

CS 150 Lab 12

Arrays and Files

Date: Tuesday, November 11, 2008

The purpose of today's lab is for you to get some hands-on experience with reading data from files, and placing them into arrays.

- **Be sure to answer the given questions before you start**
- Be sure your output looks exactly like the specified output
- Be sure to submit your solution to CS150-01 Lab when you are done (By Friday, Nov 14, 5pm)
- Show the instructor or TA your solution before submitting it

Lab 10.1

For this lab, you will need to create a new Visual Studio project that will contain your source code. Name this project "12a-CharacterCounterXXXXXXXX", replacing the XXXXXXXX with your PUNetID.

Write a program that will keep track of the number of times each character appears in a file. Your program should output the following to the screen, and to a file called "results.txt":

1. The ASCII value for each character.
2. The character itself.
3. The number of times each character appears in the file.
4. A histogram of the number of times each character appears in the file.

The easiest way to tackle this problem is to keep an integer array of counters that have all been initialized to zero. Since there are 256 possible ASCII characters, then your array should have 256 cells.

You should then have a loop to read in the characters from the file, one at a time, and increment the appropriate cell in the array. For example, if you read in the character 'a', then you should increment the value in the cell 97 by one.

Now you should have an array of 256 integers, where each integer represents the number of times that a character appears. The next step is to loop through this array and output the values the four values listed above.

We want to ignore any non-visible character (space, tab, newline) and not count them.

For example, if the input file contains:

the rain in spain falls mainly on the plain

Your program should output the following both to the screen and to a file:

```
*****
*      Character Counter      *
*****

  ASCII  CHARACTER  FREQUENCY  HISTOGRAM
    97      a         5      *****
   101      e         2       **
   102      f         1        *
   104      h         2       **
   105      i         5      *****
   108      l         4      ****
   109      m         1        *
   110      n         6      ****
   111      o         1        *
   112      p         2       **
   114      r         1        *
   115      s         2       **
   116      t         2       **
   121      y         1        *
```

What data will you need to track in your program? What data types will you need to use?

What data will you need to store in an array?

What elements of the output need to be produced by a loop? What data will control when these loops will terminate?

Challenge

For this lab, you are to modify the above program so that it outputs a vertical histogram as well as the regular histogram above.

```
*****
*           Character Counter           *
*****

ASCII    CHARACTER    FREQUENCY    HISTOGRAM
   97         a             5     *****
  101         e             2       **
  102         f             1        *
  104         h             2       **
  105         i             5     *****
  108         l             4     ****
  109         m             1        *
  110         n             6     ****
  111         o             1        *
  112         p             2       **
  114         r             1        *
  115         s             2       **
  116         t             2       **
  121         y             1        *

*
*           *           *
*           * *         *
*           * *         *
* *       * * *         * *
* * * * * * * * * * *

-----
a e f h i l m n o p .....
```