

CSCE 3600: Systems Programming

Minor Assignment 5 – Implementing Mutex Locks

Due: 11:59 PM on Monday, March 7, 2016

PROGRAM DESCRIPTION:

In this assignment, you are provided with working code that does the following:

- You input a sentence (containing no more than 50 characters).
- The program will read the sentence and put it into an array of characters.
- Then, it creates one thread for each character in the sentence.
- The goal of the program is to capitalize each letter that has an odd index.

SAMPLE OUTPUT (user input shown in **bold green**):

```
mat0299@faculty:~/csce3600/sp16$ ./minor5
Please enter a phrase (less than 50 characters): when all else
fails, read the instructions
The original sentence is:  when all else fails, read the
instructions
The new sentence is [0]:  w
The new sentence is [0]:  w
The new sentence is [0]:  w
The new sentence is [0]:  w
The new sentence is [0]:  w
The new sentence is [0]:  w
The new sentence is [3]:  N
The new sentence is [0]:  w
The new sentence is [0]:  w
The new sentence is [0]:  w
The new sentence is [0]:  w
The new sentence is [0]:  w
The new sentence is [9]:  E
The new sentence is [12]: e
The new sentence is [14]: f
The new sentence is [15]: A
The new sentence is [16]: i
The new sentence is [17]: L
The new sentence is [17]: L
The new sentence is [19]: ,
The new sentence is [20]:
The new sentence is [21]: R
The new sentence is [22]: e
The new sentence is [23]: A
The new sentence is [23]: A
The new sentence is [25]:
The new sentence is [26]: t
```

```

The new sentence is [27]: H
The new sentence is [27]: H
The new sentence is [27]: H
The new sentence is [29]:
The new sentence is [31]: N
The new sentence is [30]: i
The new sentence is [31]: N
The new sentence is [32]: s
The new sentence is [35]: U
The new sentence is [34]: r
The new sentence is [35]: U
The new sentence is [36]: c
The new sentence is [37]: T
The new sentence is [39]: 0
The new sentence is [41]: S
The new sentence is [41]: S

```

The problem is that the output should look something like:

```

mat0299@faculty:~/csce3600/sp16$ ./minor5
Please enter a phrase (less than 50 characters): when all else
fails, read the instructions
The original sentence is:  when all else fails, read the
instructions
The new sentence is [0]:  w
The new sentence is [1]:  H
The new sentence is [2]:  e
The new sentence is [3]:  N
The new sentence is [4]:
The new sentence is [5]:  A
The new sentence is [6]:  l
The new sentence is [7]:  L
The new sentence is [8]:
The new sentence is [9]:  E
The new sentence is [10]: l
The new sentence is [11]: S
The new sentence is [12]: e
The new sentence is [13]:
The new sentence is [14]: f
The new sentence is [15]: A
The new sentence is [16]: i
The new sentence is [17]: L
The new sentence is [18]: s
The new sentence is [19]: ,
The new sentence is [20]:
The new sentence is [21]: R
The new sentence is [22]: e
The new sentence is [23]: A
The new sentence is [24]: d
The new sentence is [25]:
The new sentence is [26]: t

```

```
The new sentence is [27]: H
The new sentence is [28]: e
The new sentence is [29]:
The new sentence is [30]: i
The new sentence is [31]: N
The new sentence is [32]: s
The new sentence is [33]: T
The new sentence is [34]: r
The new sentence is [35]: U
The new sentence is [36]: c
The new sentence is [37]: T
The new sentence is [38]: i
The new sentence is [39]: 0
The new sentence is [40]: n
The new sentence is [41]: S
The new sentence is [42]:
```

The program actually does this, but lacks the synchronization of the threads, so the output is not correct. You will need to provide the synchronization using mutex locks. Be sure to place the mutex locks so that your program works correctly every time.

When compiling using the GNU C compiler, be sure to include the **-lpthread** flag option.

REQUIREMENTS:

- Your code should be well documented in terms of comments. For example, good comments in general consist of a header (with your name, course section, date, and brief description), comments for each variable, and commented blocks of code.
- Your program should be named **"minor5.c"**, without the quotes.
- Your program will be graded based largely on whether it works correctly on the CSE machines (e.g., cse01, cse02, ..., cse06), so you should make sure that your program compiles and runs on a CSE machine.
- Please pay attention to the **SAMPLE OUTPUT** for how this program is expected to work. If you have any questions about this, please contact your instructor, TAs, or IA assigned to this course to ensure you understand these directions.
- This is an individual programming assignment that must be the sole work of the individual student.

SUBMISSION:

- You will electronically submit your bash program to the **Minor Assignment 5** dropbox in Blackboard by the due date.