CS310 Lab 1

Aug 2023

1. Determine the following details about your laptop/desktop.
   a. CPU make and model, clockspeed, number of cores.
   b. Amount of RAM installed.
   c. How much RAM is used up if you launch a web browser? Check amount of free memory before and after. Use the `free` command in Linux.
   d. Amount of cache memory. What are L1, L2 and L3 cache?
   e. Secondary storage. Do you have a hard disk or an SSD? What is the total capacity, what is the available capacity?
   f. Network interface(s). What is the speed? Does it have a gigabit interface?
   g. Connect to the campus network. What is your IP address? What about when you connect to your phone hotspot?
   h. Explain how you determined the above parameters. Did you use a GUI utility or a text command?

   Note: all programming must be done in C, unless stated otherwise.
   For a quick overview of C programming in Unix, see the appendix on lab sessions in Remzi's book here (pdf file).

2. Write a program called `titlecase` that takes a string as a command line argument, and outputs it in title case, with one space between the words. Make sure that the code works for any type of input, including arbitary amount of whitespace, no input, numbers, punctuation marks, inputs in mixed case etc.

   Sample run with output:
   ```
   $ titlecase welcome to   the JUNngle 123
   Welcome To The Jungle 123
   ```

3. GDB debugger (see a basic tutorial on GBD uploaded on Moodle, under References.)
   a. Write a C program to recursively compute the `n`th Fibonacci number. Do basic checks on input.
   b. Create a breakpoint in GDB and trace the execution of the program. Examine the variables.
   c. Run the recursion a few times and check the stack trace.
   d. A program called `fib2.c` is given. It has a few logical bugs. Use GDB and fix the bugs. You must use GDB, and not debug the code without GDB.

4. The `grep` program in Unix is used to search for patterns. Write a simple version of `grep` called `mingrep` that searches for patterns in a text file. A sample input file `ebook.txt` is provided. You should try with other files as well.

   Sample usage:
   ```
   $ mingrep [-i|-n] pattern file
   ```

   The option `-i` ignores case, and `-n` prefixes the output with the line number where the pattern is found. See a sample use of `grep` in the screenshot below.

```
[12:20:22 paddy@kestrel:code] $ grep hide ebook.txt -n
1577:again endued with animation could not be so hideous as that wretch. I
1672:from its hideous guest. I could hardly believe that so great a good
2057:had run away to hide himself, and that he vainly sought for him, and
2216:gigantic stature, and the deformity of its aspect more hideous than belongs
2655:moon, for a while hides but cannot tarnish its brightness. Anguish and
2738:should have been the first to hide my grief and console my friends if
2741:despair and endeavour to hide myself from his view.
3106:to hide itself behind your snowy precipices and illuminate another
3755:endued with a figure hideously deformed and loathsome; I was not even
4039:annihilation. My person was hideous and my stature gigantic. What did
4097:Why did you form a monster so hideous that even _you_ turned from me in
4164:I had sagacity enough to discover that the unnatural hideousness of my
4664:another sex, but as hideous as myself; the gratification is small, but it
4736:and hide himself from pursuit among the ridges of inaccessible precipices
5342:sworn to quit the neighbourhood of man and hide himself in deserts, but she
5999:to the creation of my hideous enemy, and I called to mind the night in
6436:described, I saw at the open window a figure the most hideous and abhorred.
6496:my hideous narration.
6682:enter by night and hide himself in a vessel bound for the Black Sea. I
6853:thus preparing for me a hideous death.
7227:such loathsome yet appalling hideousness. I shut my eyes involuntarily and
[12:22:26 paddy@kestrel:code] $
```