Lab Assignment 8

Part A (7 pts):

You are to write a program that includes and tests a function you write called `substrcnt()`. The function `substrcnt()` is to be designed such that it returns the number of times a sub-string occurs in a string. As an example, assume that the string is “`the first cut is the deepest`” and the sub-string is “`the`”. Your function should return `2` since the sub-string occurs twice in the body of the string. Note the following assumptions:

- Both the main string and sub-string can be made up of multiple words (< 200 char long).
- Assume that the main string and sub-string are entered separately.
- Assume that the length of the sub-string is less than the length of the main string.
- In the comparison of the strings, case and white space matters. For example, given the string “`Lord of the Rings`” and sub-string “`the rings`”, your function should return `0` since there is a case difference between “`Rings`” and “`rings`”. Similarly, given the string “`Lord of the Rings`” and sub-string “`the    Rings`”, your function should return `0` since there is a white space difference between “`the Rings`” and “`the    Rings`”.
- To help you enter your string and sub-string, use the string input function `gets()` and output function `puts()` to read and write your strings.
- The prototype for `substrcnt()` **must** be: `int strstrcnt(const char *s1, const char *s2);` where `s1` points to the main string, `s2` points to the sub-string and the function returns an integer number of times `s2` occurs in `s1`.

HINT: Check out the string library functions `strlen()` and `strstr()`. The prototypes for these functions are (as declared for you already in `string.h`)

```
int strlen(const char *s);
char * strstr(const char *s1, const char *s2);
```

The `strstr()` function finds the first occurrence of the string `s2` in string `s1`, and returns a pointer to that sub-string or `NULL` if it is not found. THIS IS JUST A SUGGESTION; you are free to write your function `substrcnt()` any way you desire.

Procedure:

You must structure your code as described below.

1. Include the usual (detailed) comment block including program name, author, date, inputs, outputs and description.
2. To use the string functions, you will need to include the header file `<string.h>`.
3. Create a function of type `void` to explain the program to the user with the description sent to `stderr`.
4. Query the user and input both the string and sub-string in `main()` from `stdin`.
5. Call your function `substrcnt()` from `main()`. Pass the string and sub-string to this function and store the returned result in an appropriate variable.
6. Display your result to `stdout`. As an example, for input test string “`The Lord of the Rings`” and sub-string “`the Rings`”, the output must read:

```
   The sub-string
   the Rings
   occurs 1 time(s) in the string
   The Lord of the Rings
```

As another example, let the input string be "`Sam Samsonite`" and the sub-string be "`Sam`", the output must read:

```
The sub-string
   Sam
   occurs 2 time(s) in the string
   Sam Samsonite
```

7. You must use at least the supplied test string and sub-string pairs. You can have your program execute once and loop over the data set or you may run your program each time for each data set:

String	Sub-string	Count
"Now we are engaged in a great civil war, testing whether that nation or any nation so conceived and so dedicated can long endure."	"nation"	2
"Powers herein granted shall be vested in a Congress of the United States, been seven Years a Citizen of the United States, after the first Meeting of the Congress of the United States"	"United States"	3
"following the established principle that the head of the household has the primary responsibility for the welfare of the occupants"	"The"	0
"out and about in our dashing runabout, I had to tout about the trout we had at our cookout"	"out"	7
"quid pro quo, ipsum de facto, derelictum dominous de requiem,ad hoc, ad loc"	", "	3

Part B (3 points):

First complete the assignment as described above and save your code and test outputs. Now, modify your `substrcnt()` function such that it can determine if there was a match if case and white space differences were ignored. For example, if the input string is “`The Lord of the Rings`” and the sub-string is “`the         rings`” (the sub-string contains both case and white space differences), your program should report:

```
The sub-string
the     rings
occurs 1 time(s) in the string
The Lord of the Rings
```

Your function should be able to have the count reflect the number of exact matches as well as matches that occur ignoring case and white space differences, reporting the number of matches including an exact match and white space/case ignore matches or zero if no match. As another example, consider this test case with the string "`The first case is the most important`" and the sub-string "`The`". Your program should report

```
The sub-string
The
occurs 2 time(s) in the string
The first case is the most important
```

Turn in:

- Hardcopy of your source code for Part A and Part B
- Hardcopy of your output for all test data sets for both Part A and Part B.