**Practice Problems on Structure, Union, File, CL-arg**

1. Given a short integer, print the low order and high order bytes of it separately. You cannot use bitwise operation, but try to take advantage of the idea of union. [Easy]
2. Write a structure to support 3d coordinate system. Write a function to compare the structures and sort them. The sorting will work like this: the one with lower x comes first, then the one with lower y, lastly the one with lower z. [Medium-Hard]
3. Given some numbers write a function to return their mean, median and mode. You cannot use pointers for this task. [Medium]
4. Suppose you are given the name, merit position and department of some students as input. You have to print the information of the students of a particular dept. [Medium]
5. Linked list is a linear data structure that supports insertion and deletion of values very fast. A linked list can be created using structures where the structure can contain a value (say int) and a pointer of the same type as itself. This pointer can be allocated memory dynamically for inserting a value at the end. Each of these structures in the data structure are called nodes of the linked list. The pointer in the last node is always NULL in simple linked lists.

While inserting a new value at position i, a new instance of the structure needs to be created, the pointer in it should point to the i+1-th entry and the previous i-th entry's pointer should point to it. While deleting a node a position i, in the same way, i-1-th entry's pointer should point to i+1-th entry and memory for i-th node should be freed. Now implement this data structure with insertion and deletion capabilities. [Hard]

1. You have solved a character to long long encryption-decryption problem with pointers. Now you need to do the same task with union.

Suppose you have a text message stored in a character array. If you consider 8 consecutive bytes of that array together you can get a long long integer value based on the ASCII value of the characters and their positions. So if your message consists of 16 characters, you can encrypt them in two long long integers and send it as the encrypted text for passing hidden information.

Take the length of your message, *n* as input followed by your message with *n* characters. You can safely assume that *n* will always be given as a multiple of 8. [Medium]

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| **Input** | **Output** |
| 16  Hello Programmer | 8237119381393139016 8243115009525311343 |
| 24  I hate this problem! :'( | 8367799658179207241 7093013764038158696 2893345195283015020 |

1. Count the number of vowels in a file. [Easy]
2. Given two files, delete all the appearances of the words mentioned in one of them from the other. [Medium-Hard]
3. Suppose there are *n* files in a directory. You want to merge them all. But you cannot do this with a single pass. Rather you take two files, merge them and save the merged file deleting the already processed files.

The process of merging goes like this: if you have two files f1, f2 and you are creating their merged file f3, then f3 will be constructed by taking words from f1 and f2 alternatively (when the smaller file is finished, the rest of the words of the other file can be simply put as they are). This process is repeated until there is only a single file left.  
  
Merging files comes with a cost. Each merging incurs a cost which equals the sum of sizes of the files to be merged. So, to do the task in lowest possible cost, you always have to merge the two smallest files at hand. Now solve this problem and print the total cost incurred in the merging process. [Hard]

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| --- | --- |
| File 1: Hello World File 2: I am xyz | I Hello am World xyz |
| File 1: Hello File 2: I am abcxyz File 3: Hi | Step 1: Hi Hello Step 2: Hi I Hello am abcxyz |

1. Write a C program that receives a username and a password as command line arguments, checks if they match in a text file (where all usernames and corresponding pw are stored) and greets the user with a welcome message upon successful login. [Easy-Medium]