CS342 Operating Systems - Fall 2016
Homework 1

Assigned: Sep 27, 2016 Tue
Due date: Oct 04, 2015 Tue, 23:55pm.

- *Submit using Moodle. Make sure you start submitting one day before the deadline. You can overwrite you submission as many times as you wish. Late submission will not be accepted (no excuse).*

1) Install the following Linux distribution and release into a virtual machine (VM): Ubuntu Desktop 64-bit 16.04.01 LTS (this is the latest stable release of Ubuntu Linux available at the moment). It is essential that you install this distribution and release so that you will not have problems like "was working on my Linux". For this you need to first install a virtual machine monitor software, VirtualBox or VMware, to your PC or Laptop. VirtualBox is free to use. VMware player is also free to use. If you have, you can also use VMware Fusion or VMware workstation. You are highly recommended to use a virtual machine so that a system crash will not affect you dramatically. After installing Linux on a VM, start Linux and learn basic Linux usage. You can help each other in installing Linux. Write your experience briefly in your report.

2) Find out and write down where the kernel executable is in the machine you installed Linux. Find out the version of your running kernel by using the "uname -r" command. Write the version number in your report.

3) Download the source code of the Linux kernel (from kernel.org, for example). Download the version 4.4.1. This is the version that is very close to the version of the generic kernel of Ubuntu release 16.04. Change into the root directory of the source code tree and write the names of the subdirectories you see there in your report.

4) Learn C Programming [1][2]. Write a C program "diff.c" that is finding the difference of two sets of words. The program will take 3 filenames as parameters from command line: two filenames for two input files and one filename for output file. An input file will include a large number of *unique* words (one word per line). The program will read the file and will generate a linked list from it: each word in the file will be a different entry in the linked list. Two such lists (sets), set A and set B, will be generated from two input files. Then the program will compute the difference (A - B) of these lists (sets). The difference will be written out to an output file (one word per line). The output file will be in sorted order (ascending order; use strcmp() to decide which word comes earlier). Before taking the difference, you can sort the lists if you wish. Maximum wordsize will be 256 (including the NULL character at the end of the word).

       Write a Makefile to compile your program, so that by just typing "make" the program is compiled and an executable file called "diff" is generated.

       This is useful for you to warm up with C. Make sure you do it alone. Otherwise it will be very difficult to do the projects. Make sure you develop your code in C and Linux. You can use the gcc compiler.

       Include the source code of your program and sample input/output in your report.

5) Use the *strace* command of Linux to trace the systems calls made by some simple programs like "cp", "diff", etc. Use the manual page of strace to learn more about it. Type "man strace". Include sample output in your report.

Submission: Submit a pdf file as your report which will include the information required in each question above. Submit also your diff.c file and your Makefile. Hence you will submit 3 files: report.pdf, diff.c and Makefile. Submit in Moodle. Late submission will not be accepted (no exception). A late submission will get 0 automatically (you will not be able to argue it). Make sure you make a submission one day before the deadline. You can then overwrite it.

References:

[1]. The C Programming Language. B. Kernighan and D. Ritchie. Second Edition. Prentice Hall. 1998. *A must have book; very useful.*
[2]. Any Book on C, available in Meteksan Bookstore.