WACM Explains : Basic Linux

Logging into CSL Machines Remotely

- Linux/OS X:
  `$ ssh username@best-linux.cs.wisc.edu` *(to log into the least congested machine)*
  `$ ssh username@emperor-01.cs.wisc.edu` *(to log into a specific machine, emperor-01)*
  `$ exit` *(to exit the ssh)*
- Windows: use putty. Download here: http://www.putty.org/
- List of CSL machines:
  - rockhopper-01.cs.wisc.edu through rockhopper-09.cs.wisc.edu
  - emperor-01.cs.wisc.edu through emperor-07.cs.wisc.edu
  - royal-01.cs.wisc.edu through royal-30.cs.wisc.edu
  - snares-01.cs.wisc.edu through snares-10.cs.wisc.edu

The Shell: some basic commands

- `$ ls` : Viewing directory contents. Stands for "list".
- `$ pwd` : Display the current directory. Stands for "print working directory".
- `$ cd Documents/` : Change to directory Documents. Stands for "change directory".
- Use Tab key for automatic completion, or for displaying options.
- Use up arrow for previous commands.
- Use Ctrl + R for command history.
- `$ cd ..` : Go to the parent directory.
- `$ mkdir linux-101 && cd linux-101` : Make a new directory called linux-101, and cd to it.
- `$ echo "your-string"` : Displays the text/string. To be precise, send the string to the standard output, which is the screen in this case.
- `$ echo "your-string" >> file1.txt` : Creates a new file called file1.txt. Send "your-string" to the new file.
- `$ vim file1.txt` : vim is a command-line editor. Some basic vim commands are:
  - i for inserting/editing text
  - ESC for coming back to command mode
  - :w to write/save changes
  - :q to exit
  - Interactive Tutorial: https://www.openvim.com/
- Other editors: emacs, gedit, Sublime Text, PyCharm (for Python), Visual Studio (C++), Eclipse (Java)
- `$ cp file1.txt file2.txt` : Copy contents of file1.txt to file2.txt. If file2.txt doesn't exist, create it.
- `$ cp --help` : Getting help, learning more about the command. Usually one of these -h/--help/-help.
- `$ cp -r linux-101 linux-101-copy` : Command line option -r, to recursively copy the directory linux-101 to a new directory, linux-101-copy.
- `$ scp src_file dest_file` : scp is used for remote file copying.
  - Copy from remote host: `$ scp username@best-linux.cs.wisc.edu:src_path dest_path`
  - Copy to remote host: `$ scp src_path username@best-linux.cs.wisc.edu:dest_path`
- `$ ls --help` : Getting help, learning more about a command. Usually one of these -h/--help/-help.
- `$ man ls` : man stands for manual pages. Documentation about the command ls. Press q to exit.
- `$ grep "text" filename` : Search for text pattern in filename.

- `$ ls | grep "text"` : Pipe (|) the output of ls to grep.
- `$ rm file2.txt` : Remove the file file2.txt.
- `$ rm -rf linux-101-copy`: Recursively (-r) remove the contents of linux-101-copy, and do not prompt (-f)
- `$ rmdir dirname`: Similar to above, just makes sure the directory is empty
- `$ trash -r dirname` : Moves the directory to trash ("recycle bin"). This is a safer command.

Compiling with gcc/g++

- `$ gcc hello.c`: Generates a binary a.out in the current directory.
- `$ gcc -O2 hello.c -o hello -Wall` : The following command-line options are used
    - -o: Change the output file name
    - -Wall: Display all compiler warnings
    - -O2: Compiler optimization level 2.
- Linking multiple object files:
    - `$ gcc -c your_code.c -o your_code.o` (object file for your code)
    - `$ gcc -c lib.c -o lib.o` (object file for the library)
    - `$ gcc your_code.o lib.o -o binary` (link the above .o files to generate the executable binary)
- Use Ctrl + C to terminate a program
- Ctrl + Z runs the program in background
- `$ htop`: Lists the running processes. Can be used to obtain the process ID of a program.
- `$ pkill -9 pid`: Kill the process with process id pid. Process ID is an integer.

Writing a small Bash Script

- Create a small bash script hello_world.sh with the following contents.
    ```
    #!/bin/bash
    echo "Hello World!"
    ```
- `chmod 755 hello_world.sh`: To make the script executable.
- `./hello_world.sh`: To run the script.

Bashrc: for customizing the shell

- Locate the ~/.bash_profile file.
- Add an alias to the file: `alias hello="echo Hello World!"`.
- Reload the bash_profile using `source ~/.bash_profile`
- The alias can be used instead of the command

CSL machines

- Home directory naming convention: for user abcd, the home directory would be /u/a/b/abcd.
- `$ fs lq`: For checking printer quotas
- `$ lpquota`: For checking disk quotas
- ~/public : Contents of this directory are public. Files under ~/public/html will appear on your website at http://cs.wisc.edu/~your_username.
- ~/private: For private files
- `$ recover fetch dir_name`: The CS department creates backups of all your files everyday at midnight. Use the recover command in case you accidently delete something. More information here: http://research.cs.wisc.edu/twiki/bin/view/CSDocs/BackupFAQs
- More resources at CSL website: https://csl.cs.wisc.edu/