CYBR 1500 Assignment, Week 4

# Part I: Required Readings and Lecture Content

*NB. You may read first, and watch lectures after; Or, watch the lectures, and read the text after--your choice.*

*If the videos reference any content with page numbers that you can’t locate in your textbook, please let me know. Since the 3rd edition of the textbook is used in the videos, when you use a different version of the textbook, the page numbers will be different.*

* Watch the videos here for the lectures.

Video Lecture 1, Week 4 Update: <https://www.youtube.com/watch?v=4q7zJ5OrxnM>

Video Lecture 2, Chapter 6: <https://youtu.be/SN_MaEZ7TRU>

Video Lecture 3, Chapter 7: <https://youtu.be/tdrZVvkuWtE>

* Read and be familiar with chapters 6-7 of Blum & Bresnahan.

*NB. Unless otherwise specified, all commands/steps are to be performed at the command line.*

*NB. As in the assignments for prior weeks, you will perform some tasks on the command line and capture the interactions by copying and pasting the text from the terminal. In the GNOME terminal, you can easily do this by selecting Edit/Select All from the menu, then Edit/Copy; then, paste into this document.*

***NB. Don’t worry if you mistype something or make an error in a terminal session, just go ahead and try again--no need to start over. The grader will look to see that you ultimately get it right.***

*NB. If you have this document open in a browser inside of Linux, copy and paste works similarly to Windows or other operating systems. If you have this open in your browser from within Windows, you’ll want to enable clipboard sharing in VirtualBox. From the VirtualBox menu, Devices/Shared Clipboard, select “bidirectional” for maximum flexibility.*

*NB. If copy-paste functionality between Linux and Windows does not work for you, and a solution is elusive, the easiest workaround is to just open a browser window in Linux (Firefox is installed already, and works fine)--then log into your campus Google and Blackboard accounts, and complete the assignment there.*

*NB. Certain parts of this assignment may require that you are running a Linux distribution with a graphical user interface.*

# Part 2: Chapter 6, Environment Variables

1. Start a new bash shell/terminal session.
2. In your home directory which should be /home/<your name>, make a new directory called week4.
3. Within directory week4, create a symbolic link to /bin/bash called <yourlastname>bash, e.g., trangbash. Use ls -l to verify the link.
4. Within directory week4, create another file (using touch) called testfile. Use ls -l to see the default permissions.
5. From your home directory, echo $PATH to see your current path. Set PATH to include the directory week4. echo $PATH again to verify the change.
6. From your home directory, execute <yourlastname>bash by typing <yourlastname>bash, e.g., trangbash. *NB. If you accomplished step 5 incorrectly, that won’t work. Examine your PATH variable and try again.*
7. Type ps to verify <yourlastname>bash is running.
8. Type exit to exit <yourlastname>bash. *(NB. Be careful--if it’s not running, you’ll exit bash and your terminal session, and will have to start over.)*
9. From ~, try to edit testfile (in the week4 folder, created in step 2). As above, I recommend using nano. Try to add a line or two of text (keep it short), then save the file: [ctrl]-o, [enter], and [ctrl]-x to exit.
10. Repeat step 9, but type sudo before the command. Your password will be required. Add a line or two. [ctrl-o] enter, [ctrl]-x. Verify that your edit persisted using cat.
11. Delete the file testfile. If on another distribution, and permission is denied, use sudo to get it done. ls ~/test to verify deletion.
12. Copy \*all\* of the terminal session below, using the terminal’s Edit/Select All, Edit/Copy, and then paste into the document.

>>>>>Paste your terminal capture below this line >>>>>

**andrew@andrew-VirtualBox**:**~**$ ls

**backup.tar**  **Documents**  **Music**     **Public**     **Videos**

**Desktop**     **Downloads**  **Pictures**  **Templates**  **week4**

**andrew@andrew-VirtualBox**:**~**$ cd /home/andrew/week4/

**andrew@andrew-VirtualBox**:**~/week4**$ ln -s /bin/bash koenigbash

**andrew@andrew-VirtualBox**:**~/week4**$ ls -l

total 0

lrwxrwxrwx 1 andrew andrew 9 Feb  7 13:54 **koenigbash** -> **/bin/bash**

**andrew@andrew-VirtualBox**:**~/week4**$ touch testfile

**andrew@andrew-VirtualBox**:**~/week4**$ ls -l

total 0

lrwxrwxrwx 1 andrew andrew 9 Feb  7 13:54 **koenigbash** -> **/bin/bash**

-rw-rw-r-- 1 andrew andrew 0 Feb  7 13:54 testfile

**andrew@andrew-VirtualBox**:**~/week4**$ cd /home/andrew/

**andrew@andrew-VirtualBox**:**~**$ echo $PATH

/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin

**andrew@andrew-VirtualBox**:**~**$ export PATH=$PATH: /home/andrew/week4/

bash: export: `/home/andrew/week4/': not a valid identifier

**andrew@andrew-VirtualBox**:**~**$ export PATH=$PATH:/home/andrew/week4/

**andrew@andrew-VirtualBox**:**~**$ echo $PATH

/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin::/home/andrew/week4/

**andrew@andrew-VirtualBox**:**~**$ koenigbash

**andrew@andrew-VirtualBox**:**~**$ ps

    PID TTY          TIME CMD

   1375 pts/0    00:00:00 bash

   2082 pts/0    00:00:00 koenigbash

   2088 pts/0    00:00:00 ps

**andrew@andrew-VirtualBox**:**~**$ exit

exit

**andrew@andrew-VirtualBox**:**~**$ nano ~/week4/testfile

**andrew@andrew-VirtualBox**:**~**$ sudo nano ~/week4/testfile

[sudo] password for andrew:

Sorry, try again.

[sudo] password for andrew:

**andrew@andrew-VirtualBox**:**~**$ cat ~/week4/testfile

Hello world

This is text

Oh look, even more text

Even on this line

**andrew@andrew-VirtualBox**:**~**$ rm ~/week4/testfile

**andrew@andrew-VirtualBox**:**~**$ ls -w

ls: option requires an argument -- 'w'

Try 'ls --help' for more information.

**andrew@andrew-VirtualBox**:**~**$ ls ~w

ls: cannot access '~w': No such file or directory

**andrew@andrew-VirtualBox**:**~**$ ls ~/week4/

**koenigbash**

**andrew@andrew-VirtualBox**:**~**$ ls ~/test

ls: cannot access '/home/andrew/test': No such file or directory

**andrew@andrew-VirtualBox**:**~**$

<<<<< Paste your terminal capture above this line <<<<<

# Part 3: Chapter 7, Security and File Permissions

1. Start a new bash shell/terminal session.
2. Create a new user named <yourlastname>test, e.g., horntest. Use the option -m to create a home directory.

*NB. You’ll probably have to escalate privileges to do this: remember sudo?*

*NB. If you create the user incorrectly, learn the userdel command :-)*

1. cat /etc/passwd to verify the add. Better: grep <yourlastname>test /etc/passwd. Try both to become accustomed to both.
2. Let’s add a password for user <yourlastname>test: sudo passwd <yourlastname>test, e.g., sudo passwd horntest. That was easy! Be sure to remember the password.
3. Create a new group, testgroup. (remember sudo)
4. Make <yourlastname>test’s primary group the group, testgroup. *NB. You might want to man usermod, look at the -g parameter.* Last time I’ll mention it: sudo.
5. id <yourlastname>test to see that the group assignment was successful.
6. Add yourself to testgroup (as a secondary group, leave your primary group alone).
7. Use id: id <your login>, e.g., id trang to verify
8. Capture the terminal interactions and paste below:

>>>>>Paste your terminal capture below this line >>>>>

**andrew@andrew-VirtualBox:~$ useradd koenigtest -m**

**useradd: Permission denied.**

**useradd: cannot lock /etc/passwd; try again later.**

**andrew@andrew-VirtualBox:~$ sudo useradd koenigtest -m**

**[sudo] password for andrew:**

**andrew@andrew-VirtualBox:~$ cat /etc/passwd**

**root:x:0:0:root:/root:/bin/bash**

**daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin**

**bin:x:2:2:bin:/bin:/usr/sbin/nologin**

**sys:x:3:3:sys:/dev:/usr/sbin/nologin**

**sync:x:4:65534:sync:/bin:/bin/sync**

**games:x:5:60:games:/usr/games:/usr/sbin/nologin**

**man:x:6:12:man:/var/cache/man:/usr/sbin/nologin**

**lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin**

**mail:x:8:8:mail:/var/mail:/usr/sbin/nologin**

**news:x:9:9:news:/var/spool/news:/usr/sbin/nologin**

**uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin**

**proxy:x:13:13:proxy:/bin:/usr/sbin/nologin**

**www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin**

**backup:x:34:34:backup:/var/backups:/usr/sbin/nologin**

**list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin**

**irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin**

**gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin**

**nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin**

**systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin**

**systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin**

**systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin**

**messagebus:x:103:106::/nonexistent:/usr/sbin/nologin**

**syslog:x:104:110::/home/syslog:/usr/sbin/nologin**

**\_apt:x:105:65534::/nonexistent:/usr/sbin/nologin**

**tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false**

**rtkit:x:107:112:RealtimeKit,,,:/proc:/usr/sbin/nologin**

**systemd-coredump:x:108:113:systemd Core Dumper,,,:/run/systemd:/usr/sbin/nologin**

**kernoops:x:109:65534:Kernel Oops Tracking Daemon,,,:/:/usr/sbin/nologin**

**uuidd:x:110:118::/run/uuidd:/usr/sbin/nologin**

**cups-pk-helper:x:111:114:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin**

**tcpdump:x:112:120::/nonexistent:/usr/sbin/nologin**

**geoclue:x:113:122::/var/lib/geoclue:/usr/sbin/nologin**

**avahi-autoipd:x:114:123:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin**

**usbmux:x:115:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin**

**lightdm:x:116:124:Light Display Manager:/var/lib/lightdm:/bin/false**

**dnsmasq:x:117:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin**

**\_flatpak:x:118:127:Flatpak system-wide installation helper,,,:/nonexistent:/usr/sbin/nologin**

**avahi:x:119:128:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin**

**saned:x:120:129::/var/lib/saned:/usr/sbin/nologin**

**colord:x:121:130:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin**

**pulse:x:122:131:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin**

**speech-dispatcher:x:123:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false**

**nm-openvpn:x:124:133:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin**

**hplip:x:125:7:HPLIP system user,,,:/run/hplip:/bin/false**

**andrew:x:1000:1000:Andrew,,,:/home/andrew:/bin/bash**

**koenigtest:x:1001:1001::/home/koenigtest:/bin/sh**

**andrew@andrew-VirtualBox:~$ grep koenigtest /etc/passwd**

**koenigtest:x:1001:1001::/home/koenigtest:/bin/sh**

**andrew@andrew-VirtualBox:~$ sudo passwd koenigtest**

**New password:**

**Retype new password:**

**passwd: password updated successfully**

**andrew@andrew-VirtualBox:~$ groupadd testgroup**

**groupadd: Permission denied.**

**groupadd: cannot lock /etc/group; try again later.**

**andrew@andrew-VirtualBox:~$ sudo groupadd testgroup**

**andrew@andrew-VirtualBox:~$ usermod -g testgroup koenigtest**

**usermod: Permission denied.**

**usermod: cannot lock /etc/passwd; try again later.**

**andrew@andrew-VirtualBox:~$ sudo usermod -g testgroup koenigtest**

**andrew@andrew-VirtualBox:~$ id koenigtest**

**uid=1001(koenigtest) gid=1002(testgroup) groups=1002(testgroup)**

**andrew@andrew-VirtualBox:~$ sudo usermod testgroup andrew**

**Usage: usermod [options] LOGIN**

**Options:**

**-b, --badnames            allow bad names**

**-c, --comment COMMENT     new value of the GECOS field**

**-d, --home HOME\_DIR       new home directory for the user account**

**-e, --expiredate EXPIRE\_DATE  set account expiration date to EXPIRE\_DATE**

**-f, --inactive INACTIVE   set password inactive after expiration**

**to INACTIVE**

**-g, --gid GROUP           force use GROUP as new primary group**

**-G, --groups GROUPS       new list of supplementary GROUPS**

**-a, --append              append the user to the supplemental GROUPS**

**mentioned by the -G option without removing**

**the user from other groups**

**-h, --help                display this help message and exit**

**-l, --login NEW\_LOGIN     new value of the login name**

**-L, --lock                lock the user account**

**-m, --move-home           move contents of the home directory to the**

**new location (use only with -d)**

**-o, --non-unique          allow using duplicate (non-unique) UID**

**-p, --password PASSWORD   use encrypted password for the new password**

**-R, --root CHROOT\_DIR     directory to chroot into**

**-P, --prefix PREFIX\_DIR   prefix directory where are located the /etc/\* files**

**-s, --shell SHELL         new login shell for the user account**

**-u, --uid UID             new UID for the user account**

**-U, --unlock              unlock the user account**

**-v, --add-subuids FIRST-LAST  add range of subordinate uids**

**-V, --del-subuids FIRST-LAST  remove range of subordinate uids**

**-w, --add-subgids FIRST-LAST  add range of subordinate gids**

**-W, --del-subgids FIRST-LAST  remove range of subordinate gids**

**-Z, --selinux-user SEUSER new SELinux user mapping for the user account**

**andrew@andrew-VirtualBox:~$ sudo usermod -a  testgroup andrew**

**Usage: usermod [options] LOGIN**

**Options:**

**-b, --badnames            allow bad names**

**-c, --comment COMMENT     new value of the GECOS field**

**-d, --home HOME\_DIR       new home directory for the user account**

**-e, --expiredate EXPIRE\_DATE  set account expiration date to EXPIRE\_DATE**

**-f, --inactive INACTIVE   set password inactive after expiration**

**to INACTIVE**

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**mentioned by the -G option without removing**

**the user from other groups**

**-h, --help                display this help message and exit**

**-l, --login NEW\_LOGIN     new value of the login name**

**-L, --lock                lock the user account**

**-m, --move-home           move contents of the home directory to the**

**new location (use only with -d)**

**-o, --non-unique          allow using duplicate (non-unique) UID**

**-p, --password PASSWORD   use encrypted password for the new password**

**-R, --root CHROOT\_DIR     directory to chroot into**

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**-s, --shell SHELL         new login shell for the user account**

**-u, --uid UID             new UID for the user account**

**-U, --unlock              unlock the user account**

**-v, --add-subuids FIRST-LAST  add range of subordinate uids**

**-V, --del-subuids FIRST-LAST  remove range of subordinate uids**

**-w, --add-subgids FIRST-LAST  add range of subordinate gids**

**-W, --del-subgids FIRST-LAST  remove range of subordinate gids**

**-Z, --selinux-user SEUSER new SELinux user mapping for the user account**

**andrew@andrew-VirtualBox:~$ id andrew**

**uid=1000(andrew) gid=1000(andrew) groups=1000(andrew),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),114(lpadmin),134(sambashare)**

**andrew@andrew-VirtualBox:~$ sudo usermod -a koenigtest testgroup**

**Usage: usermod [options] LOGIN**

**Options:**

**-b, --badnames            allow bad names**

**-c, --comment COMMENT     new value of the GECOS field**

**-d, --home HOME\_DIR       new home directory for the user account**

**-e, --expiredate EXPIRE\_DATE  set account expiration date to EXPIRE\_DATE**

**-f, --inactive INACTIVE   set password inactive after expiration**

**to INACTIVE**

**-g, --gid GROUP           force use GROUP as new primary group**

**-G, --groups GROUPS       new list of supplementary GROUPS**

**-a, --append              append the user to the supplemental GROUPS**

**mentioned by the -G option without removing**

**the user from other groups**

**-h, --help                display this help message and exit**

**-l, --login NEW\_LOGIN     new value of the login name**

**-L, --lock                lock the user account**

**-m, --move-home           move contents of the home directory to the**

**new location (use only with -d)**

**-o, --non-unique          allow using duplicate (non-unique) UID**

**-p, --password PASSWORD   use encrypted password for the new password**

**-R, --root CHROOT\_DIR     directory to chroot into**

**-P, --prefix PREFIX\_DIR   prefix directory where are located the /etc/\* files**

**-s, --shell SHELL         new login shell for the user account**

**-u, --uid UID             new UID for the user account**

**-U, --unlock              unlock the user account**

**-v, --add-subuids FIRST-LAST  add range of subordinate uids**

**-V, --del-subuids FIRST-LAST  remove range of subordinate uids**

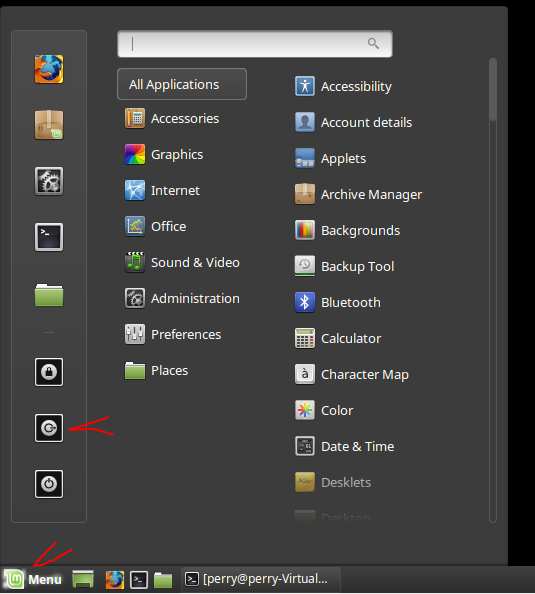
**-w, --add-subgids FIRST-LAST  add range of subordinate gids**

**-W, --del-subgids FIRST-LAST  remove range of subordinate gids**

**-Z, --selinux-user SEUSER new SELinux user mapping for the user account**

<<<<< Paste your terminal capture above this line <<<<<

1. Log out/switch user, and log in as <yourlastname>test, the new user account you created before. In Mint Cinnamon, you just go to the menu (bottom left), and select the icon that looks like an arrow leaving a circle. Other desktops will be similar:



1. Start a new bash shell/terminal session.
2. Launch a bash shell by just typing bash.
3. Use ls -l to list the content.
4. Capture the terminal interactions and paste below:

>>>>>Paste your terminal capture below this line >>>>>

**andrew@andrew-VirtualBox:~$**

**$ bash**

**koenigtest@andrew-VirtualBox:~$ ls -l**

**total 32**

**drwxr-xr-x 2 koenigtest testgroup 4096 Feb  7 14:37 Desktop**

**drwxr-xr-x 2 koenigtest testgroup 4096 Feb  7 14:37 Documents**

**drwxr-xr-x 2 koenigtest testgroup 4096 Feb  7 14:37 Downloads**

**drwxr-xr-x 2 koenigtest testgroup 4096 Feb  7 14:37 Music**

**drwxr-xr-x 2 koenigtest testgroup 4096 Feb  7 14:37 Pictures**

**drwxr-xr-x 2 koenigtest testgroup 4096 Feb  7 14:37 Public**

**drwxr-xr-x 2 koenigtest testgroup 4096 Feb  7 14:37 Templates**

**drwxr-xr-x 2 koenigtest testgroup 4096 Feb  7 14:37 Videos**

**koenigtest@andrew-VirtualBox:~$**

<<<<< Paste your terminal capture above this line <<<<<

# Part 4:

* + - 1. How many types of environment variables in the bash shell? What is the difference between them? 2 types. Shell variables and environment variables. Shell variables are local to an instance of the shell, but environment variables are used by any program that is run even in another shell.

# Part 5: Submit your assignment to Blackboard

***NB. Don’t forget to take the weekly quiz!***

# Rubric

* Part 2, Chapter 6, 18 points. Maximum deduction of 1.5 points per numbered instruction. Must capture the actual terminal interactions, not just commands, to receive credit for a question.
* Part 3, 30 points. Maximum deduction of 2 points per numbered instruction. Must capture the actual terminal interactions, not just commands, to receive credit for a question.
* Part 4, 2 points.