Lab Assignment - 4

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Problem Statement -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.

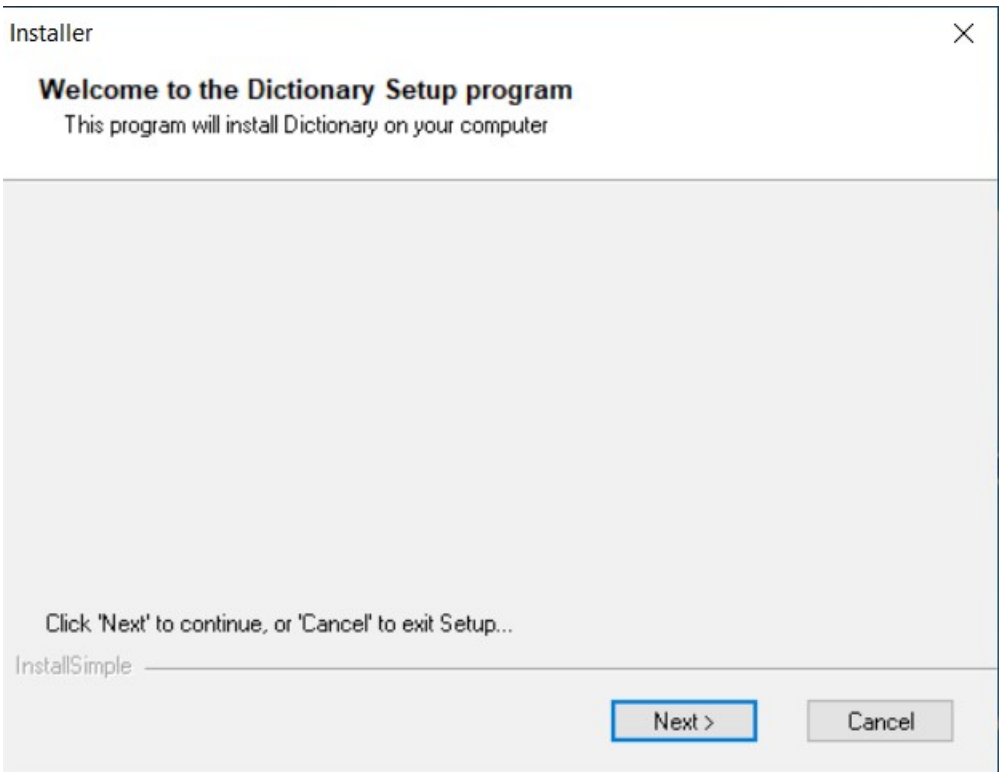
Also, create an installer of your program for Windows OS. You can use the software like InstallSimple or InstallShield or WIX or NSIS to do so.

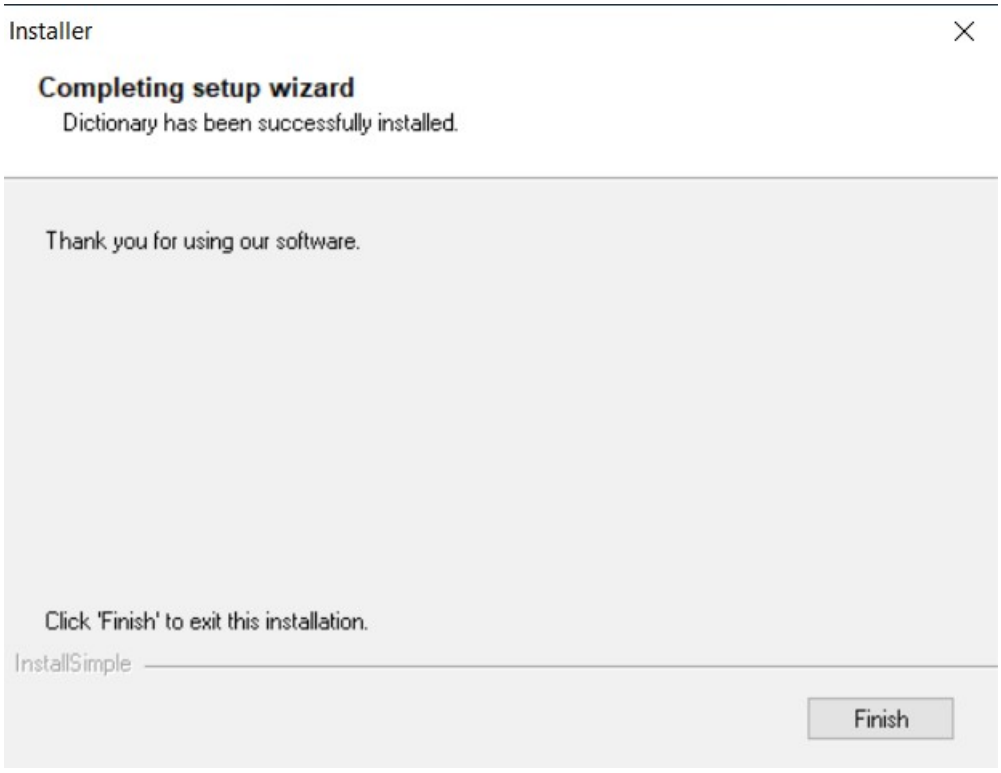
DATA STRUCTURES USED:

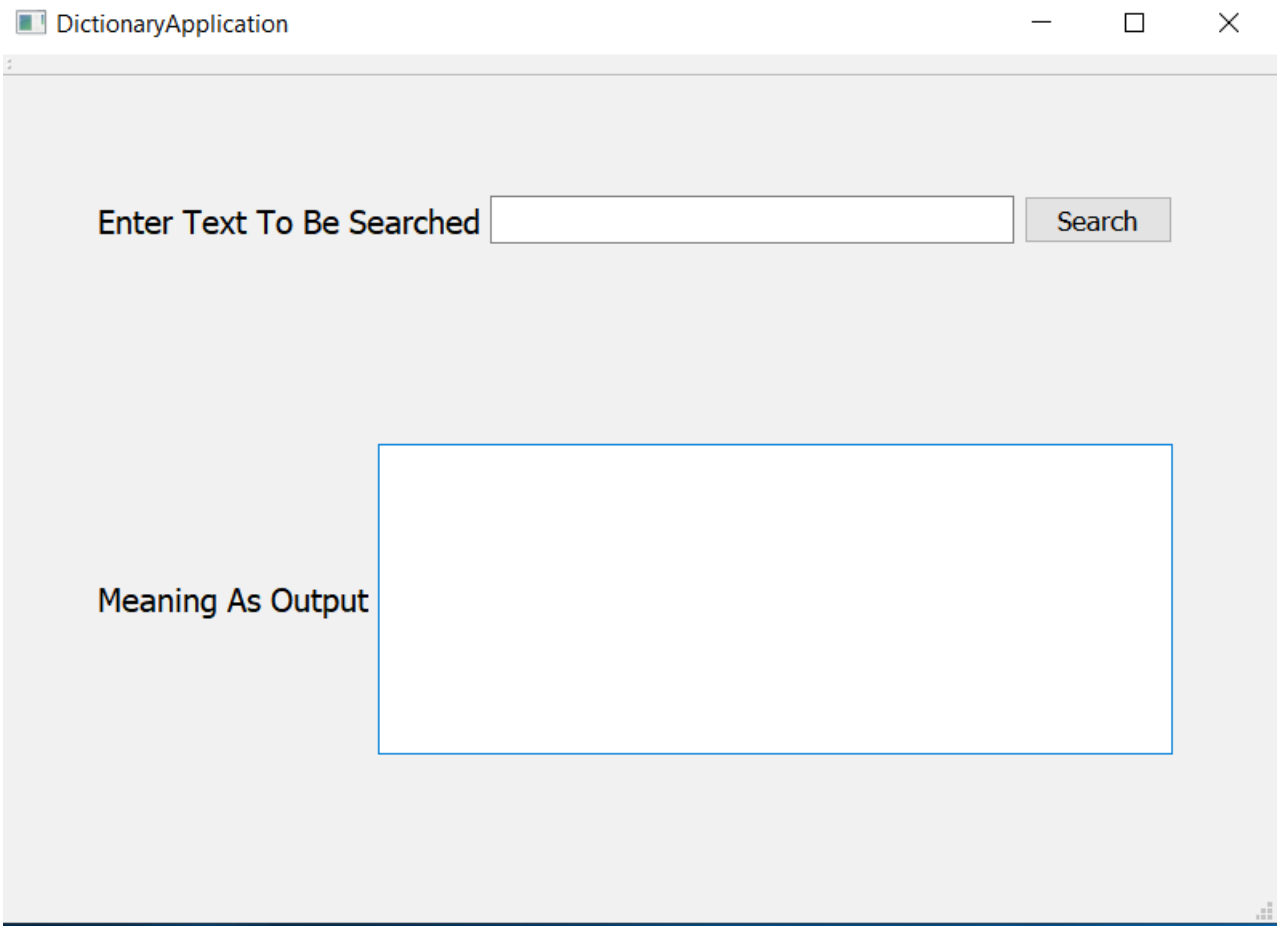
- M-way Trees
- Trie
- Arrays

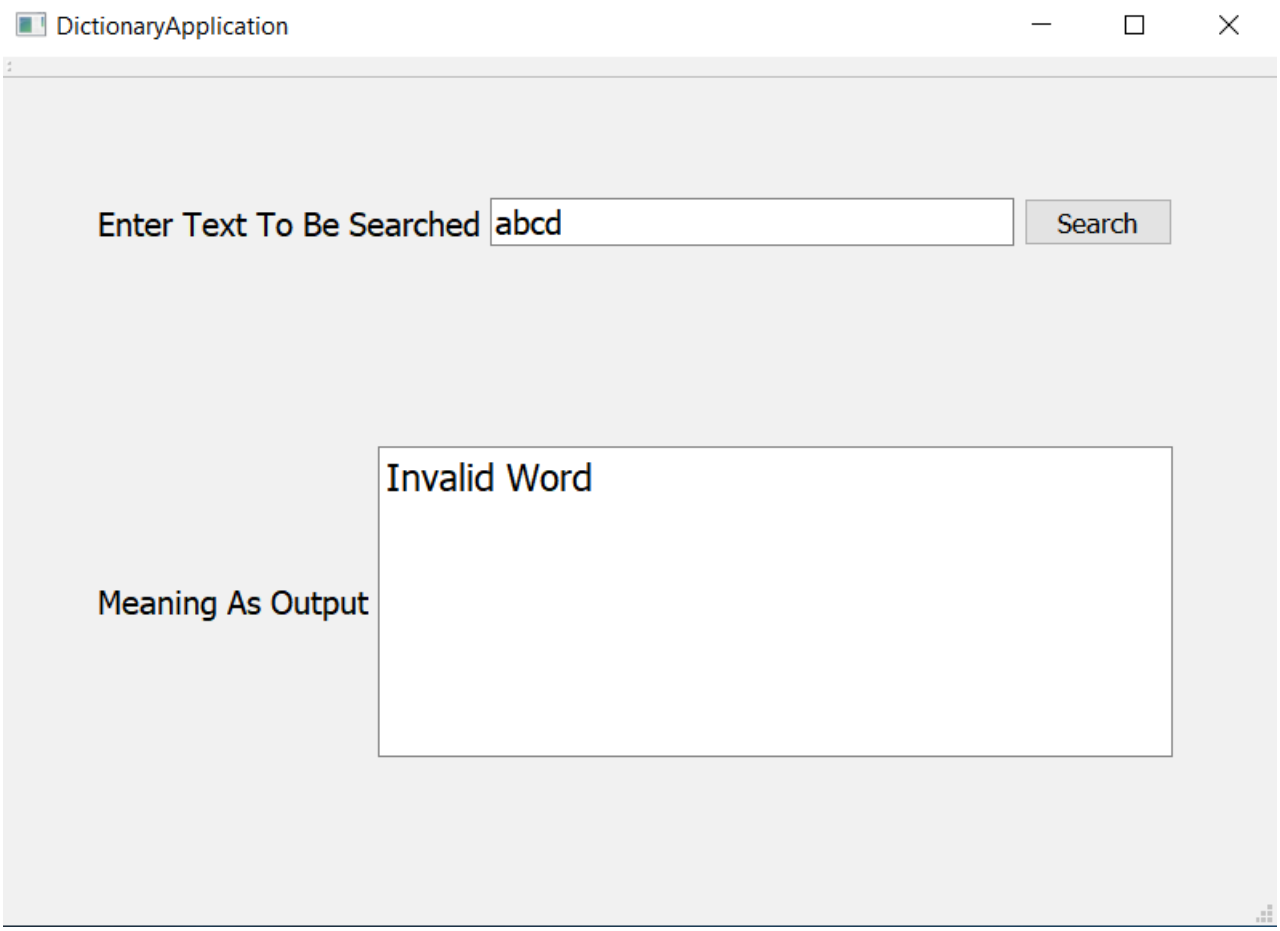
ALGORITHMS USED:

- M-way search and insert algorithm for inserting in the dictionary in O(log k) steps , where k is the length of the key
- Read csv file using getline with ‘,’ and ‘\n’ as delimiters
- Created GUI for the program using Qt libraries


Installer
Welcome to the Dictionary Setup program
This program will install Dictionary on your computer
Click 'Next' to continue, or 'Cancel' to exit Setup...
InstallSimple
Next >
Cancel


Installer
Completing setup wizard
Dictionary has been successfully installed.
Thank you for using our software.
Click 'Finish' to exit this installation.
InstallSimple
Finish


DictionaryApplication
Enter Text To Be Searched
Search
Meaning As Output


DictionaryApplication
Enter Text To Be Searched
abcd
Search
Meaning As Output
Invalid Word


DictionaryApplication
Enter Text To Be Searched
unreal
Search
Meaning As Output
Something that is unbelievably cool or brilliant

Problem Statement -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.

DATA STRUCTURES USED:

- 2-D arrays

ALGORITHMS USED:

- Use of recursive algorithm to find the solution
- Use of Backtracking algorithm
- Use of linear algorithm to check the safety of a position

```
$ ./prob2
Enter N
3
No Such Combination can be found for given N
```

```
$ ./prob2
Enter N
4

Combination 1:
0 0 1 0
1 0 0 0
0 0 0 1
0 1 0 0


Combination 2:
0 1 0 0
0 0 0 1
1 0 0 0
0 0 1 0

Total number of combinations: 2
```

```
$ ./prob2
Enter N
5

Combination 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


Combination 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


Combination 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


Combination 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
```

```
Combination 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


Combination 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


Combination 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
```

```


Combination 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


Combination 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


Combination 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

Total number of combinations: 10
```

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".

DATA STRUCTURES USED:

- 1-D arrays
- Hash Map(using STL)

ALGORITHMS USED:

- Using hashmap to store the sum to a certain index from start.
- Checking for a certain value in hashmap to find optimum subarray

```
$ ./prob3
Enter N
8
15 0 2 -3 1 5 3 -2
Enter n
5
Length of longest subarray is 5
Index from 1 to 5.
```

```
$ ./prob3
Enter N
6
10 5 2 7 1 9
Enter n
15
Length of longest subarray is 4
Index from 1 to 4.
```