

# **Lab Assignment :4**

## **CSN-261:Data structures Lab**

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*Sub Batch:O2*

*Tools used : C(language),Linux(os),  
Github(csv),Doxygen(documentation),GDB(debugger)*

## **PROBLEM 1:**

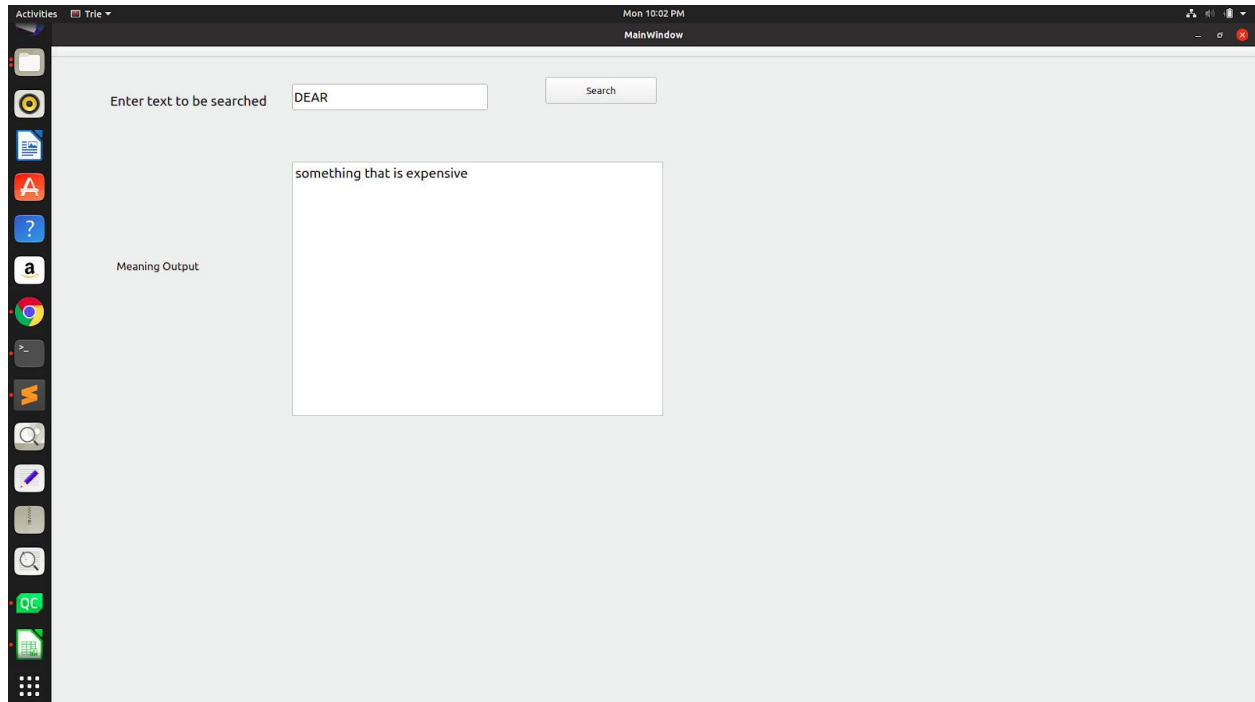
Create a dictionary using Trie data structure (without using STL) having words and their meanings. You need to read the words and their respective meanings from a CSV file (uploaded in Piazza, named as TrieInput.csv), where 1st column is for words and 2nd column shows its meaning. Given a word you have to print its meaning. If no such word is found in the dictionary, then print “Invalid word”. Create a GUI using Qt library to accept a word in a text box and display the meaning in an another box, as shown in the Figure 1. Also, create an installer of your program for Windows OS. You can use the software like InstallSimple or InstallShield or WIX or NSIS to do so.

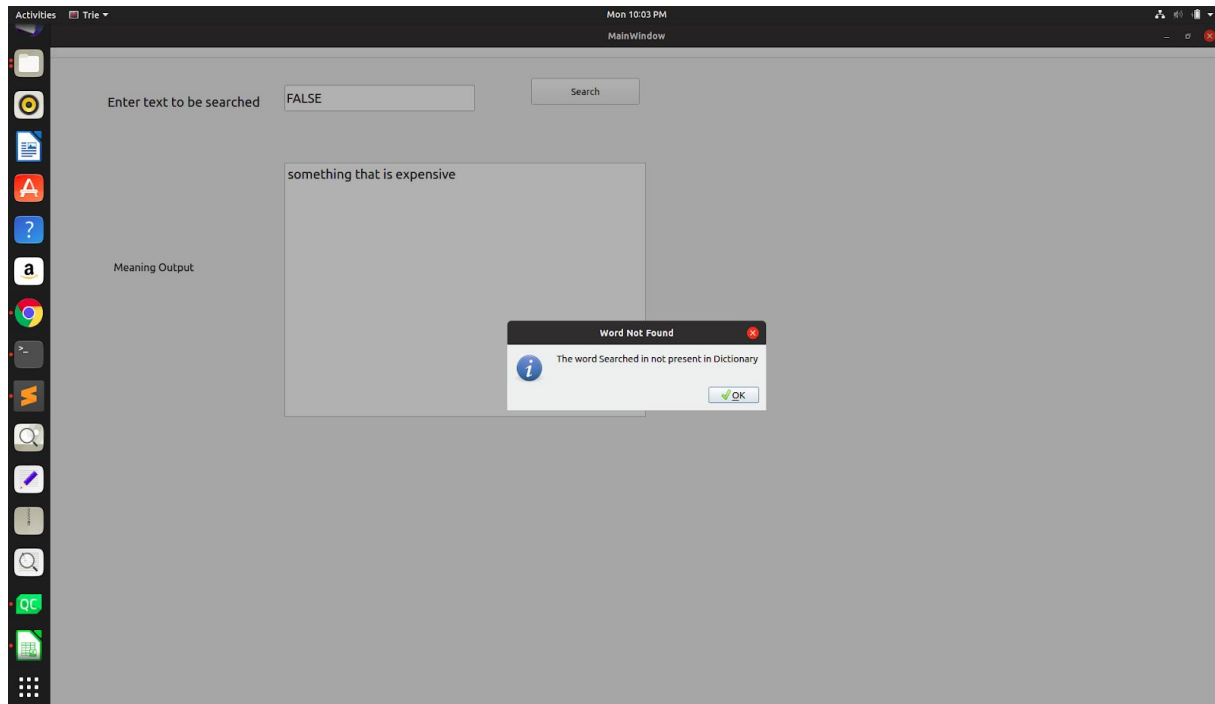
## **DATA STRUCTURES AND ALGORITHM:**

I have used trie data structure for implementing the dictionary.

The GUI has been created using Qt.

## **OUTPUTS :**





## **Problem Statement 2:**

Implement N Queens problem to show all the possible combinations in  $N \times N$  binary matrix and to display the total number of such combinations at the end, where 1 represents the position of N queens in the  $N \times N$  matrix and remaining cells are represented by 0. A sample output for  $N=4$  is shown below.

## **DATA STRUCTURES AND ALGORITHM USED**

I have used Backtracking for implementing N queen problem.

# OUTPUT

```
Activities Terminal Mon 10:06 PM mahak@nspiron: ~/Desktop/lab 4/Q2
File Edit View Search Terminal Help
mahak@nspiron:~/Desktop/lab 4/Q2$ g++ l4q2.cpp -o l4q2
mahak@nspiron:~/Desktop/lab 4/Q2$ time ./l4q2
Enter the value of N :4
1
0 0 1 0
1 0 0 0
0 0 0 1
0 1 0 0
2
0 1 0 0
0 0 0 1
1 0 0 0
0 0 1 0
real    0m1.410s
user    0m0.001s
sys     0m0.005s
mahak@nspiron:~/Desktop/lab 4/Q2$ g++ l4q2.cpp -o l4q2
mahak@nspiron:~/Desktop/lab 4/Q2$ time ./l4q2
Enter the value of N :5
1
1 0 0 0 0
0 0 0 1 0
0 1 0 0 0
0 0 0 0 1
0 0 1 0 0
2
1 0 0 0 0
0 0 1 0 0
0 0 0 0 1
0 1 0 0 0
0 0 0 1 0
3
0 0 1 0 0
1 0 0 0 0
0 0 0 1 0
0 1 0 0 0
0 0 0 0 1
4
0 0 0 1 0
1 0 0 0 0
0 0 1 0 0
0 0 0 0 1
0 1 0 0 0
5
0 1 0 0 0
0 0 0 1 0
1 0 0 0 0
0 0 0 0 0
```

```
Activities Terminal Mon 10:06 PM mahak@nspiron: ~/Desktop/lab 4/Q2
File Edit View Search Terminal Help
4
0 0 0 1 0
1 0 0 0 0
0 0 1 0 0
0 0 0 0 1
0 1 0 0 0
5
0 1 0 0 0
0 0 0 1 0
1 0 0 0 0
0 0 1 0 0
0 0 0 0 1
6
0 0 0 0 1
0 0 1 0 0
1 0 0 0 0
0 0 0 1 0
0 1 0 0 0
7
0 1 0 0 0
0 0 0 0 1
0 0 1 0 0
1 0 0 0 0
0 0 0 1 0
8
0 0 0 0 1
0 1 0 0 0
0 0 0 1 0
1 0 0 0 0
0 0 1 0 0
9
0 0 0 1 0
0 1 0 0 0
0 0 0 0 1
0 0 1 0 0
1 0 0 0 0
10
0 0 1 0 0
0 0 0 0 1
0 1 0 0 0
0 0 0 1 0
1 0 0 0 0
real    0m0.999s
user    0m0.000s
sys     0m0.000s
mahak@nspiron:~/Desktop/lab 4/Q2$
```

### **CPU TIME:**

```
real    0m1.410s
user    0m0.001s
sys     0m0.005s
```

### **Problem Statement 3:**

Given an integer array having N number of elements, write a C++ program using hash map (using STL) to find the length of the largest subarray from the given input array, where the summation of the elements of the subarray is equal to n. In the output, if any solution exists then print the starting and ending index (with respect to given input array) of the largest subarray and also print its length. Otherwise, print “Not Found”, as described in the following output

#### **Input:**

```
N = 8 15 0 2 -3 1 5 3 -2
n = 5
```

#### **Output:**

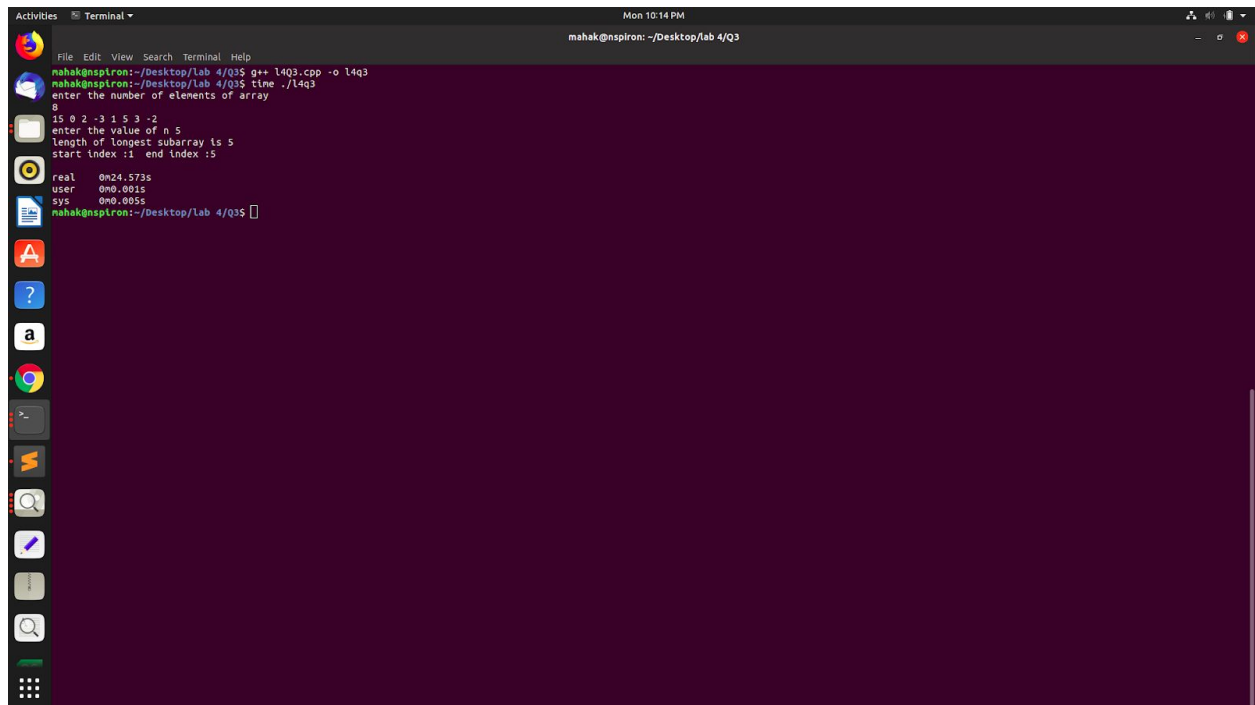
Length of longest subarray is 5 Index from 1 to 5.

### **DATA STRUCTURE AND ALGORITHM USED:**

I have used Hash map to store the sum of the array.

Basic map function like ‘find’ is used to iterate through the map until given k is found .

## OUTPUT:

A terminal window titled 'Terminal' with a dark background and light text. The window shows the execution of a C++ program. The user enters '8' for the number of elements, and the program outputs the array '15 0 2 -3 1 5 3 -2'. The user then enters '5' for the value of n, and the program outputs 'length of longest subarray is 5' and 'start index :1 end index :5'. Finally, the program outputs the timing results: 'real 0m24.573s', 'user 0m0.001s', and 'sys 0m0.005s'. The terminal window has a menu bar with 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The status bar at the bottom shows 'mahak@nsipron: ~/Desktop/lab 4/Q3' and the time 'Mon 10:14 PM'.

```
File Edit View Search Terminal Help
mahak@nsipron:~/Desktop/lab 4/Q3$ g++ l4Q3.cpp -o l4q3
mahak@nsipron:~/Desktop/lab 4/Q3$ time ./l4q3
enter the number of elements of array
8
15 0 2 -3 1 5 3 -2
enter the value of n 5
length of longest subarray is 5
start index :1 end index :5

real    0m24.573s
user    0m0.001s
sys     0m0.005s
mahak@nsipron:~/Desktop/lab 4/Q3$
```

## CPU TIME:

real 0m24.573s  
user 0m0.001s  
sys 0m0.005s

