COMPUTER PROGRAMING

EX NO - 4

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EX NO -4: PROGRAMS USING RECURSIVE FUNCTION

A. LINEAR SEARCH USING RECURSIONS.

Aim:

To Write a program in C to find an element using linear search by recursive Functions.

Algorithm:

MAIN:

Step 1: Start
Step 2: Declare an array Arr[100] of integer datatype,n,sele.
Step 3: input the value of n .
Step 4: for (int i=0; i<n; i++)
Get the input of Arr[i]
Step 5: input the value of "sele" the element to search.
Step 6: Call the function linear (Arr ,0, n-1, sele) and store the value to c.
Step 7: if (c! =-1) print that element found in the location of index c.
Step 8: else print element not found.
Step 9: Stop.

Linear (int Array [], int findex, int lindex, int search)

Step 1: Start
Step 2: if (lindex < findex)
Return (-1);
Step 3: else if (Array[findex] == search)
Return findex;
Step 4: else return linear (Array, findex+1, lindex, search)

Program:

```c
#include<stdio.h>
int linear(int Array[],int f,int l,int search)
{
    if(l<f)
        return -1;   // Stoping Condition
    else if(Array[f] == search)
        return f;    // Stoping Condition
    else
        return linear(Array,f+1,l,search); // Recursive Call
}
void main()
{
    int Arr[101],n,sele;
    printf("Enter the size of Array:");
    scanf("%d",&n);      // Input the Size of array
    printf("Enter the elemnts:\n");
    for(int i=0;i<n;i++)   // Input the Array elements
    {
        scanf("%d",&Arr[i]);
    }
    printf("\nEnter the value to search:");
    scanf("%d",&sele); // Input the elements to Search
    int value = linear(Arr, 0, n-1, sele);    //function Call
    if (value != -1)
       printf("\nElement Found : Arr[%d] = %d\n",value,Arr[value]);
    else
        printf("\nElement not Found", sele);
}
```

Output:

```
Enter the size of Array:8
Enter the elemnts:
5
69
87
54
29
48
31
94

Enter the value to search:48

Element Found : Arr[5] = 48
```

Result:

Thus, the program to find an element using linear search by recursive Functions in C language has been executed and verified successfully.

B. BINARY SEARCH USING RECURSIONS.

Aim:

To Write a program in C to find an element using binary search by recursive Functions.

Algorithm:

MAIN:

Step 1: Start
Step 2: Declare an array Arr[100] of integer datatype,n,sele.
Step 3: input the value of n .
Step 4: for (int i=0; i<n; i++) // elements should be sorted
Get the input of Arr[i]
Step 5: input the value of "sele" the element to search.
Step 6: Call the function bisearch (Arr ,0, n-1, sele) and store the value to c.
Step 7: if (c! =-1) print that element found in the location of index c.
Step 8: else print element not found.
Step 9: Stop.

bisearch (int Array [], int low, int high, int search)

Step 1: Start
Step 2: if (high >= low)
{
1. Calculate Average of low and high and store it to mid.
2. If (Array[mid] == search) Return mid;
3. If (Array[mid] > search)
return bisearch (A, low, mid - 1, s);
else
return bisearch (A, mid + 1, high, s);

Step 3: Return (-1);

Program:

```
#include<stdio.h>
int bisearch(int A[],int low,int high,int s)
{
    if (high >= low) {
        int mid = (low + high)/2;
        if (A[mid] == s)
            return mid;  // Stoping Condition
        if (A[mid] > s)
            return bisearch(A, low, mid - 1, s); // Recursive Call
        else
            return bisearch(A, mid + 1, high, s); // Recursive Call
    }
    return -1; // Stoping Condition
}
void main()
{
    int A[101],n,s,c;
    printf("Enter the size of Array:");
    scanf("%d",&n);     // Input the Size of array
    printf("Enter the elemnts:\n");
    for(int i=0;i<n;i++)    // Input the sorted Array elements
    {
        scanf("%d",&A[i]);
    }
    printf("Enter the value to search:");
    scanf("%d",&s);     // Input the elements to Search
    c = bisearch(A,0,n-1,s);     //function Call
     if(c != -1)
         printf("\nElement found : A[%d] = %d\n",c+1,s);
      else
        printf("\nElement Not found\n");
}
```

Output:

```
Enter the size of Array:6
Enter the elemnts:
12
15
18
54
68
87
Enter the value to search:68

Element found : A[5] = 68
```

Result:

Thus, the program to find an element using binary search by recursive Functions in C language has been executed and verified successfully.

C. SELECTION SORT USING RECURSIONS.

Aim:

To Write a program in C to Sort An Array using Selection sort by recursive Functions.

Algorithm:

MAIN:

Step 1: Start
Step 2: Declare an array Arr [100] of integer datatype,n.
Step 3: input the value of n .
Step 4: for (int i=0; i<n; i++) // elements should be sorted
Get the input of Arr[i]
Step 5: Call the function Selection (Arr, 0, 0, n, 1);
Step 6: Print the Array "Arr".
Step 9: Stop.

Selection (int list[], int i, int j, int size, int flag)

Step 1: Start
Step 2: Declare an integer temp.
Step 3: if (i < size - 1)
{ if (flag) {
j = i + 1;
}
if (j < size) {if (list[i] > list[j]) { temp = list[i];
list[i] = list[j];
list[j] = temp;
}
selection(list, i, j + 1, size, 0);}
selection(list, i + 1, 0, size, 1);}

Program:

```c
#include <stdio.h>
void selection(int list[], int i, int j, int size, int flag)
{
    int temp;
    if (i < size - 1)
    {
        if (flag)
        {
            j = i + 1;
        }
        if (j < size)
        {
            if (list[i] > list[j])
            {
                temp = list[i];
                list[i] = list[j];
                list[j] = temp;
            }
            selection(list, i, j + 1, size, 0);
        }
        selection(list, i + 1, 0, size, 1);
    }
}
void main()
{
    int list[100], size, temp, i, j;
    printf("Enter the size of the list: ");
    scanf("%d", &size);
    printf("Enter the elements in list:\n");
    for (i = 0; i < size; i++)
    {
        scanf("%d", &list[i]);
    }
    selection(list, 0, 0, size, 1);
    printf("The sorted list in ascending order is\n");
    for (i = 0; i < size; i++)
    {
        printf("%d\n", list[i]);
    }
}
```

Output:

```
Enter the size of the list: 6
Enter the elements in list:
89
456
751
365
845
35
The sorted list in ascending order is
35
89
365
456
751
845
```

Result:

Thus, the program to Sort An Array using Selection sort by recursive Functions in C language has been executed and verified successfully.