Assignment 0: Linux Familiarity

CS 3423 — Systems Programming — Sam Silvestro

The goals of this assignment are as follows.

- Log in to a UTSA CS VDI (*Virtual Desktop Interface*) machine with your *abc123* myUTSA ID. As a better alterantive, instead visit `http://vpn.utsa.edu`, download the GlobalProtect VPN client, and proceed with using an SSH client of your choice rather than regularly utilizing VDI. SSH clients include, but are not limited to, the `ssh` command built into most modern OS's (e.g., Mac OS X, Linux, and Windows 10+), as well as third-party software such as MobaXTerm (recommended), PuTTY, and others.
- Log in to a UTSA CS `fox` machine with your Linux user ID via SSH
- Utilize essential **Unix**/**Linux** commands
- Utilize **vi**/**vim** (identical on almost all modern OS's) and gain familiarity with the commands enumerated within the "vi cheat sheet"
- Create and run a very simple shell script
- Learn to submit assignments correctly via **Canvas**

This assignment refers to documents that may be found on Canvas under the Content Miscellaneous sub-folder. In particular, you should take a look at the **vi cheat sheet** and **Unix cheat sheet** if you are planning on using Windows to connect to the department's computer resources.

Steps

1. Log in to Linux
   (a) Access the UTSA "fox" machines utilizing either an SSH client directly, or by using the CS VDI (the same interface as was used on the machines in the classrooms or main CS Student Lab). In the event of the former, skip to step (c). To use this, use a compatible web browser (Chrome recommended) to log on to `https://myappsvdi.utsa.edu/`. Use your *abc123* myUTSA ID and password to log in.
   (b) Once logged on, you may utilize MobaXterm to initiate an SSH connection to one of the `fox` machines using your **abc123** ID. Your password will be defaulted to your UTSA banner ID without the `@`. These machines will use port 22 (default SSH port) and have addresses in the range of `fox01.cs.utsarr.net` – `fox02.cs.utsarr.net`. Please refer to the accompanying "Student CS Linux and VDI Access" document available under the "Modules"/"Miscellaneous" section in Canvas.
   (c) Once logged in, since you are (likely) using a temporary password, change your password using the **`passwd`** command. (Note that the "$" is being used to indicate that the Linux

shell is prompting you for input). The actual prompt may look different (e.g., your user ID). In the terminal window, type (without the "$"):

```
$ passwd
```

Notes: If you are logging in remotely via SSH, you may alternatively perform the following:

- Connect to the CS VPN by logging in at vpn.utsa.edu.
- If using Linux or a third-party SSH client (such as PuTTY or Secure Shell Client [see the Content\Miscellaneous module in Canvas]):
  - Start a terminal window and connect to a target `fox` machine. If using the Linux command line on a Linux machine, you may enter the following command directly into the terminal window:
    $ ssh *abc123*@fox*0x*.cs.utsarr.net
    (where *abc123* is your myUTSA ID and *0x* is one of {01 ... 04}.
- If using Windows:
  - You should install **ssh** (see the setup page).
  - You can transfer files with an **scp** or **sftp** client (*not* ftp) – I recommend MobaXTerm again for this purpose, or WinSCP as a popular alternative on this platform.
  - For both, you will specify *abc123*@fox*ii*.cs.utsarr.net to connect (where *abc123* is your abc123 and *ii* is one of 01 through 04)
  - In the future, consider using a virtual machine (e.g., VirtualBox), dual boot, or Cygwin.

2. Create a directory for this course and copy important course files to it. (You may want to check the **Unix Cheat Sheet** for help here).

   (a) After logging in, check your current directory using the **p**rint **w**orking **d**irectory command:
   `$ pwd`

   (b) See what files are in your current directory:
   `$ ls -al`
   (This will show **a**ll files and give **l**ong details on them. You will notice "hidden" files beginning with a "`.`".)

   (c) Create a directory for this course:
   `$ mkdir ~/courses/cs3423 -p`

   (d) Change to your cs3423 directory:
   `$ cd ~/courses/cs3423`
   (You should verify that you are in the directory with the `pwd` command.)

   (e) Copy the course materials to your directory:
   `$ cp -r /usr/local/courses/ssilvestro/cs3423/ .`

Note that it is perfectly normal to experience a copy error at this point due to lack of permissions on a particular subfolder; you may safely disregard this "Permission denied" message at this step. You should subsequently verify that the material was copied by using the `ls` command.

3. Use the **vi** editor to create a simple shell script.

   (a) Study the **vi Cheat Sheet** from the setup page.

   (b) (optional) Try the vi tutorial:
   ```
   $ mkdir ~/tmp 2> /dev/null; cd ~/tmp
   $ vimtutor
   ```
   (follow the instructions)

   (c) If you haven't already in a prior course, create a `.vimrc` file to set up defaults in vim for indention and line numbers.
   ```
   $ vi ~/.vimrc
   ```

```
:set ai sw=4
:set number
:set expandtab
:set softtabstop=4
:set smartindent
```

(d) Create your first script for this class using **vi**. **Note:** Be careful to type each character, including spaces, exactly as it appears below. Copying and pasting will not preserve spaces nor hyphens correctly! Also, be very careful of quoting: it matters, and must be exact!

i. **$ cd ~/courses/cs3423**

ii. **$ mkdir assignments**

iii. **$ cd assignments**

iv. **$ vi cs3423a0.bash**

v. Enter the following code *exactly* as it appears (quotations are extremely specific in bash (the command line interpreter we are currently using); therefore, you must have 100% accurate when differentiating single quotes, double quotes, and backticks. Do not copy/paste this block: it will not function!

```
#!/bin/bash

if [ $# -ne 2 ]; then
    echo "usage: $0 <firstName> <lastName>"
    exit 1
fi

echo "My name is $1 $2"
echo "I am running this script from `pwd`"
echo "My username is `whoami`"
echo "I am logged in to `hostname`"
```

4. Exit your text editor and make your script executable:
   $ chmod u+x ./cs3423a0.bash

5. Execute your script and verify the output. In the command below, replace *myFirstName* and *myLastName* with your actual name.

   $ ./cs3423a0.bash *myFirstName myLastName*
   It should print the following:
   My name is *myFirstName myLastName*
   I am running this script from /home/*myUTSAId*/courses/cs3423/assignments

```
My username is myUTSAId
I am logged in to remoteHostName
```

6. You now need to save the output of your script by redirecting the output to **a0Out.txt**.
   `$ ./cs3423a0.bash myFirstName myLastName > a0Out.txt`

7. Zip all your deliverables into a single zip file for turning in. Your zip file's name should include your abc123 ID using the format in the command below. **You will do this for all assignments going forward.**
   `$ zip a0-abc123.zip cs3423a0.bash a0Out.txt`

8. Upload your results to **Canvas**.

   (a) Visit `https://utsa.instructure.com/`.

   (b) Log in with your myUTSA ID and passphrase.

   (c) Canvas will display your list of courses. Select **CS 3423**, (specifically, the lecture section, *not* the recitation).

   (d) Locate **Assignment 0 – Linux Familiarity** under **Assignments**

   (e) Follow the directions on the screen to upload your zip file.

   Note: If you created your script and zip file remotely via ssh, you will need to use either an **sftp** client or the **scp** command to move the files from the remote machine to your local one.