

# C Warmup

Data and File Structures Laboratory

<http://www.isical.ac.in/~dfslab/2018/index.html>

# Problems Day 1 – I

- 1 Write a program that reads text typed at the terminal, and counts
  - (a) the number of occurrences of vowels in the input text;
  - (b) the number of words in the input text. Assume that any contiguous sequence of letters and / or digits forms one word.
- 2 Let  $s$  and  $t$  be strings containing at most 100 characters. Implement the following functions in C:
  - (a) `strlen(s)`: returns the length of  $s$ , i.e., the number of characters present in  $s$ ;
  - (b) `strcmp(s, t)`: returns 1 if  $s$  and  $t$  are identical, 0 otherwise;
  - (c) `diffByOne(s, t)`: returns 1 if  $s$  and  $t$  are of the same length, and differ in exactly one position, 0 otherwise.

## 3 Write a function `uniquify` that

- takes two arguments: an array `a` containing at most 100 non-negative integers, and `n`, the number of integers contained in the array, and
- stores in `a` a list of the *distinct* integers contained in `a` if the integers in `a` are sorted in increasing order, and returns the number of distinct integers in `a`;
- returns -1 otherwise.

- 4 Suppose that we choose to represent sets by arrays of non-negative integers, containing at most 100 elements each. Let  $A$  and  $B$  be 2 such sets of integers. Implement the following set operations:
- (a)  $A \cup B$ ;
  - (b)  $A \cap B$ ;
  - (c)  $A \subseteq B$  (returns 1 if  $A$  is a subset of  $B$ , 0 otherwise);
  - (d) prints the power set of  $A$  on the screen.

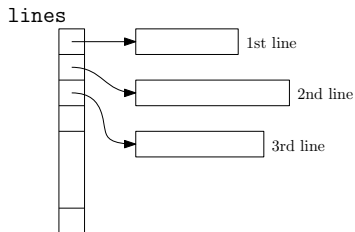
# Problems Day 1 – IV

- 5 Define a structure to represent complex numbers. Using this definition, write a function that takes as input 3 real numbers,  $a$ ,  $b$ , and  $c$ , and returns the **two** roots of the quadratic equation  $ax^2 + bx + c = 0$ .
- 6 Write a program to count the number of occurrences of each keyword in a C program.  
THIS IS WORKED OUT IN SECTION 6.3 OF K&R. PLEASE TRY TO SOLVE THIS ON YOUR OWN AND COMPARE AGAINST THE SOLUTION IN THE TEXTBOOK.

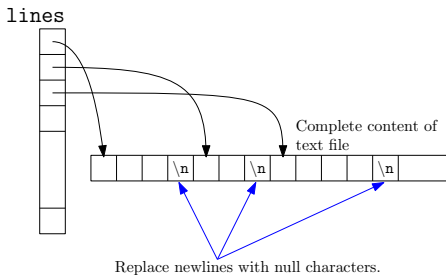
# Problems Day 1 – V

- 7 Write a program to print the lines of a text file in alphabetically sorted order.

## Naive Method



## Better Method



HINT: `$ man 2 stat`