
Programming Challenge: Word Transformation

A word puzzle found in many newspapers and magazines is the word transformation. By taking a starting word and successively substituting a single letter to make a new word, one can build a sequence of words which changes the original word to a given end word. For instance, the word "spice" can be transformed in four steps to the word "stock" according to the following sequence:
spice ==> slice ==> slick ==> stick ==> stock.
Each successive word differs from the previous word in only a single character position while the word length remains the same.

Given a list of words(dictionary) from which to make transformations, plus a starting and ending word, your goal is to write a program to determine the sequence of words in the shortest possible transformation.

This assignment is similar to the 'Open book' exam during your college days. You are allowed to search the web and your notes. Please provide the reference if you are taking an approach specified at some place. Also please explain the pros, cons and complexities of the algorithm.
Though we are ok with you searching the web, please don't copy code. We want to judge you on your problem solving and programming capabilities.

Input and Output

The program should be written in C/C++. Please do not use STL and boost. Program should be invoked with a command line of the following form:

```
> WordTransformer DICTIONARYFILE STARTWORD ENDWORD
```

and it should produce as output only the series of words in the transformation, one per line, written to standard out. The program should then exit.

We have supplied two sample dictionary files, 850words.txt and 17words.txt.

Sample Input/Output

```
> WordTransformer 17words.txt spice stock
spice
slice
slick
stick
stock

> WordTransformer 17words.txt maple may
No transformation found.
```

Evaluation

We will be looking not only for correctness but also for design and efficiency considerations. Please write code which employs nice modular decomposition and is easily maintainable.

We use g++ compiler. Please specify if you are using any other compiler. Also Please include any compiling instructions with your answer if they are not obvious.

There is no time limit to complete the assignment. However, please note that the time taken for the assignment is also used as a criteria for evaluation. When you have completed the challenge, please email us your response as an attached zip of source files.

Optional Challenges

These are optional parts of the challenge, if you have enough time.

1. Suppose that we allow other operators other than substitution, such as insertion and deletion of characters. How do you change your code? Build a command-line switch to turn this feature on.
2. Suppose the different operators have different weights? Suppose substitution is worth 2, but insertion/deletion is worth 1. Can you find the shortest path?