SC 290: High-Performance Computing  
Spring 2015  
Homework #1

Directions: Write your answers in a word document and email to will@accre.vanderbilt.edu before lecture (9:10am) on the due date (Jan 16). Please ensure that all the files/scripts you create remain in the appropriate location until the assignment has been graded!

Total Points: 22

1. Create a sub-directory in your home directory called hwk1. Move into the directory, and then print your current path (/home/vuid/hwk1; where vuid is your Vanderbilt ID). What sequence of commands did you use to accomplish these tasks? Keep any files and directories you create for this homework assignment in hmk1. (2 points)

2. Create a sub-directory in hwk1 called myfiles. Create three files in the myfiles directory: sc290.txt, sc290.dat, and sc290.cfg. Add a single line of text (something unique for each file, but the text can say anything you wish) to each file. Create another sub-directory in hwk1 called mycopies. Move into mycopies and then copy sc290.txt into mycopies. Now change the name of the copy of sc290.txt to sc290.copy. What sequence of commands did you use to accomplish all of these tasks? (2 points)

3. If you haven't done so already, figure out how to save your cluster login information in the PuTTY login window, that way you don’t have to type out (and remember!) vmlogin.accre.vanderbilt.edu each time you want to log in to the cluster. You may need to consult Google. (1 point)

4. What is Unix? What is the difference between Unix and Linux? How does Mac OS X relate to Unix? (1 point)

5. Which shell do you use on the ACCRE cluster? If you are unsure, try typing echo $0 or echo $SHELL. (1 point)

6. What does the command ls -alh accomplish? Use the man command to find out. Explain how each of the command options affects the output. (1 point)

7. Run ls -alh /usr/local/bin.  
   a. What is the size of the file uperf in this directory? When was this file created? (1 point)  
   b. What user owns the file check_cpu_usage? What group? What are the group, user, and other permissions on this file? (1 point)
8. Create a bash script called `unix_reminders.sh` that, when executed, lists a bunch of useful Unix command reminders. Take the necessary steps to ensure that you can run this script as a command when you type `unix_reminders.sh` from any arbitrary directory for the current and future login sessions. You may make the script as elaborate as you wish, but at a minimum include reminders for 10 commands. (2 points)

For example:

```bash
#!/bin/bash
echo "pwd prints your current working directory"
echo "ls lists the contents of a directory"
echo "ls -l provides a long listing of the contents of the current directory"
...
```

9. Define an alias that allows you to move into `/home/vuid/hwk1/mycopies` when you type `cdmycopies` from any arbitrary directory. Ensure that this command persists for future login sessions. Hint: what file is executed by the shell each time you log into the cluster? (2 points)

10. How large is the ACCRE cluster (Vampire) in terms of number of nodes and processor cores? (1 point)

11. Describe the purpose of the `$PATH` and `$LD_LIBRARY_PATH` environment variables. What commands do you use to print the value of these two variables? What output do you get from running these commands? Hint: one of these variables may be empty. (1 point)

12. Type `python --version` and `which python`. What is the output of these two commands? Now type `setpkgs --a python2.7.8`. How have your `$PATH` and `$LD_LIBRARY_PATH` changed as a result (compare to values you saw in question 12 above)? Type `python --version` and `which python` again. Now what is the output? (2 points)

13. Move into `/home/vuid/hwk1/myfiles`. Type `ls -lh > ls.out`. Now type `wc -l ls.out`. What is the output from this second command and what does it mean (type `man wc` if you are unsure)? How could you execute this same series of commands to generate the same output (actually you may note one minor difference in the output) but without the need to generate an intermediate file `ls.out`? (2 points)

14. What command allows you to see all the software packages currently installed on the cluster? Now re-direct the output from this command to a filter that will only show those lines containing the string `python`. What command did you use to
accomplish this? What versions of Python are installed on the cluster? You can ignore the Boost and SciPy lines. *(2 points)*