Linux Notes

Linux is a free operating system derived from Unix that runs on PCs and laptops. The user interface is now similar to Windows/MacOS (the latter's kernel is actually based on Unix), and casual users can use Linux in a way that they are used to on those other platforms. However, for computer scientists, Linux offers much more (direct) access to operating system functions. The downside is that this necessitates learning some commands and having to type them on the command line. Nevertheless, once basic commands are mastered, for software development or other work (gamers are mostly out of luck), most Linux users stay Linux users, and enjoy a more dependable and more secure operating system than Windows/MacOS. And Linux is free.

- Window Managers

  When you login, you'll notice that a default window manager starts up. There are many flavors of window manager, including: Gnome (gnome.org; this is the default), KDE (kde.org), LXDE (lxde.org), and more. Each of these set up the screen with varying complexity and user control. The important thing to note about any of these window managers is that you can set up any one you wish, and customize the colors, the look, and the functionality of the interface your liking, unlike Windows/MacOS. This is something for you to experiment with on your own computer.

- Linux Distributions

  There are free (and some not free) distributions of Linux, such as Debian (debian.org), Fedora (getfedora.org), Red Hat (redhat.com), SUSE (suse.com), Ubuntu (ubuntu.com), and many, many more. Currently in csLab, we are using Ubuntu 24.04 or higher. This distribution is free, easily installed, and comes with a wealth of software, or "packages." To facilitate software installation, Ubuntu comes with a "package manager." The user can easily choose packages to update or install, and Ubuntu will automatically do so. In addition, all of the dependencies are found automatically and any additional required software will be installed.

- Basic Linux Commands

  With today's powerful window managers, you can get away with not typing many Linux commands; Linux looks pretty much like Windows/MacOS. However, you might get annoyed when you realize you could do something with one typed command compared to clicking on several folders/icons. Here is a quick tutorial on the very basics to get you started.

  The first thing to realize is that the file system is stored as a tree (upside down). Folders are called **directories** and are denoted with a forward slash and/or color. The topmost directory, or **root**, is simply `/`. From there, other directories form the branches of the tree. One of these directories is is your "home" directory that stores of all of the folders that hold all of your files on the server. When you login, you are in your home directory; in my case, it's `/home/mgousie`.

The following shows some basic commands to navigate the file system and to work with files; words in *italics* should be replaced with actual file/directory names. Most commands have options that are added starting with a "–" (see `ls` below).

Command	Description
Files/Directories	
ls	list contents of current directory (colors denote files/directories)
ls -F	list contents with * next to executables and / next to directories
ls -l	list contents with size and other information of each file
pwd	returns current path (i.e., which directory you are in)
mkdir *myDir*	create a new directory called *myDir*
cd *myDir*	move down to the *myDir* directory
cd ..	move up to previous directory; note space between cd and ".."
cd */usr/local*	move directly to the directory */usr/local*
	i.e., you can jump to any directory you wish
cat *fun*	show the contents of file *fun*
more *fun*	show the contents of file *fun* one page at a time
less *fun*	show the contents of file *fun*, allowing for scrolling in both directions
cp *old new*	copy file *old* to file *new*
mv *old new*	rename (move) file *old* to file *new*
	Note that you can copy or move across directories using path names
rm *myfile*	delete (remove) file *myfile*
rmdir *mydir*	delete (remove) directory *mydir*
Editors	
libreoffice	start libreoffice from command line or choose application from menu
subl *blip*	start a plain text editor with file *blip*
gedit *blah*	start the gedit editor with the file *blah*; a good choice for beginners
emacs *bloop*	start the emacs editor; much more functionality than you'll ever need
vi *blech*	start the vi editor; extremely cryptic
Compilers and Interpreters	
g++ *program.cpp*	invoke the gnu C++ compiler and create the executable *a.out*
g++ *prog.cpp* -o *prog*	invoke the C++ compiler and create the executable *prog*
./a.out or *./prog*	execute the file *a.out* or *prog*
gcc *program.c*	same as above, but invokes the C compiler
python	start interactive Python (default version) session
python *prog.py*	interpret and run *prog.py*
python$X$	start interactive Python version X
prolog	start interactive PROLOG session
gplc *prog.pl*	invoke PROLOG compiler
scheme	start interactive Scheme session
Miscellaneous	
man *command*	displays the on-line manual page for *command* (including all options)
spell *flim*	spell check the file *flim*; returns a list of misspelled words
wc *flam*	check the size (in lines, words, and characters) of *flam*
date	returns the current date and time
cal	shows calendar for the current month
cal *year*	shows calendar for the year *year*
grep *word afile*	look for *word* in the file *afile*
sort *zoi*	sort the lines in file *zoi*
sort *zoi* > *zim*	**redirect** the output of the sort into file *zim* (redirect input with <)
grep *word afile* | sort	**pipe** the output of grep to the sort function
top	shows all currently running processes and usage statistics
history	shows past commands; type "! n" to repeat command number n
up arrow	repeats last command