SystemC & Behavior Coding

Assignment 2, 2024-10-10

Abstract

Develop two (2) C programs. The first one analyzes a given text using while and string functions. The second one is to practice using pointers.

Please read carefully. All required outputs are described in the text. Five (5) points will be taken for each bug, missing required output, and behavior.

I. Text Processing

Description

1. Open any file (the text file) by command input, e.g. `run TheTextFile`.
2. Implement a function to count in the file
   - How many lines (how many '\n' in the file and also the EOF)
   - How many characters (alphanumeric characters only, i.e. 'A'~'Z', 'a'~'z', and '0'~'9')
   - How many uppercase letters ('A'~'Z')
   - How many words (separated by spaces (' ') and '\n')
3. Then, implement another function that converts all the text into uppercase and writes to a file named "UPPER." For example, given an original text as "The fox in the fog –%&9 catch me if you can." and convert it into "THE FOX IN THE FOG –%&9 CATCH ME IF YOU CAN."

II. Pointers

Description

1. Use `void* malloc(size_t size)` to allocate `argv[1]` bytes of memory, i.e., `argv[1]` always is an integer. Do not write codes to check if `argv[1]` is an integer. Notice that you must turn `argv[1]`, a `char*` type data, into the integer type to process. Please use `atoi()` in `stdlib.h` for this conversion.
2. Use `char*` and a `for` loop, assign to the block of memory, byte-by-byte, '`A`' to '`Z`' then '`1`' to '`9`' repeatedly, to fill up the allocated memory. Use one `printf` to print the string generated above.
3. Then use an `int*` and a `while` loop, in each iteration, print the memory content and its subtract 1 value in a pair of integers, e.g.,

   1145258561 : 1145258560
4. In the integer process loop, you need to implement a guard to prevent segmentation faults.

Please turn in the source codes only. Do not turn in the executable.

Using Generative AI

It is encouraged to use Generative AI (GAI) to solve the problem. In seconds, you can generate the programs that function exactly as described in the specs above. If you use GAI to solve the problems:

1. For Text Processing, you must create at least 3 test text files, each at least 1,000 characters, to verify the program's correctness and also turn in these 3 test text files.
2. For Pointers, write a TESTPLAN file to describe a test plan and verify the program's correctness. Turn in the TESTPLAN file as well.

It is also allowed to use GAI to create the above 3 test text files and the TESTPLAN, just to make sure they can verify the program's correctness.

Due date

3:00PM, October 17th, 2024

Score weight (towards the final grade)   5%