CSCI-311 Assignment 3

Overview:

1. Command line arguments.
2. Read from a file and write to a file.
3. How to test a program that has *.*out* and *.*cmd* files.
4. How to measure time in seconds inside a C++ program.
5. ASCII character representation and how to convert characters to lower case in constant time.

To get credit for this assignment, you need to write four functions:

1. Function ***readFromFile*** will take as a parameter an empty string S by reference, and a string, name of a file. This function will open the given file, and will read all the lines from the file and concatenate the lines to S. At the end of the function, S will be the concatenation of all lines from the given file.
2. Function ***convertToLower*** will take a character *ch* as a parameter, and will return the character that is lower case of *ch*. This function must run in constant time (just a few basic operations; do not use STL functions to do this job).
3. Function ***lessThan*** will take as parameters a constant string passed by reference *S*, and two integers, *first* and *second*, the starting indices of two suffixes in *S*. This function will compare the two suffixes of S starting at their starting positions and to the end of S one character at a time (before comparing a character, convert it to lower case). The function will return true if the suffix starting at *first* is less than the suffix starting at position *second.*
4. Function ***partition*** that takes as parameters (1) string ***S*** of size *n*, passed constant by reference (2) vector ***indices*** of integers of size *n*, where each integer is the starting position of a suffix in S; *indices* are passed by reference (3) integers ***low*** and ***high,*** the start and the end indices of a given range; and (4) an integer ***pivotIndex***, which is an arbitrary index of the vector *indices*.

    - ✓ First, this function swaps *indices*[*pivotIndex*] and *indices*[*high*], where *high* is the last index in the range.
    - ✓ Then, this function will partition suffix indices (use code of Partition provided in lecture notes as an example) so that the first half contains positions of suffixes that are less than suffix *pivot* and the second contains indices of suffixes that are greater than suffix *pivot.* This function will call the functions *lessThan* and *convertToLower* to accomplish this task.

Inside your main(int argc, char* argv[])

1. Call *readFromFile.*
2. If argc is equal to 2 (*e.g.*, command line is: ***./main text1.txt***), then print out S using *cout* and *endl* at the end.
3. If argc is 4 (*e.g.*, command line is: ***./main text1.txt 10 20***), then print out S using *cout* and *endl* at the end, and call function ***lessThan*** on indices 10 and 20 (from the command line arguments), if function returns true, print out "True."; otherwise, print out "False.", and *endl* at the end.
4. If argc is 3 (*e.g.,* command line is: ***./main text1.txt 30***), then call function *partition*, and print out the resulting *indices*, with a space after each index, and *endl* at the end.
5. If argc is not 2, 3 or 4, return -1, and do nothing.

To test your program, use test files inside tests directory inside Lab3 (untar Lab3.tar: tar -xvf Lab3.tar). Your program will use command line arguments stored inside *.*cmd* files and input files inside Lab3.

Example of the content t01.cmd:

text1.txt 10 20

This means that you need to run your executable using this command:
./main *text1.txt* 10 20 > *t01.my*
This will use **text1.txt**, **10** and **20** as the command line arguments and will redirect the output from your program into *t01.my* file. To compare your output and the correct output, use: ***diff t01.my tests/t01.out***

Submission: submit main.cpp to Assignment3 to turnin.

Grading:

Function	Points	Test files
readFromFile	15	t00, t01, t02
convertToLower	10	t03, t04, t05
lessThan	25	t03, t04, t05
partition	50	t06, t07, t08, t09