2025 CPE 555 Team Project - Program Requirements

Team Project Program Requirements

Implement a functional program according to the following requirements WITHOUT using a prebuilt crossword generator library.

(1) The program must open a file specified as a command line argument

(2) The program must read a list of words from the specified file where each line of the input file contains the length of the word, a variable amount of whitespace (spaces and/or tabs), and the word

Example input file contents:

```
3  cat
5 horse
3      dog
4 GOAT
```

(3) Convert any uppercase letters to lowercase characters prior to placing the words into a crossword puzzle.

(4) The program must form from the set of words a crossword puzzle where ANY adjacent letters must be a part of the same word or part of an intersection between two or more words that appear in the word list.

If the words share no common letters, then print out an error message.

A valid crossword puzzle contains every word from the specified input file.

(5) When placing words in the puzzle, the program must not overwrite a previously placed word.

(6) The program must compute a compactness score for the puzzle as the width multiplied by the height of the smallest rectangle that can circumscribe the puzzle (i.e. minimum number of rows * minimum number of columns)

(7) The program must write to std out the crossword puzzle and the compactness score

(8) The tasks outlined above should be encapsulated within supporting functions, each of which is invoked by your main( ) function or another support function.

NOTE:

I am not requiring your synthesized code to generate an optimal solution for a given input file, just a valid solution that utilizes every word appearing in the specified input file.

Sample Word File Contents

```
5 essays
7 empathy
4 meet
4 mach
4 arty
4   emma
4  sear
4 sect
```

Sample Valid Solution (compactness score = 10 rows * 12 columns = 120)

Sample Valid Solution (compactness score = 10 rows * 12 columns = 120)

```
        s a
        e r
m       c t
e    empathy
essays
t    s
  emma
   a y
   c sear
   h
```

Sample Optimal Solution (compactness score = 7 rows * 6 columns = 42)

```
   e
   m
   p
essays
meet
mach
arty
```

Once your program implementation is functional, you will perform a sequence of analyses on your program.

Constraints

==> You are NOT allowed to use third party libraries to perform the assigned tasks! <==

==> You are NOT allowed to share code with other student teams in CPE 455/555 <==

==> I rely on Gitlab for evidence that you contributed your fair share of work so be sure to commit your own contributions <==

Disclaimer

The instructor reserves the right to amend this project description as needed.