CSN 261

DATA STRUCTURES LAB

ASSIGNMENT 4

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B. TECH, CSE

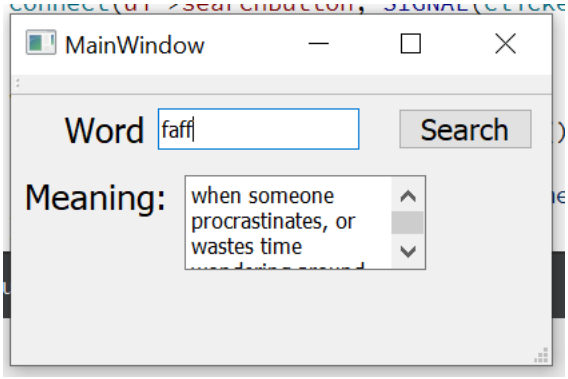
PROBLEM 1:

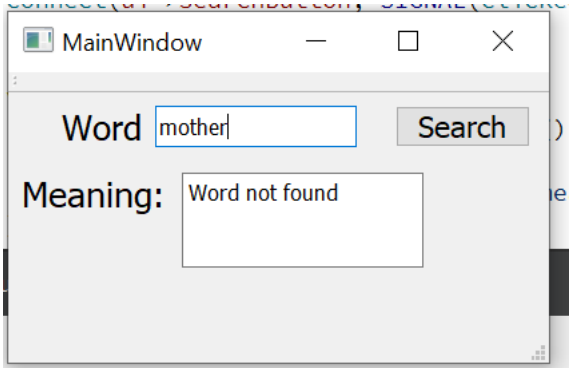
Create a dictionary using Trie data structure (without using STL) having words and their meanings. You need to read the words and their respective meanings from a CSV file (uploaded in Piazza, named as TrieInput.csv), where 1st column is for words and 2nd column shows its meaning. Given a word you have 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.

INPUT:

Faff, mother

OUTPUT:





ALGORITHMS AND DATA STRUCTURES:

- A Trie is implemented to store data with each node having an array of 26 children nodes
- A recursive function is used for insertion an searching the trie

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PROBLEM 2:

Implement N Queens problem to show all the possible combinations in N x 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 x N matrix and remaining cells are represented by 0. A sample output for N=4 is shown below.

INPUT:

```
Enter the value of n
4
```

OUTPUT:

```
0 0 1 0
1 0 0 0
0 0 0 1
0 1 0 0

0 1 0 0
0 0 0 1
1 0 0 0
0 0 1 0

There are 2 ways to set the board
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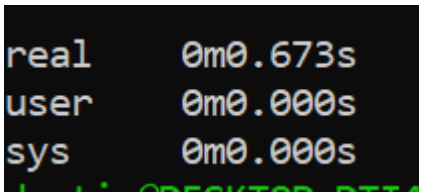
ALGORITHMS AND DATA STRUCTURES:

- An array is used to implement the board.
- A backtracing algorithm is used to set up the queens on the board

TIME:



PROBLEM 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.

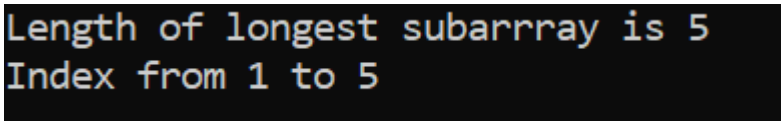
INPUT:

N = 8

15 0 2 -3 1 5 3 -2

n = 5

OUTPUT:



ALGORITHMS AND DATA STRUCTURES:

- A hash map is implemented to store key value pairs
- A pre-sum array is used for the key and the index is the value of hash map

TIME: