Due Date:

You must demonstrate the solution to this lab exercise to the instructor by **Wednesday, October 16, 2019**, in order to receive full credit for this work.

Programming Exercise

Be sure that you read and understand this entire document **before** you begin coding.

Write a program that asks the user to specify the name of an **input/output** file (using an **fstream** object) and an **output-only** file (using an **ofstream** object). The program must read the **fstream** file, and store the contents of the file in an array of '**FileText**' structures, described below. Each line of input text must be placed in one element of the array of structures. (The **size** of the array must be 1000 elements. The program must keep track of *how many* elements of the array actually contain meaningful data.) *After* reading the complete file into this array of structures, output the portion of the array of structures that contains meaningful data to the output-only file, with each line formatted as described below.

The program must declare a **struct** called '**FileText**', and define an array of these structures.   The declaration of '**FileText**' is shown below:

```
struct FileText
{
    int lineNumber;
    long long fileOffset; // (use long long to prevent compiler warning)
    int length;
    string contents;
};
```

After reading the complete **fstream** file into the array of structs, the program should write the contents of the array to the output-only (**ofstream**) file. Each line of text in the output file must contain the field values from one **FileText** structure, in the format specified below:

> lineNumber **<** fileOffset**,** length **>:** contents

Notice that each line of the original text is preceded by:

- The line number.
- The file offset (bytes from the beginning of the file).
- Length of the original text for that particular line.

How to Get the Current "File Offset" Value

At any time while the program is reading the file, there is a current offset value for reading the file. When the file is first opened, the offset is zero.   At any moment, the offset is the number of bytes (from the beginning of the file) where the **next** input operation will get its data. For this reason, it is important to save the file offset value <u>before</u> each call to **getline**. After the program returns from **getline**, the file offset will have moved

forward to the position of the following line of text in the file. We can obtain the current file offset (for reading the file) by calling the   *fstreamName*.**tellg()**   function.

Sample Input and Output Files

There are several sample input files on Moodle, in the ZIP file associated with this lab exercise. Some of these are shown in the following pages, each with the corresponding output file.

Sample input file: **oneLine.txt**
abcdefghijklmnopqrstuvwxyz

Sample output file: **oneLine_LISTING.txt**
Format of each line: lineNumber **<** fileOffset, length **>:** contents
1<0,26>: abcdefghijklmnopqrstuvwxyz

Sample input file: **BHCC_Address.txt**
Bunker Hill Community College 250 New Rutherford Ave. Boston, MA 02129

Sample output file: **BHCC_Address_LISTING.txt**
Format of each line: lineNumber **<** fileOffset, length **>:** contents
1<0,29>: Bunker Hill Community College 2<31,23>: 250 New Rutherford Ave. 3<56,16>: Boston, MA 02129

Sample input file: **Preamble.txt**
We the People of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defense, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America.

Sample output file: **Preamble_LISTING.txt**
Format of each line: lineNumber **<** fileOffset, length **>:** contents
1<0,75>: We the People of the United States, in Order to form a more perfect Union, 2<77,80>: establish Justice, insure domestic Tranquility, provide for the common defense, 3<159,78>: promote the general Welfare, and secure the Blessings of Liberty to ourselves 4<239,65>: and our Posterity, do ordain and establish this Constitution for 5<306,29>: the United States of America.

Sample input file: **Gettysburg.txt**

```
Four score and seven years ago our fathers brought forth
on this continent a new nation, conceived in liberty,
and dedicated to the proposition that all men are created equal.
Now we are engaged in a great civil war, testing whether that nation,
or any nation so conceived and so dedicated, can long endure.
We are met on a great battle-field of that war.
We have come to dedicate a portion of that field, as a final resting place
for those who here gave their lives that that nation might live.
It is altogether fitting and proper that we should do this.
But, in a larger sense, we can not dedicate, we can not consecrate,
we can not hallow this ground.  The brave men, living and dead,
who struggled here, have consecrated it,
far above our poor power to add or detract.
The world will little note, nor long remember what we say here,
but it can never forget what they did here.
It is for us the living, rather, to be dedicated here to the unfinished work
which they who fought here have thus far so nobly advanced.
It is rather for us to be here dedicated to the great task remaining before us
--that from these honored dead we take increased devotion to that cause
  for which they gave the last full measure of devotion
--that we here highly resolve that these dead shall not have died in vain
--that this nation, under God, shall have a new birth of freedom
--and that government of the people, by the people, for the people,
  shall not perish from the earth.
Abraham Lincoln
```

Sample output file: **Gettysburg_LISTING.txt**

Format of each line: lineNumber **<**   fileOffset, length **>:** contents

```
1<0,57>: Four score and seven years ago our fathers brought forth
2<59,54>: on this continent a new nation, conceived in liberty,
3<115,66>: and dedicated to the proposition that all men are created equal.
4<183,70>: Now we are engaged in a great civil war, testing whether that nation,
5<255,63>: or any nation so conceived and so dedicated, can long endure.
6<320,48>: We are met on a great battle-field of that war.
7<370,75>: We have come to dedicate a portion of that field, as a final resting place
8<447,66>: for those who here gave their lives that that nation might live.
9<515,61>: It is altogether fitting and proper that we should do this.
10<578,68>: But, in a larger sense, we can not dedicate, we can not consecrate,
11<648,64>: we can not hallow this ground.  The brave men, living and dead,
12<714,41>: who struggled here, have consecrated it,
13<757,45>: far above our poor power to add or detract.
14<804,64>: The world will little note, nor long remember what we say here,
15<870,45>: but it can never forget what they did here.
16<917,77>: It is for us the living, rather, to be dedicated here to the unfinished work
17<996,61>: which they who fought here have thus far so nobly advanced.
18<1059,78>: It is rather for us to be here dedicated to the great task remaining before us
19<1139,72>: --that from these honored dead we take increased devotion to that cause
20<1213,55>:   for which they gave the last full measure of devotion
21<1270,73>: --that we here highly resolve that these dead shall not have died in vain
22<1345,64>: --that this nation, under God, shall have a new birth of freedom
23<1411,68>: --and that government of the people, by the people, for the people,
24<1481,34>:   shall not perish from the earth.
25<1517,15>: Abraham Lincoln
```