return 0;
            break;
            case 4 : exit(0);
            break;
            default : printf("Please Enter Valid Choice");
            break;
        }
    }
}
```

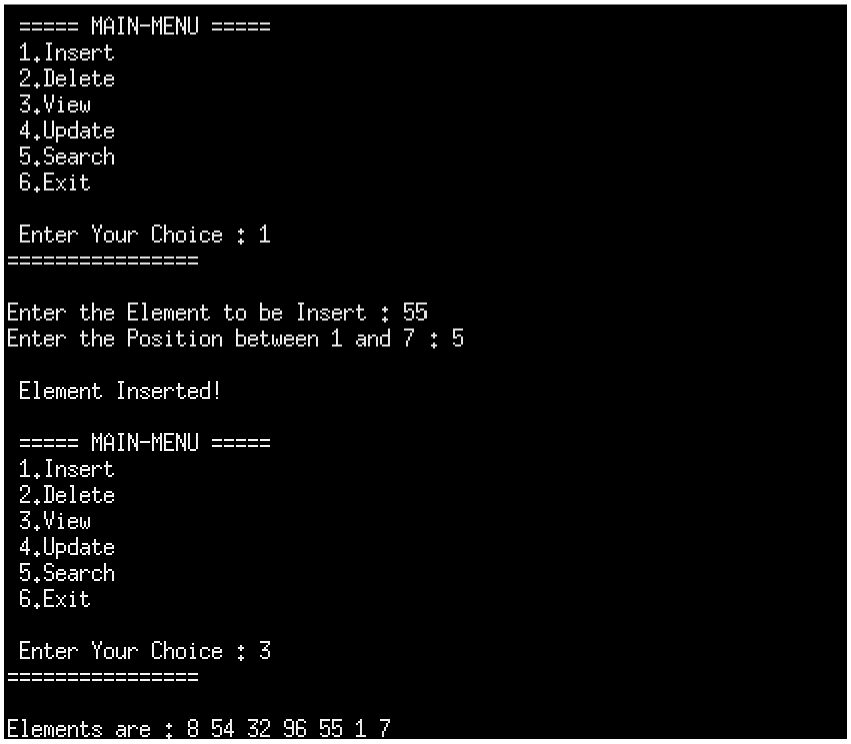
Output

0 . Accept the input:



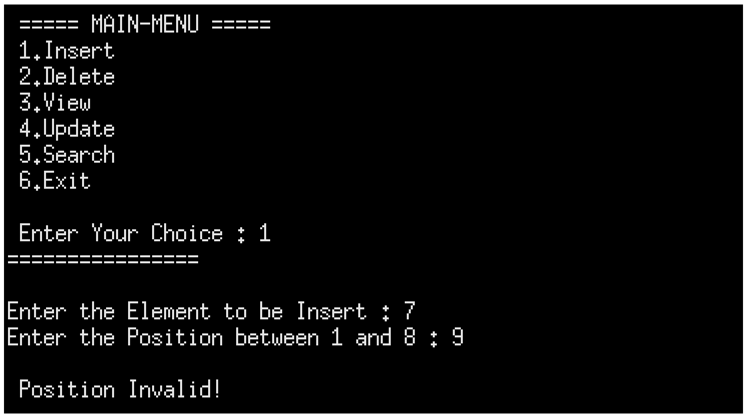
```
Enter the Number of Elements : 6
Enter the 6 Elements :
8
54
32
96
1
7

 Elements are : 8 54 32 96 1 7
```

1 . Insert the Element :



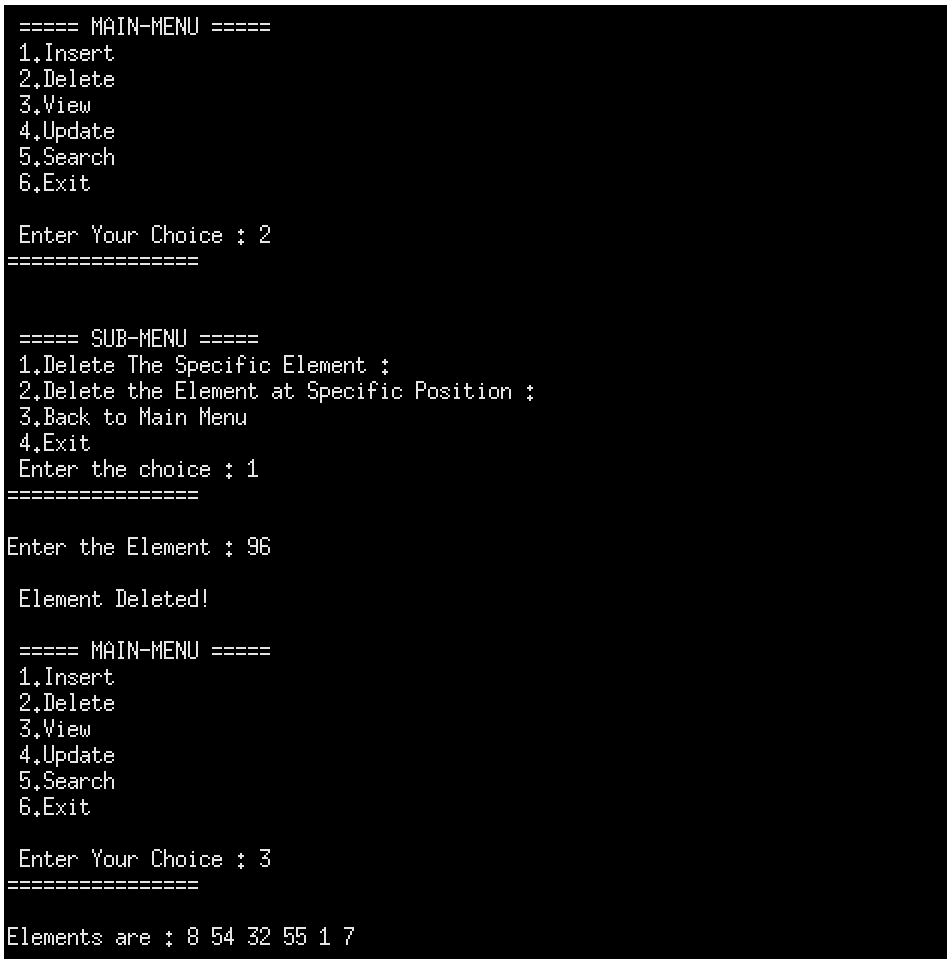
```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 1
================

Enter the Element to be Insert : 55
Enter the Position between 1 and 7 : 5

 Element Inserted!

 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 3
================

Elements are : 8 54 32 96 55 1 7
```

1 validation for inserting element :



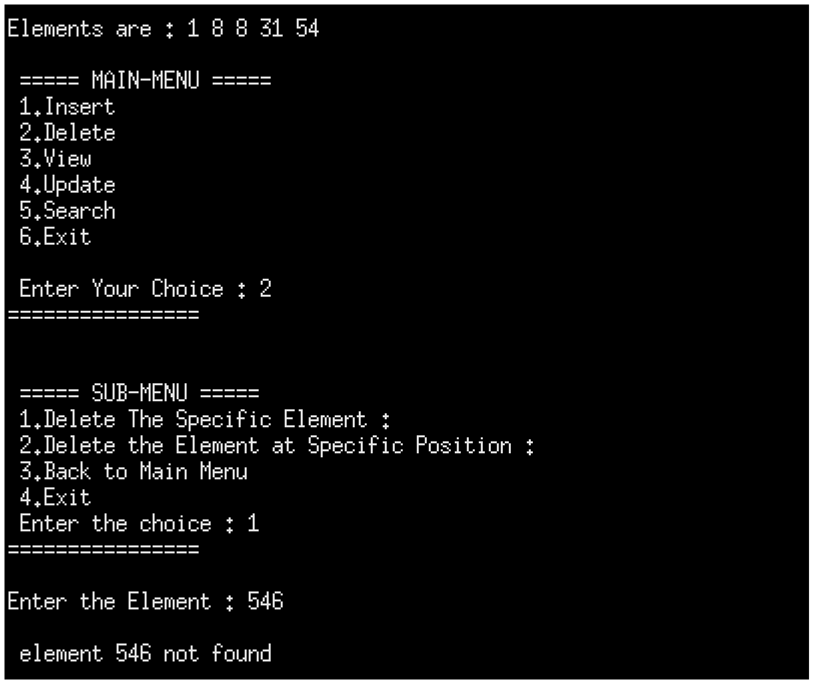
```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 1
================

Enter the Element to be Insert : 7
Enter the Position between 1 and 8 : 9

 Position Invalid!
```

2.1 Delete Specific Element :



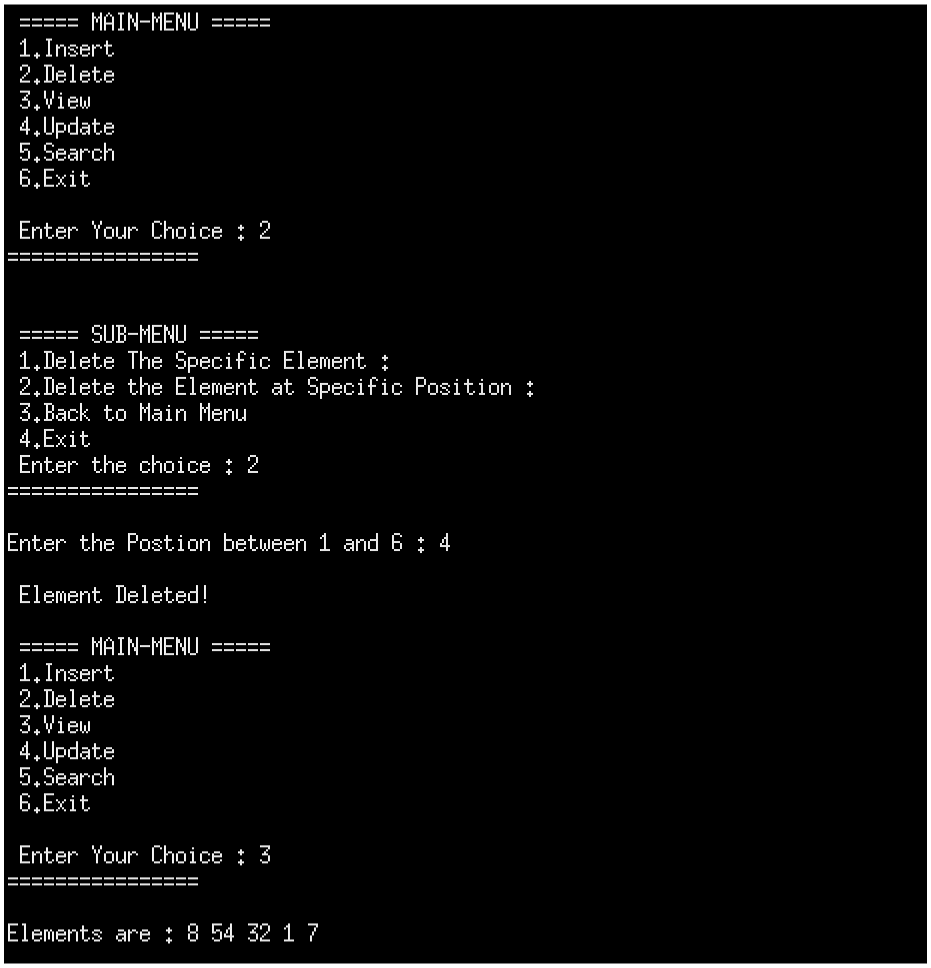
```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 2
================


 ===== SUB-MENU =====
 1.Delete The Specific Element :
 2.Delete the Element at Specific Position :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 1
================

Enter the Element : 96

 Element Deleted!

 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 3
================

Elements are : 8 54 32 55 1 7
```

2.1 Validation for Delete Specific Element :



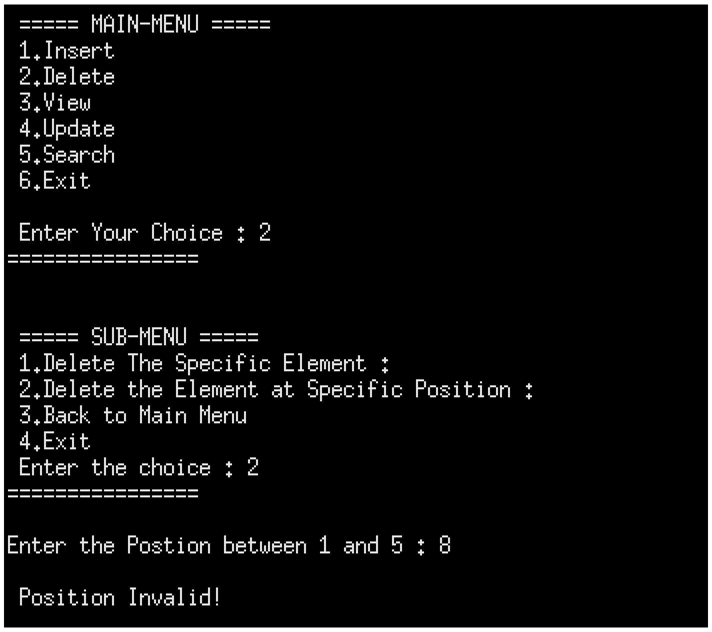
```
Elements are : 1 8 8 31 54

 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 2
================


 ===== SUB-MENU =====
 1.Delete The Specific Element :
 2.Delete the Element at Specific Position :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 1
================

Enter the Element : 546

 element 546 not found
```

2.2 Delete Element at Specific Position :



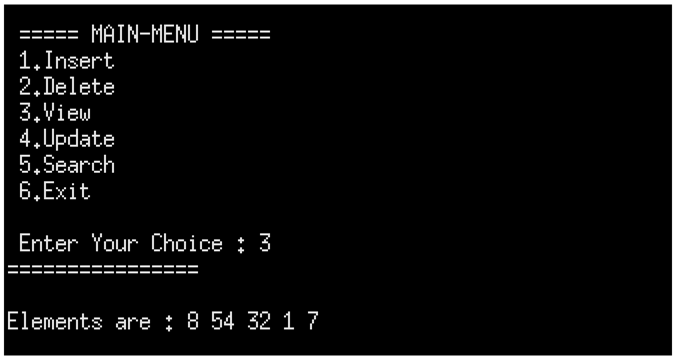
```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 2
================


 ===== SUB-MENU =====
 1.Delete The Specific Element :
 2.Delete the Element at Specific Position :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 2
================

Enter the Postion between 1 and 6 : 4

 Element Deleted!

 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 3
================

Elements are : 8 54 32 1 7
```

2.2 Validation for Delete Element at Specific Postion :



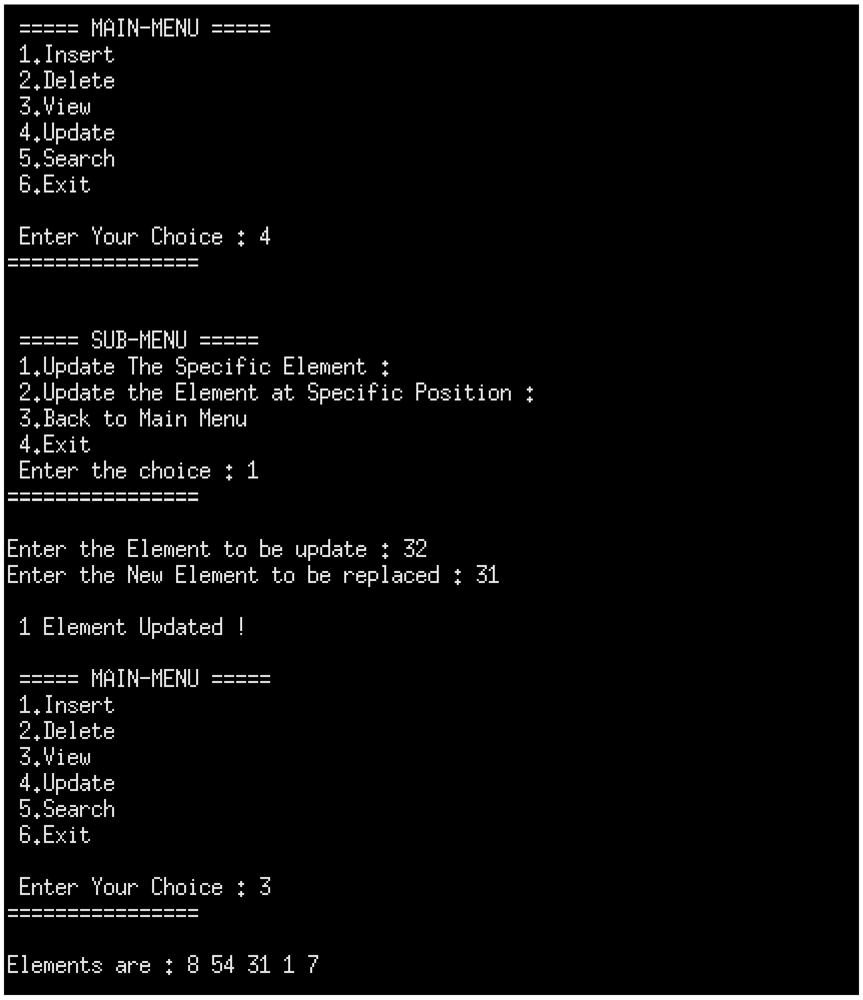
```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 2
================


 ===== SUB-MENU =====
 1.Delete The Specific Element :
 2.Delete the Element at Specific Position :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 2
================

Enter the Postion between 1 and 5 : 8

 Position Invalid!
```

3. View the Elements of Array :



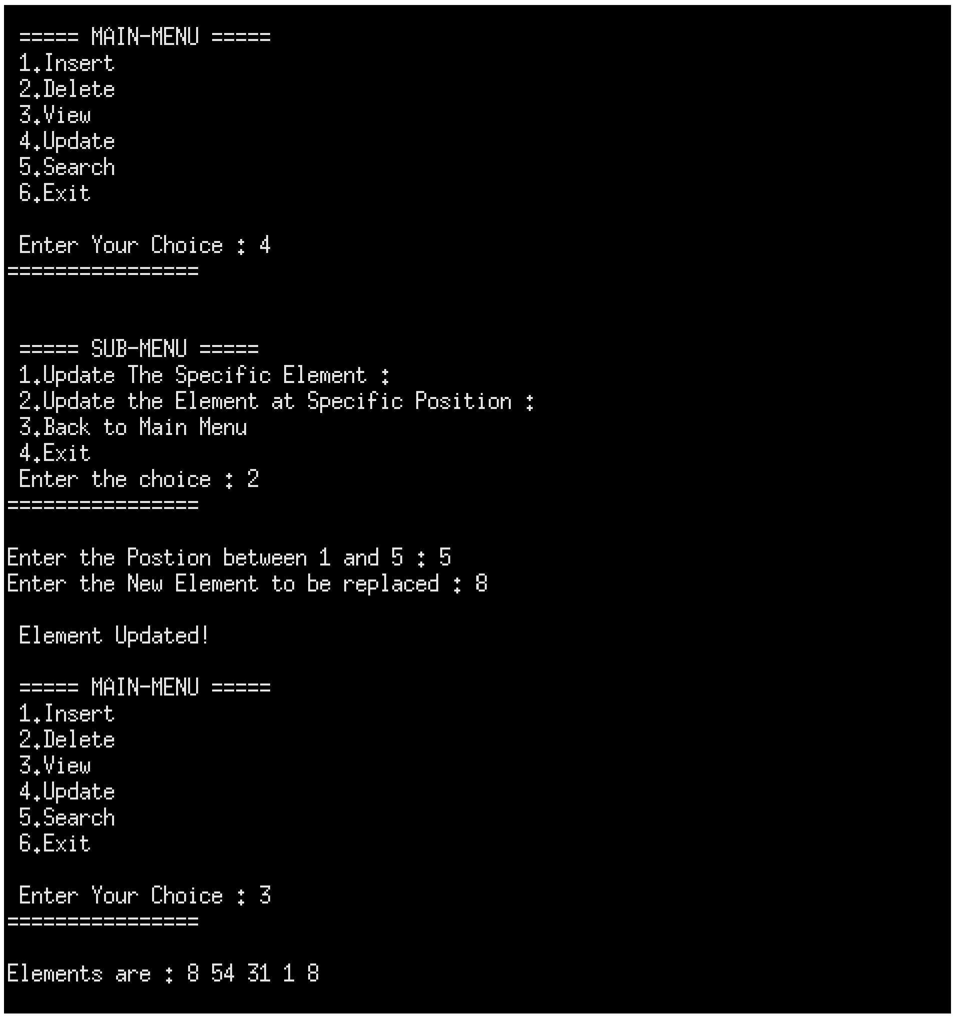
```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 3
================

Elements are : 8 54 32 1 7
```

4.1 Update Specific Element :



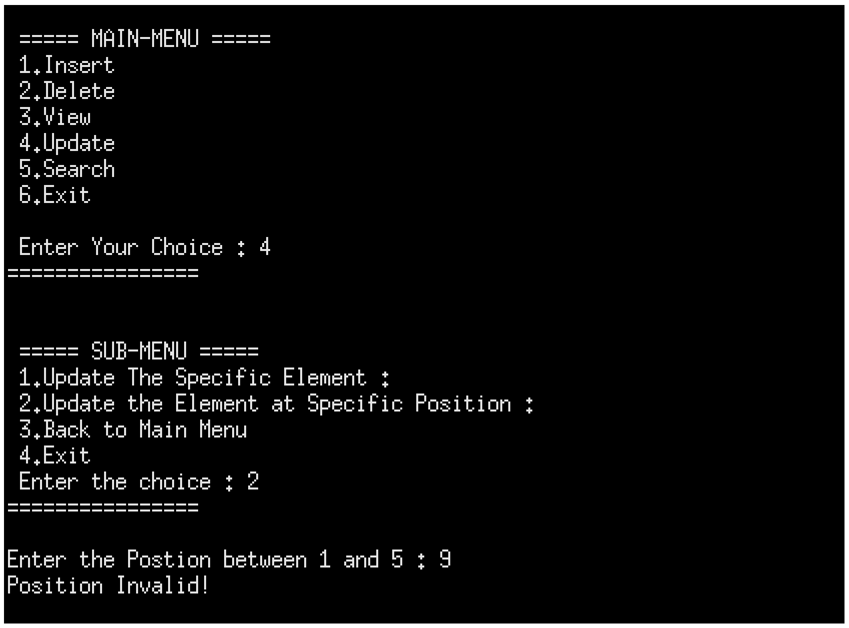
```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 4
================



 ===== SUB-MENU =====
 1.Update The Specific Element :
 2.Update the Element at Specific Position :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 1
================

Enter the Element to be update : 32
Enter the New Element to be replaced : 31

 1 Element Updated !

 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 3
================

Elements are : 8 54 31 1 7
```

4.2 Update Element at Specific Postion :



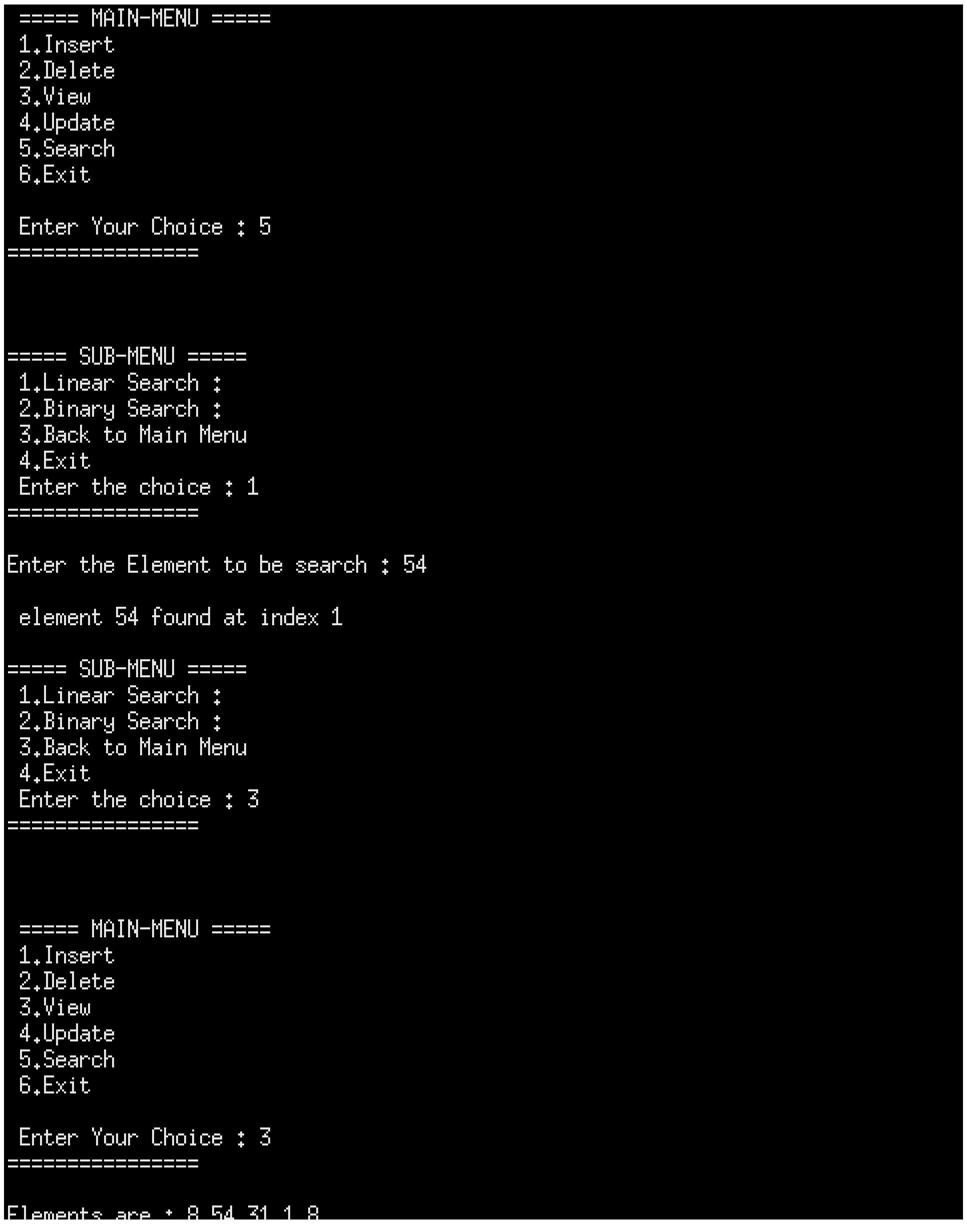
```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 4
================


 ===== SUB-MENU =====
 1.Update The Specific Element :
 2.Update the Element at Specific Position :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 2
================

Enter the Postion between 1 and 5 : 5
Enter the New Element to be replaced : 8

 Element Updated!

 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 3
================

Elements are : 8 54 31 1 8
```

4.2 Validation for Update Element at Specific Postion :



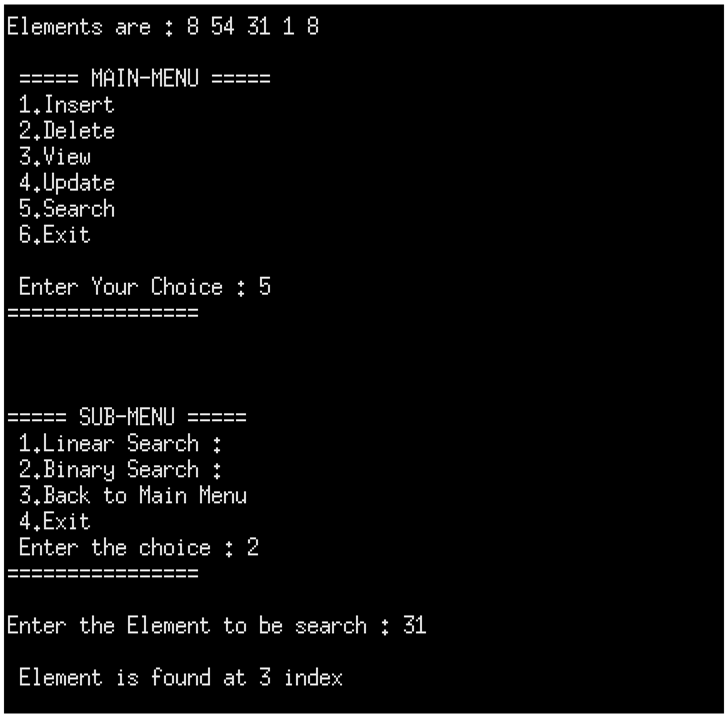
```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 4
================


 ===== SUB-MENU =====
 1.Update The Specific Element :
 2.Update the Element at Specific Position :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 2
================

Enter the Postion between 1 and 5 : 9
Position Invalid!
```

5.1 Linear Search :



```
 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 5
================



===== SUB-MENU =====
 1.Linear Search :
 2.Binary Search :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 1
================

Enter the Element to be search : 54

 element 54 found at index 1

===== SUB-MENU =====
 1.Linear Search :
 2.Binary Search :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 3
================



 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 3
================

Elements are : 8 54 31 1 8
```

5.2 Binary Search :



```
Elements are : 8 54 31 1 8

 ===== MAIN-MENU =====
 1.Insert
 2.Delete
 3.View
 4.Update
 5.Search
 6.Exit

 Enter Your Choice : 5
================



===== SUB-MENU =====
 1.Linear Search :
 2.Binary Search :
 3.Back to Main Menu
 4.Exit
 Enter the choice : 2
================

Enter the Element to be search : 31

 Element is found at 3 index
```