

CS218- Data Structures

Programming Assignment No. 1

Fall 2019

Instruction

This is the first programming assignment for the course CS218- Data Structures in the offering Fall 2019. The assignment comprises of three problems. It is suggested that you should start working on the assignment at your earliest. This seems a good amount of intellectual work required to complete it. Each question should be solved in one program file names as per suggested scheme. Your student number dash assignment number and problem number, e.g K182122-A1P1.cpp

Your program should take input from the input file as per the direction of the input format. The output should be produced in an output file as per the required format. These two files should be read from the current directly where your source code is residing.

The assignment is for individual and there should not be any case of cheating. You can have discussion about any problem and approach among yourself but do not share code and instruction for any problem.

Due Date: September 30, 2019 21:00PM

Problem 1: Word Puzzle

Given an array of dimension n,m of alphabets of English along with a dictionary of words to look into the puzzled. You need to write a program in object oriented programming such that the puzzle object has a function “solve” that return an array of positions(Point2D) if a dictionary word is found at the starting (x,y) location in either direction. Only up, down, left and right movement for searching is allowed. Your puzzle class read an instance of a puzzle from the input file. The solution should also be written in file.

Input file format: The first line of the input file for this problem contains size of the puzzle n and m two integers both single digit. The next line contains the first row of n possible row with m alphabets all lower case. After the puzzle the next line give how many word you need to search maximum 10. From the next line the words are given per line. A sample input is given below:

Output file format: The output file contains starting position (x,y) for each word given in order, if the word is not present in the puzzle just place n on the corresponding line.

Input File	Output File
5 6	01
gakiwi	31
rpopla	n
apapba	02
plemon	n
eeepbp	00
6	
apple	
lemon	
banana	
kiwi	
papaya	
grape	

Problem 2: Counting Paths in Maze

Consider a 2-dimensional array as maze containing 0 and 1, zero means a path and 1 means blocked path. You need to count all possible paths someone can take in maze to reach the end. The starting location is (0,0) and end location is (n,m). You can only move right and down for reaching the destination.

Input file format: The first line of the input file contains two integers n and m both can be $0 < n, m < 10$, The maze is available from next line containing first row of m cells. Remember each cell can contain 0 or 1.

Output file format: The first line of the output file contains possible paths p as integer. If there is no path you should write “No Path” in the file.

Input File	Output File
5 6 001000 000000 111110 000010 000010	2

Problem 3: Unique characters in a string

You are given an array of string. You need to retain only the first appearance of each character in the string and for all other repeating characters' place “-” in the string. For example, given the string “i love to play cricket and I hate hockey” is converted to “i love t- p-ay cr—k-- -nd – h--- - -----“

Input file format: The file contains single line of text comprises of English character in lower case. The length of the string is possibly 80-characters long.

Output file format: The output file contains the same string after mutating the string as per requirements of the problem.

Input File	Output File
i love to play cricket and I hate hockey	i love t- p-ay cr—k-- -nd – h--- -----