

CS/SE 1337 – Homework 2 – Word Search

Dr. Doug DeGroot's C++ Class

Due: Sunday, February 28, 2021, by midnight

How to submit: Upload

1. your source code file (.cpp) and
2. a copy of your program's output in PDF or TXT format.

Your program must compile on either Codeblocks or MS Visual Studio 2015 (or later).

Include your name in the source code file, like so:

HW2-CS1337-John-Doe.cpp

Maximum Number of Points: 110 (The 10 extra points are for very clever, well-designed programs, with additional bells and whistles added; e.g., see points 10, 11, and 12 below for examples. Or think up your own, **If you add any, *be sure* to point this out in your comments at the top of your source file if you want to earn extra credit.**)

Objective:

Write a program that searches for specified words hidden within a matrix of letters.

1. Ask the user for the name and location of a file to read; this file will contain the Word Search puzzle. Read the file. The file may contain comment lines (they will start with a # symbol), data lines, and blank lines. The data in the file will first specify the dimensions of the matrix (e.g., 20 30). These two numbers specify the number of rows in the matrix and then the number of columns in the matrix.
2. Following these two numbers, there will be a number of rows of letters. These letters should be read into your matrix (a 2D array of chars) row by row, column by column.
3. Following the rows of letters, there will be some number of words/phrases that might or might not be hidden within the matrix. You are to search for these words/phrases and report 1) whether or not a given word/phrase is found within the matrix, and if so, 2) the starting coordinates of the word/phrase and the direction in which you found it, e.g., N, NW, SE, etc.
4. Search for each word (name, title, phrase, etc.) one at a time (i.e., read a word/phrase, search for it, report the results, and then read the next word/phrase from the file). Continue until all words/phrases have been searched for and reported.
5. You might want to start by creating your own file of data. You can start with a small matrix size (say 5x5) and your own hidden words. When you're ready, start testing one or more of the files I'm going to upload to eLearning for your use. I suggest starting with the Comedy Movies puzzle called **ComedyMovies-partial.txt**. Once you can process this puzzle correctly, you can try other hidden-word puzzles.
6. Provide for fault-tolerance when trying to open the input file. If it doesn't exist or can't be found, tell the user. Also, tell the user the name of the file that can't be found/opened. Then give the user a chance to enter another file name and try to open that file. Continue until you either find and open the file or until the user types something like "quit" or "exit." If you feel comfortable doing so, use the *perror* function to report the system's error message; then report your own error messages. Make sure your program can handle bad file names and/or non-existent files.
7. Don't report success or failure for each word as you go. Instead, report only words that are found,

their locations, and their directions; but for words that are not found, shove them into a *vector of strings* and wait until you've searched for all words before reporting the words that weren't found and then finally quitting. Thus, you will have all successfully found words appear first -- along with their coordinates and their direction -- and then the words that weren't found will be listed at the end.

8. Report the indices where movies are found in human-speak, not C/C++ speak. (See the example output at the end of this file. Don't report coordinates using 0-based index numbers.)
9. Assume that words/phrases can appear more than once in the matrix; so you may find and report on a given word more than once.
10. Don't wrap around the edges of the matrix. Instead, if you hit an edge while searching, assume the word isn't in the matrix. **To be extra clever, you could also check for length issues before searching in a given direction if you want to**, or you can start traversing a direction and check for out-of-bounds errors as you go; either way works fine, but the first way is a bit cleverer. If you use that method, ***please, please make a note of this in your header comments*** in the source file.
11. You could add a Boolean variable that controls whether you search for multiple or just single occurrences within the matrix. This is optional, but please consider adding it. Set it to multiple for your final run and for the output you submit to eLearning.
12. **For extra fun**, consider adding an interactive capability to your program that asks the user to enter additional words to search for in the matrix once you've searched for all words in the data file. Search for a few and report the results. (Your search string doesn't have to be a movie; it can be pure gibberish. It just needs to be some string that your program can search for, preferably strings that you can spot visually in the input matrix.)

Annotations for the code:

1. The main function can be at either the beginning or the end of the program. I don't care which.
2. Add comments at the top of your program file to include your name, the name of the program, and any relevant notes on how your design works when executed.
3. Add a change log in your comments as you go that lists the major changes you make to your logic and when -- nothing too terribly detailed, but a list of breadcrumbs that will remind you and others of what you've done as your program becomes more sophisticated and/or nearly complete.
4. Point out (in the comments at the top of your program) any special features or techniques you added using a comment saying something like ***“// Special Features:”***
5. Comment your code effectively, as we discussed in class. Use descriptive variable names everywhere so that the code becomes as self-documenting as possible. Use additional commentary only to improve readability and comprehensibility by other people. No fluff!
6. You absolutely **MUST** use consistent indentation and coding styles throughout the program. Failure to do so will result in a loss of 5 points.
7. If the program does not work at all, or works incorrectly, at least 10 points will be deducted. So you must find every word that is in the matrix and must report all words that are NOT in the matrix. The starting coordinates and direction must also be correct.
8. Please meet the deadline.
- 9.

Notes:

We will need to discuss the `peek()` function in class and the STL Vector container. Don't worry; they're fun,

Example output:

Note: I am uploading two data files for you to try.

ComedyMovies-partial.txt
and
ComedyMoviles-FINAL.txt

To Submit:

Start with the partial movie file, as it has some aspects to it that will help you debug your program. Once you have your program working correctly, use the FINAL version for submitting your homework.

Copy the output that your program writes and include it in your homework submission as a separate file. The output should look something like the following:

```
Oops, can't open the specified input file: No such file or directory
The file name used was: I_Dont_Exist.txt
Enter another file name to use (or quit): comedymovies-final.txt
--- The new file name is: comedymovies-final.txt
```

```
Nbr Rows: 18;  Nbr Cols: 18
```

```
SCFRBOBROBERTSLOKL
TNLESREKCILSYTICRL
AOEPOBLRUAECHBUDEA
RITOTHEYOMTOLBATPH
LTCMWRGIFMLBEEIBEE
LCHAIBAONILLAURGEI
AEKNLULDDGCISLHKLN
MLCTILLAIN TAGOLHSN
AEUDALYCUNZHSYLOSA
CRRURDBHSAGTEOPLUS
LOTCLULHLLBPCRAPLA
UMSKIROPOULALPEAAK
EHNSAHNNSTLASACCEH
LSOORADTEHSHBKCROA
EUOUFMEMECOHETHEER
SRMPARTRBTAROSAASV
SLEISTOOTHERUTLESE
NATTAHNAMEYSLSSMY
```

```
ALL OF ME found at 9, 5: (direction = NE)
ANNIE HALL found at 9, 18: (direction = N)
BABE found at 3, 14: (direction = SE)
BEING THERE found at 3, 6: (direction = SE)
BIG found at 4, 14: (direction = SE)
BOB ROBERTS found at 1, 5: (direction = E)
.
.
.
UNCLE BUCK found at 9, 9: (direction = NE)
YES MAN found at 18, 12: (direction = W)
```

RUR found at 10, 3: (direction = E)
RUR found at 10, 5: (direction = W)

Couldn't find these movies:
Zzzz

[and maybe others!]