

## Data Structure & Algorithm Assignment 1

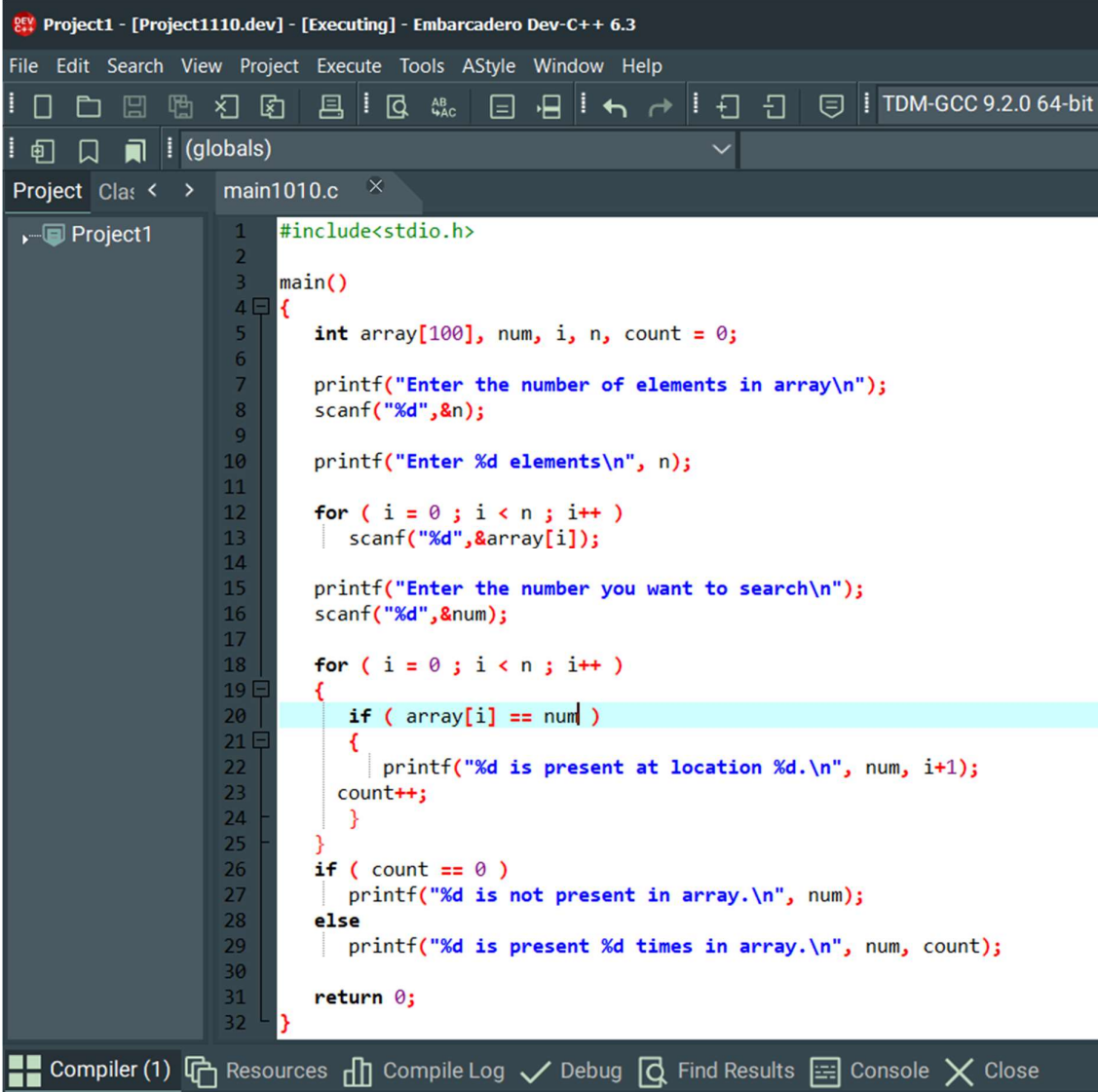
Name- Abhinav Kumar

Branch- AIML-A1

PRN- 21070126006

A) Implement following searching algorithm: Linear search with multiple occurrences.

Sol)



```
Project1 - [Project1110.dev] - [Executing] - Embarcadero Dev-C++ 6.3
File Edit Search View Project Execute Tools AStyle Window Help
(globals)
Project1
main1010.c
1 #include<stdio.h>
2
3 main()
4 {
5     int array[100], num, i, n, count = 0;
6
7     printf("Enter the number of elements in array\n");
8     scanf("%d",&n);
9
10    printf("Enter %d elements\n", n);
11
12    for ( i = 0 ; i < n ; i++ )
13        scanf("%d",&array[i]);
14
15    printf("Enter the number you want to search\n");
16    scanf("%d",&num);
17
18    for ( i = 0 ; i < n ; i++ )
19    {
20        if ( array[i] == num )
21        {
22            printf("%d is present at location %d.\n", num, i+1);
23            count++;
24        }
25    }
26
27    if ( count == 0 )
28        printf("%d is not present in array.\n", num);
29    else
30        printf("%d is present %d times in array.\n", num, count);
31
32    return 0;
33 }
```

```
C:\Users\AK-Lenovo\Documents\DEV++\Project1110.exe
Enter the number of elements in array
5
Enter 5 elements
5 5 4 3 2
Enter the number you want to search
5
5 is present at location 1.
5 is present at location 2.
5 is present 2 times in array.

-----
Process exited after 16.39 seconds with return value 0
Press any key to continue . . .
```

B) Implement following searching algorithms in menu:

1. Binary search with iteration
2. Binary search with recursion

Sol)

```
Project1 - [Project1110.dev] - Embarcadero Dev-C++ 6.3
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 9.2.0 64-bit Rel
(globals)
Project1 main1010.c
1 //Binary Search using recursion
2 #include <stdio.h>
3
4 int binarySearch(int arr[], int l, int h, int x)
5 {
6     if (h >= l)
7     {
8         int mid = (h+l)/2;
9         if (arr[mid] == x) return mid;
10        if (arr[mid] > x) return binarySearch(arr, l, mid-1, x);
11        return binarySearch(arr, mid+1, h, x);
12    }
13    return -1;
14 }
15
16 int main(void)
17 {
18     int arr[] = {2, 3, 4, 10, 40};
19     int n = 5;
20     int x = 40;
21     int result = binarySearch(arr, 0, n-1, x);
22     (result == -1)? printf("Element is not present in array")
23     : printf("Element is present at index %d", result);
24     return 0;
25 }
```

C:\Users\AK-Lenovo\Documents\DEV++\Project1110.exe

— □ ×

Element is present at index 4

-----

Process exited after 0.05343 seconds with return value 0

Press any key to continue . . .

DEV C++ Project1 - [Project1110.dev] - Embarcadero Dev-C++ 6.3

File Edit Search View Project Execute Tools AStyle Window Help

(globals)

Project Class < > [\*] main1010.c

```
1 //Binary Search iterative
2 #include <stdio.h>
3 int binarySearch(int array[], int x, int low, int high) {
4     while (low <= high) {
5         int mid = low + (high - low) / 2;
6
7         if (array[mid] == x)
8             return mid;
9
10        if (array[mid] < x)
11            low = mid + 1;
12
13        else
14            high = mid - 1;
15    }
16
17    return -1;
18 }
19 int main(void) {
20     int array[] = {3, 4, 5, 6, 7, 8, 9};
21     int n = sizeof(array) / sizeof(array[0]);
22     int x = 4;
23     int result = binarySearch(array, x, 0, n - 1);
24     if (result == -1)
25         printf("Not found");
26     else
27         printf("Element is found at index %d", result);
28     return 0;
29 }
```

C:\Users\AK-Lenovo\Documents\DEV++\Project1110.exe



Element is found at index 1

-----  
Process exited after 5.091 seconds with return value 0

Press any key to continue . . .