Laboratory 1: Getting Familiar with GLUE UNIX Programming Environment

Lecture notes:

1. Scope of the course

   Prerequisite for ENEE 150 (see the last page for more details), very basic skills in programming and UNIX.

   a. Principles of programming and software development.

   b. C will be used as the programming language to illustrate the concepts.

   c. Basic skills in UNIX operating systems.

2. How to program (or develop software package in the future)

   a. **Document** everything you do in each of the following steps.

   b. Understand the project/problem requirements

   c. Develop algorithm (the way or method to solve the problem)

   d. Plan for the implementation of your algorithm (data structure, etc.)

   e. Write the programming (C, C++, Java, Matlab, etc.)

   f. Compile the program (gcc or cc in GLUE UNIX for C codes. Compiler is the interpreter that translates the program written in the so-called high level programming languages like C by human, who call themselves programmers, and understandable by human to the low level language that the computer understands.)

   g. Execute, test, and debug your program on sample data.

   h. Go back to step d. (modify your code) if necessary (programming or syntax bugs).

   i. Go back to step c. or step b. if there are serious problems (algorithm or logic bugs).

   j. Confirm that all the project requirements are met. (output format, etc.)

3. What is UNIX?

   a. UNIX is an operating system, like windows, which is a complex set of computer codes that manages the activities and resources of the computer. It is very popular in universities and colleges.

   b. It was designed and developed in the late 60’s and 70’s in Bell Labs to help scientists write papers, store/share/manipulate data, exchange ideas, and work with others. UC Berkeley has also contributed a lot, most known as Berkely Software Distribution (BSD).

   c. UNIX system can run multiple applications at the same time (multitasking); it allows multiple users to use the same system at the same time (multiuser); it has programming shells to enable the communication between user and UNIX kernel.

4. Logging in/out

a. In UNIX, each user has a separate working space. The system identified users by their *usernames.*

b. *whoami:* displays the effective current username.

c. *logout, exit, bye:* exits from a login session.

d. *passwd:* change your password.

e. *renew:* enter your password again to renew your authentication ticket.

5. UNIX file system

a. UNIX file system consists of *files* and *directories.* A file is a collection of data. A directory is a "file folder" that stores one or multiple files.

b. UNIX file system is hierarchical, in the sense that a directory can have *sub-directories.* (Tip: using directories and sub-directories to organize your files.)

c. root: is the top directory for all users (/) and for each individual user (~).

d. . and .. directories.

e. mkdir, rmdir, mv, cp

f. *pwd:* print the current working directory

g. *cd:* change directory, cd, cd dirname, cd /, cd ~, cd .., cd ../.., cd ../dirname, cd ~/dirname, cd /dirname/dirname

h. *ls,* list the contents in a directory or directories.

ls, ls -a, ls -l, ls -F, ls -t, ls -r,

ls dirname, ls *.c, ls p*.c, ls ???.txt, ls *[13].c, ls *[0-9].c, ls *[!12].c

i. *rm, mv, cp:* delete, remove, and copy a file.

j. *grep:* search text in a file.

k. *diff:* compare the difference between two files; *diff* file1 file2.

l. *more, less, head, tail:* view a file, (you can also view and modify a file by any of the UNIX text editors, see item 7 below.)

6. UNIX help:

The *man* command displays UNIX reference manual. You can type in *man command_name (man grep* for example) and the system will print out the entry of *grep* in the reference manual.

7. UNIX text editors: vi and emacs

a. vi references: http://www.adminschoice.com/docs/vi_editor_ref.htm
http://www.cs.rit.edu/~/cslab/vi.html
http://www.kb.indiana.edu/data/afdc.html

b. emacs references: http://sip.clarku.edu/tutorials/intro_emacs.html
http://www.cs.princeton.edu/courses/archive/spr97/csl26/help/emacs.html
http://www2.lib.uchicago.edu/keith/tcl-cource/emacs-tutorial.html

8. For further help on UNIX:
   a. UNIX tutorial for beginners: http://www.ee.surrey.ac.uk/Teaching/lJnix/
   b. Wiki: http://en.wikipedia,org/wiki/Unix
9. My first c program *hello.c:* how to create code, compile, and execute it in GLUE UNIX. The code is posted on blackboard in the document section.

Lab Description

1. Objectives:
   a. Get to know how to access GLUE UNIX directly and remotely.
   b. Learn text editor in UNIX (vi and/or emacs).
   c. Learn basic UNIX commands.
2. Pre-lab preparations:
   a. Login to blackboard (https://bb.eng.umd.edu/) and find the class website.
   b. Read course syllabus and email your questions to Dr. Silio (silio@umd.edu) by Tuesday, Sep. 7.
3. In-lab description:
   a. Learn how to log in the computer in the lab. If you don't know your ECE account information, use your directory name (the same as you use for UMEG/Testudo) as the login name and asdf&*123 as the password.
   b. Learn how to log in to your GLUE UNIX account directly from the terminal.
   c. Learn how to log in to your GLUE UNIX account remotely (PuTTY).
   d. Go and visit blackboard (https://bb.eng.umd.edu/) where most of the important class materials will be posted.
   e. Explore your GLUE UNIX account and practice the basic UNIX commands you have learned in class.
   f. Learn how to transfer files from your GLUE UNIX account to the local computer and vice versa.
   g. Practice UNIX text editor vi and/or emacs.
   h. Play with the *hello_comment.c* code.

Name: ________________________ Section: 010__ Date: _____________

Lab Report

1. What do you do if you don’t think you get the credits you deserve in project/quiz/exam?

2. (optional) What are the differences among commands *logout, exit, bye*?

3. What are the differences among commands *more, less, head, tail*, which are used to view a file. Which one do you prefer to use? Why? (hint: create a large file and try these commands on it. And/or use the UNIX help.)

4. What are the . and .. directories in each directory?

5. Assuming that you are at your root directory, write down the UNIX command to build the following directory tree under your GLUE UNIX account. (Notice that some of these might require more than one command).

   ENEE_140 ____

Notes ____

Lab_work ____

  Week_01 ____

  Week_02 ____

Quiz ____

Project ____

  Proj_1 ____

  Proj_2 ____

  Proj_3 ____

6. Download hello_comment.c from blackboard to directory ENEE_140/Notes; what are the UNIX commands for the following:

   a. start from your root directory; go to the directory where hello_comment.c is ____

   b. make a copy of hello_comment.c and call it hello.c _________________

   c. compile hello.c using gcc ______________________________________

   d. rename the executable generated from step c. to hello.out ______________

   e. compile hello_comment.c using gcc _______________________________

      ____

   f. list the files in the current directory and check the size of the two executables you generated in steps c and e. Write down their sizes _________________

      ____

   g. repeat steps c-f using cc as the compiler. What do you find? ______________

      ____

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   h. copy hello.c from current directory to ENEE_140/Lab_work/Week_0___

7. Modify the hello_comment.c code so it will print out the following (of course, replace Charles Silio by your name and the x in 0l0x by your own section number) Make sure that you document your code.

   Hello, I am Charles Silio and I am in section 0l0x.