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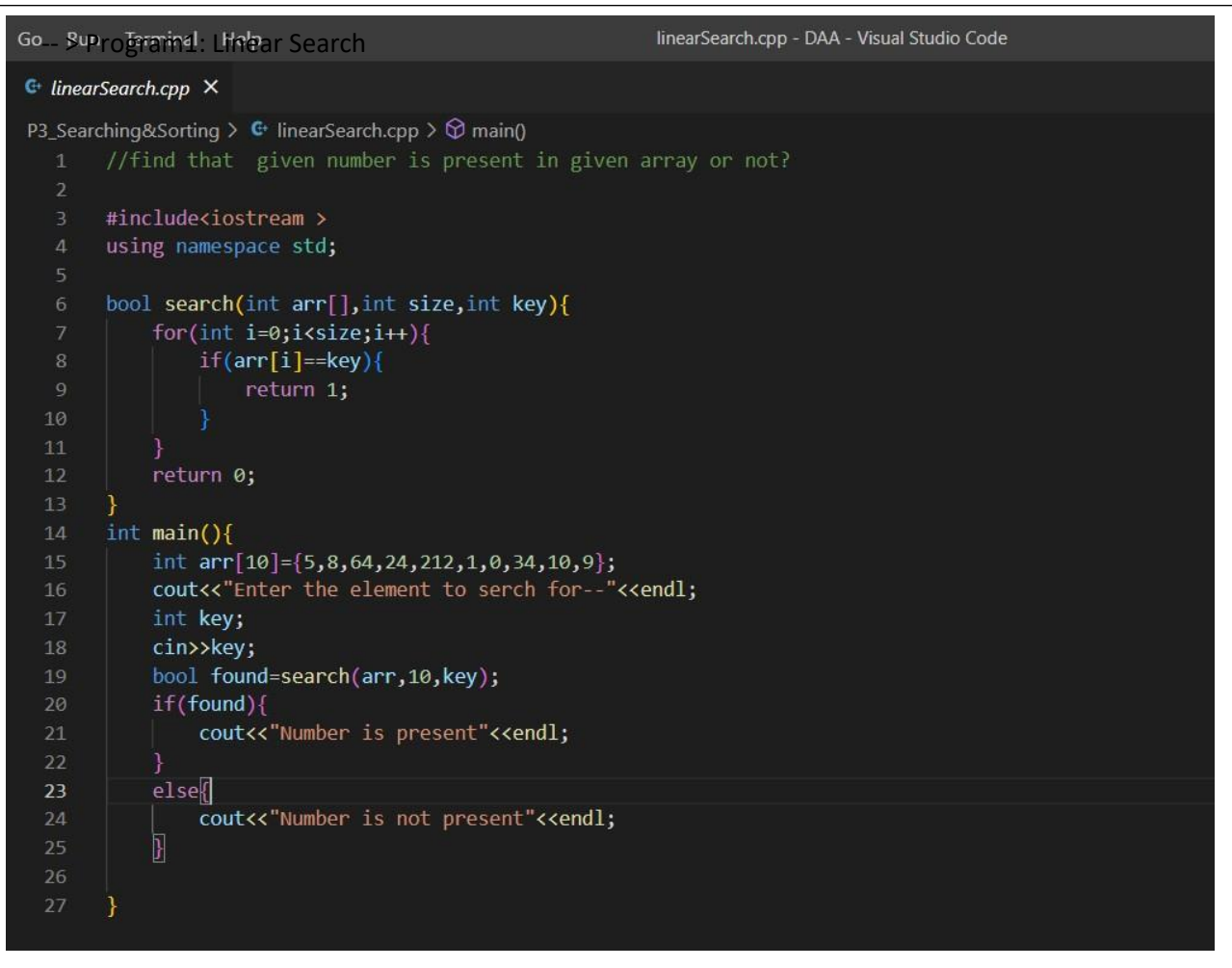
DAA Practical No 3

Aim: Write C/C++ code to implement concept of

1)Searching Algorithm (Any three)

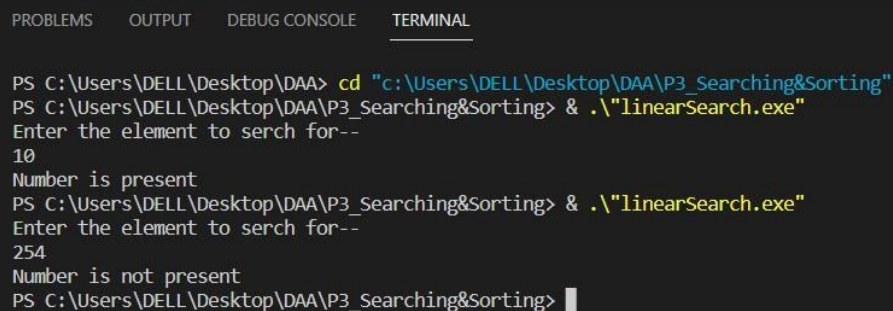
2)Sorting Algorithm (Any Three)

1)Searching Algorithm



```
Go... Search... Terminal: Hub
> Program1: Linear Search
linearSearch.cpp - DAA - Visual Studio Code

linearSearch.cpp X
P3_Searching&Sorting > linearSearch.cpp > main()
1 //find that given number is present in given array or not?
2
3 #include<iostream >
4 using namespace std;
5
6 bool search(int arr[],int size,int key){
7     for(int i=0;i<size;i++){
8         if(arr[i]==key){
9             return 1;
10        }
11    }
12    return 0;
13 }
14 int main(){
15     int arr[10]={5,8,64,24,212,1,0,34,10,9};
16     cout<<"Enter the element to serch for--"<<endl;
17     int key;
18     cin>>key;
19     bool found=search(arr,10,key);
20     if(found){
21         cout<<"Number is present"<<endl;
22     }
23     else{
24         cout<<"Number is not present"<<endl;
25     }
26 }
27 }
```



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS C:\Users\DELL\Desktop\DAA> cd "c:\Users\DELL\Desktop\DAA\P3_Searching&Sorting"
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> & .\"linearSearch.exe"
Enter the element to serch for--
10
Number is present
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> & .\"linearSearch.exe"
Enter the element to serch for--
254
Number is not present
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> |
```

-->Program2: Binary Search

```
Go Run Terminal Help BinarySearch.cpp - DAA - Visual Studio Code

BinarySearch.cpp X
P3_Searching&Sorting > BinarySearch.cpp > main(void)
1 // C++ program to implement recursive Binary Search
2 #include <bits/stdc++.h>
3 using namespace std;
4
5 // A recursive binary search function. It returns location of x in given array arr[l..r] is present,otherwise -1
6
7 int binarySearch(int arr[], int l, int r, int x)
8 {
9     if (r >= l) {
10         int mid = l + (r - l) / 2;
11         // If the element is present at the middle itself
12         if (arr[mid] == x)
13             return mid;
14         // If element is smaller than mid, then it can only be present in left subarray
15         if (arr[mid] > x)
16             return binarySearch(arr, l, mid - 1, x);
17
18         // Else the element can only be present in right subarray
19         return binarySearch(arr, mid + 1, r, x);
20     }
21     // We reach here when element is not present in array
22     return -1;
23 }
24
25 int main(void)
26 {
27     int array[] = { 2, 3, 4, 10, 40 ,50,0,78,100};
28     int x;
29     cout<<"Enter the element which you want to search"<<endl;
30     cin>>x;
31     int n = sizeof(array) / sizeof(array[0]);
32     int result = binarySearch(array, 0, n - 1, x);
33     (result == -1)
34     ? cout << "Element is not present in array"
35     : cout << "Element is present at index " << result;
36     return 0;
37 }
```

Output:

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS C:\Users\DELL\Desktop\DAA> cd "c:\Users\DELL\Desktop\DAA\P3_Searching&Sorting"
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> & .\"BinarySearch.exe"
Enter the element which you want to search
78
Element is present at index 7
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> & .\"BinarySearch.exe"
Enter the element which you want to search
250
Element is not present in array
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> █
```

-->Program 3: Meta Binary Search

Go Run Terminal Help metaBinarySearch.cpp - DAA - Visual Studio Code

metaBinarySearch.cpp X

P3_Searching&Sorting > metaBinarySearch.cpp > ...

```
1 // Meta Binary Search also called as one sided Binary Search.
2
3 #include <iostream>
4 #include <cmath>
5 #include <vector>
6 using namespace std;
7 // Function to show the working of Meta binary search
8 int bsearch(vector<int> A, int key_to_search)
9 {
10     int n = (int)A.size();
11     // Set number of bits to represent largest array index
12     int lg = log2(n-1)+1;
13     int pos = 0;
14     for (int i = lg ; i >= 0; i--) {
15         if (A[pos] == key_to_search)
16             return pos;
17
18         // Incrementally construct the index of the target value
19         int new_pos = pos | (1 << i);
20
21         // find the element in one direction and update position
22         if ((new_pos < n) && (A[new_pos] <= key_to_search))
23             pos = new_pos;
24     }
25
26     // if element found return pos otherwise -1
27     return ((A[pos] == key_to_search) ? pos : -1);
28 }
29
30 int main(void){
31
32     vector<int> A = { -2, 10, 100, 250, 32315 };
33     cout << bsearch(A, 10) << endl;
34
35     return 0;
36 }
37
```

Output:

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```
PS C:\Users\DELL\Desktop\DAA> cd "c:\Users\DELL\Desktop\DAA\P3_Searching&Sorting"
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> & .\"metaBinarySearch.exe"
1
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> |
```

2) Sorting Algorithms

-- >Program 1: Selection Sort

Go Run Terminal Help SelectionSort.cpp - DAA - Visual Studio Code

SelectionSort.cpp X

P3_Searching&Sorting > SelectionSort.cpp > main()

```
1  #include<iostream>
2  using namespace std;
3  int main(){
4      int i,j,num;
5      int p;
6      int temp;
7      int min;
8      int arr[10];
9      cout<<"Enter the number of elements:"<<endl;
10     cin>>num;
11     cout<<"Enter the elements:"<<endl;
12
13     for(int i=0;i<num;i++){
14         cin>>arr[i];
15     }
16     for(i=0;i<num-1;i++){
17         min=arr[i];
18         p=i;
19         for(j=i+1;j<num;j++){
20             if(min>arr[j]){
21                 min=arr[j];
22                 p=j;
23             }
24         }
25         temp=arr[i];
26         arr[i]=arr[p];
27         arr[p]=temp;
28     }
29     cout<<"Sorted elements : "<<endl;
30     for(int i=0;i<num;i++){
31         cout<<arr[i]<<" ";
32     }
33     return 0;
34 }
35 }
```

Output:

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```
PS C:\Users\DELL\Desktop\DAA> cd "c:\Users\DELL\Desktop\DAA\P3_Searching&Sorting"
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> & .\"SelectionSort.exe"
Enter the number of elements:
4
Enter the elements:
8 10 45 0
Sorted elements :
0 8 10 45
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> |
```

-->Program 2: Bubble Sort

```
Go Run Terminal Help BubbleSort.c - DAA - Visual Studio Code
BubbleSort.c X
P3_Searching&Sorting > C BubbleSort.c > ...
1 //Bubble Sort
2 #include <stdio.h>
3 int main()
4 {
5     int a[100], number, i, j, temp;
6
7     printf("\n Please Enter the total Number of Elements in array : ");
8     scanf("%d", &number);
9
10    printf("\n Please Enter the Array Elements : ");
11    for(i = 0; i < number; i++)
12        scanf("%d", &a[i]);
13
14    for(i = 0; i < number-1; i++)
15    {
16        for(j = 0; j < number - i - 1; j++)
17        {
18            if(a[j] > a[j + 1])
19            {
20                temp = a[j];
21                a[j] = a[j + 1];
22                a[j + 1] = temp;
23            }
24        }
25    }
26    printf("\n List Sorted in Ascending Order:");
27    for(i = 0; i < number; i++)
28    {
29        printf(" %d \t", a[i]);
30    }
31    printf("\n");
32    return 0;
33 }
34 }
35 }
```

Output:

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS C:\Users\DELL\Desktop\DAA> cd "c:\Users\DELL\Desktop\DAA\P3_Searching&Sorting"
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> & .\"BubbleSort.exe"

Please Enter the total Number of Elements in array : 5

Please Enter the Array Elements : 40 12 78 5 100

List Sorted in Ascending Order: 5      12      40      78      100
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> █
```


-->Program 3: Insertion Sort

```
Go Run Terminal Help InsertionSort.cpp - DAA - Visual Studio Code

InsertionSort.cpp x
P3_Searching&Sorting > InsertionSort.cpp > main()
1  #include<iostream>
2  using namespace std;
3
4  int main(){
5      int i,j,num;
6      int temp;
7      int arr[30];
8      cout<<"Enter the number of elements:"<<endl;
9      cin>>num;
10     cout<<"Enter the elements: "<<endl;
11
12     for(int i=0;i<num;i++){
13         cin>>arr[i];
14     }
15
16     for(int i=0;i<num;i++){
17         temp=arr[i];
18         j=i-1;
19
20         while((temp<arr[j]) && (j>=0)){
21             arr[j+1]=arr[j];
22             j=j-1;
23         }
24         arr[j+1]=temp;
25     }
26     cout<<"Sorted elements : "<<endl;
27     for(i=0;i<num;i++){
28         cout<<arr[i]<<" ";
29     }
30
31     return 0;
32 }
33 }
```

Output:

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

PS C:\Users\DELL\Desktop\DAA> cd "c:\Users\DELL\Desktop\DAA\P3_Searching&Sorting"
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> & .\"InsertionSort.exe"
Enter the number of elements:
5
Enter the elements:
30 40 7 100 70
Sorted elements :
7 30 40 70 100
PS C:\Users\DELL\Desktop\DAA\P3_Searching&Sorting> █
```