

# ASEN 4057: Assignment 3

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## I. Part 2

1. Start your Virtual Machine (VM) and open a terminal window. Enter the command to show the directory contents.

```
shen@shen-VirtualBox:~$ ls
Desktop  Downloads  Music      Pictures  Templates
Documents examples.desktop part2.txt  Public    Videos
```

Figure 1: "ls"

2. Get the directory listing showing all files (including hidden files) within the directory in a long format.

```
shen@shen-VirtualBox:~$ ls -al
total 132
drwxr-xr-x 21 shen shen 4096 Feb 25 15:43 .
drwxr-xr-x  3 root root 4096 Feb 19 10:35 ..
-rw-r--r--  1 shen shen   53 Feb 25 15:21 .bash_history
-rw-r--r--  1 shen shen  220 Feb 19 10:35 .bash_logout
-rw-r--r--  1 shen shen 3771 Feb 19 10:35 .bashrc
drwx----- 12 shen shen 4096 Feb 25 15:13 .cache
drwx----- 16 shen shen 4096 Feb 25 15:07 .config
drwxr-xr-x  2 shen shen 4096 Feb 19 10:45 Desktop
drwxr-xr-x  4 shen shen 4096 Feb 25 15:37 Documents
drwxr-xr-x  9 shen shen 4096 Feb 19 10:54 Downloads
drwx-----  2 shen shen 4096 Feb 25 15:43 .emacs.d
-rw-r--r--  1 shen shen 8980 Feb 19 10:35 examples.desktop
drwx-----  2 shen shen 4096 Feb 25 15:22 .gconf
drwx-----  3 shen shen 4096 Feb 25 15:13 .gnupg
-rw-r--r--  1 shen shen  708 Feb 25 15:13 .ICEauthority
drwxrwxr-x  3 shen shen 4096 Feb 25 15:34 .java
drwx-----  3 shen shen 4096 Feb 19 10:45 .local
drwxrwxr-x  3 shen shen 4096 Feb 25 15:19 .matlab
drwx-----  4 shen shen 4096 Feb 19 10:46 .mozilla
drwxr-xr-x  2 shen shen 4096 Feb 19 10:45 Music
drwxrwxr-x  2 shen shen 4096 Feb 25 15:33 .oracle_jre_usage
-rw-rw-r--  1 shen shen   94 Feb 25 15:40 part2.txt
drwxr-xr-x  2 shen shen 4096 Feb 19 10:45 Pictures
-rw-r--r--  1 shen shen  655 Feb 19 10:35 .profile
drwxr-xr-x  2 shen shen 4096 Feb 19 10:45 Public
drwxrwxr-x  3 shen shen 4096 Feb 25 15:33 .subversion
-rw-r--r--  1 shen shen    0 Feb 19 10:54 .sudo_as_admin_successful
drwxr-xr-x  2 shen shen 4096 Feb 19 10:45 Templates
drwxr-xr-x  2 shen shen 4096 Feb 19 10:45 Videos
-rw-r--r--  1 shen shen   60 Feb 25 15:13 .Xauthority
-rw-r--r--  1 shen shen   82 Feb 25 15:13 .xsession-errors
-rw-r--r--  1 shen shen   82 Feb 19 10:45 .xsession-errors.old
```

Figure 2: "ls -al"

3. For each file listed in the long format, what do each of the first ten characters imply?

*The first ten characters imply the type and access right to file*

4. Assess the file system disk usage in a human readable format.

```
shen@shen-VirtualBox:~$ ls -a
.          Documents      .local      Public
..         Downloads      .matlab     .subversion
.bash_history .emacs.d      .mozilla    .sudo_as_admin_successful
.bash_logout examples.desktop Music        Templates
.bashrc     .gconf        .oracle_jre_usage Videos
.cache      .gnupg        part2.txt   .Xauthority
.config     .ICEauthority Pictures     .xsession-errors
Desktop     .java         .profile    .xsession-errors.old
```

Figure 3: "ls -a"

5. Examine the contents of the /bin directory. Choose five programs that you do not know and determine what they do and how they are used by employing bash commands

```
shen@shen-VirtualBox:~$ ls /usr/bin
[
2to3          gnome-screensaver      nmtui-hostname      rvlew
2to3-2.7      gnome-screensaver-command nohup                sane-find-scanner
2to3-3.5      gnome-screenshot       notify-send          savelog
411toppm      gnome-session          nproc                sbattach
aily-profile-manager-indicator gnome-session-inhibit nroff                sbgtopgm
aa-enabled    gnome-session-properties nsenter              sbkeysync
aconnect      gnome-session-quit     nslookup             sblist
acpi_listen   gnome-software         nstat                sbm
activity-log-manager gnome-system-log       nsupdate             sbvarsign
add-apt-repository gnome-system-log-pkexec ntfsdecrypt           sbverify
addpart       gnome-system-monitor  numfmt               scanimage
addr2line     gnome-terminal         nvidia-detector      scp
alsabat       gnome-terminal.real    oakdecode            scp-dbus-service
alsaloop      gnome-terminal.wrapper obexctl              screendump
alsamixer     gnome-text-editor      objcctl              script
alsatplg      gnome-thumbnail-font   objdump              scriptreplay
alsaucm       gnome-www-browser      oclock               sdiff
amidi         gold                   od                   sed
amixer        gouldtoppm            on_ac_power          sedtool
amuFormat.sh  gpg                   onboard              seahorse
animate       gpg2                  onboard-settings     see
animate-in6   gpg-agent              online-accounts-preferences select-default-iwrap
anytopnm     gpgconf                openssl              select-editor
apg          gpg-connect-agent      opldecode            sensible-browser
apgbfm       gpgparsemail           orca                  sensible-editor
aplay        gpgsplit               os-prober             sensible-pager
aplaymidi    gpgv                   p11-kit              seq
apport-bug   gpg-zip                pacat                 session-installer
apport-cli   gpic                   pacnd                 session-migration
apport-collect gprof                  pactl                 sessreg
apport-unpack gpu-manager             padsp                 setarch
appres       grep-changelog          pager                 setfacl
                                    setkeycodes
                                    settled
```

Figure 4: "ls /usr/bin"

6. . Complete the following tasks:

Create a folder in your /Documents directory called ASEN4519.

```
shen@shen-VirtualBox:~/Documents$ mkdir ASEN4519
```

Figure 5: "mkdir"

Within this new directory, create a text file called asen4519test.txt.

```
shen@shen-VirtualBox:~/Documents$ cd ASEN4519
shen@shen-VirtualBox:~/Documents/ASEN4519$ asen4519test.txt
asen4519test.txt: command not found
shen@shen-VirtualBox:~/Documents/ASEN4519$ touch asen4519test.txt
shen@shen-VirtualBox:~/Documents/ASEN4519$ ls
asen4519test.txt
```

Figure 6: "touch"

Within this file, include both group members names, class years, and favorite movies

```
shen@shen-VirtualBox:~/Documents/ASEN4519$ echo "Group 11, Michael Tzimourakas and Yao Shen, 2019, Mulan, Room" >> asen4519test.txt
```

Figure 7: "echo"

Change the permissions on this file so that you, the user, has read, write, and execute permissions.

```
shen@shen-VirtualBox:~/Documents/ASEN4519$ chmod u+r asen4519test.txt
shen@shen-VirtualBox:~/Documents/ASEN4519$ chmod u+w asen4519test.txt
shen@shen-VirtualBox:~/Documents/ASEN4519$ chmod u+x asen4519test.txt
shen@shen-VirtualBox:~/Documents/ASEN4519$
```

Figure 8: "chmod"

Show all the contents (including hidden files) of the /Documents/ASEN4519 directory in a long format.

```
shen@shen-VirtualBox:~/Documents/ASEN4519$ ls -al
total 12
drwxrwxr-x 2 shen shen 4096 Feb 26 06:59 .
drwxr-xr-x 5 shen shen 4096 Feb 26 06:57 ..
-rwxrwxrwx 1 shen shen   18 Feb 26 07:10 asen4519test.txt
```

Figure 9: "ls -al"

Display the contents of asen4519test.txt using the cat command.

```
shen@shen-VirtualBox:~/Documents/ASEN4519$ cat asen4519test.txt
Group 11, Michael Tzimourakas and Yao Shen, 2019, Mulan, Room
shen@shen-VirtualBox:~/Documents/ASEN4519$
```

Figure 10: "cat"

Move asen4519test.txt to your home directory and verify it is there.

```
shen@shen-VirtualBox:~/Documents$ cd ASEN4519/
shen@shen-VirtualBox:~/Documents/ASEN4519$ ls
asen4519test.txt
shen@shen-VirtualBox:~/Documents/ASEN4519$ mv asen4519test.txt /home/shen/
shen@shen-VirtualBox:~/Documents/ASEN4519$ cd
shen@shen-VirtualBox:~$ ls
asen4519test.txt Desktop Documents Downloads examples.desktop Music part2.txt Pictures Public Templates Videos
```

Figure 11: "mv"

Rename the file to asen4519.txt and verify it has changed. Delete the file and verify it has been deleted.

```
shen@shen-VirtualBox:~$ ls
asen4519test.txt Desktop Documents Downloads examples.desktop Music part2.txt Pictures Public Templates Videos
shen@shen-VirtualBox:~$ mv asen4519test.txt 123.txt
shen@shen-VirtualBox:~$ ls
123.txt Desktop Documents Downloads examples.desktop Music part2.txt Pictures Public Templates Videos
shen@shen-VirtualBox:~$ rm 123.txt
shen@shen-VirtualBox:~$ ls
Desktop Documents Downloads examples.desktop Music part2.txt Pictures Public Templates Videos
```

Figure 12: " mv and rm "

7. Complete the following tasks: Start MATLAB from the command line as a background process. Once MATLAB has started, return to the command line and use the top command to assess the most computationally expensive processes running on your VM. List what percentage of the CPU and memory MATLAB is utilizing. For this last task, you may need to wait for top to refresh.

```
michael@michael-VirtualBox: ~
top - 11:25:38 up 7 min, 1 user, load average: 1.26, 1.20, 0.65
Tasks: 172 total, 1 running, 171 sleeping, 0 stopped, 0 zombie
%Cpu(s): 10.6 us, 1.7 sy, 0.0 ni, 87.3 id, 0.3 wa, 0.0 hi, 0.0 si, 0.0 st
KiB Mem : 4953688 total, 2585744 free, 1237424 used, 1130520 buff/cache
KiB Swap: 5116924 total, 5116924 free, 0 used. 3449176 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1603	michael	20	0	1297292	301304	76640	S	9.3	6.1	0:32.71	compiz
902	root	20	0	419272	94868	30468	S	2.3	1.9	0:10.07	Xorg
3309	michael	20	0	670012	36204	28304	S	0.7	0.7	0:00.63	gnome-termi+
1298	michael	20	0	123368	2128	1756	S	0.3	0.0	0:00.61	VBoxClient
1458	michael	20	0	533104	27984	22220	S	0.3	0.6	0:00.62	banfdaemon
3326	michael	20	0	48868	3632	3100	R	0.3	0.1	0:00.14	top
3347	michael	20	0	3881184	578684	210280	S	0.3	11.7	0:25.81	MATLAB
3629	michael	20	0	634000	30308	25376	S	0.3	0.6	0:00.14	gnome-scre+
1	root	20	0	119568	5736	4004	S	0.0	0.1	0:01.22	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	20	0	0	0	0	S	0.0	0.0	0:00.08	kworker/0:0
4	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kworker/0:0H
6	root	20	0	0	0	0	S	0.0	0.0	0:00.18	ksoftirqd/0
7	root	20	0	0	0	0	S	0.0	0.0	0:00.26	rcu_sched
8	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_bh
9	root	rt	0	0	0	0	S	0.0	0.0	0:00.00	migration/0
10	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	lru-add-dra+

Figure 13: matlab CPU usage

Return to the MATLAB session and enter the following at the command line: tic; a = rand(9973); b = fft(a); toc List what percentage of the CPU and memory MATLAB is utilizing while MATLAB processing that line, and list the time it takes for MATLAB to run the commands. Once MATLAB completes the computation, list what percentage of the CPU and memory MATLAB is now utilizing.



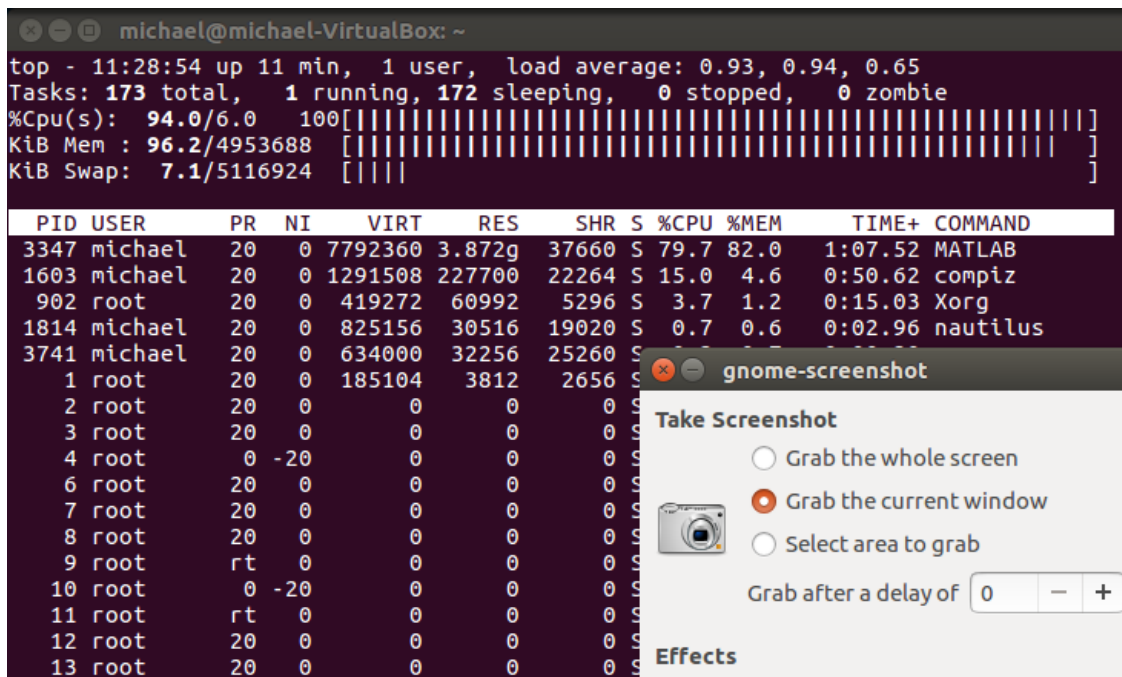


Figure 14: matlab CPU usage while running

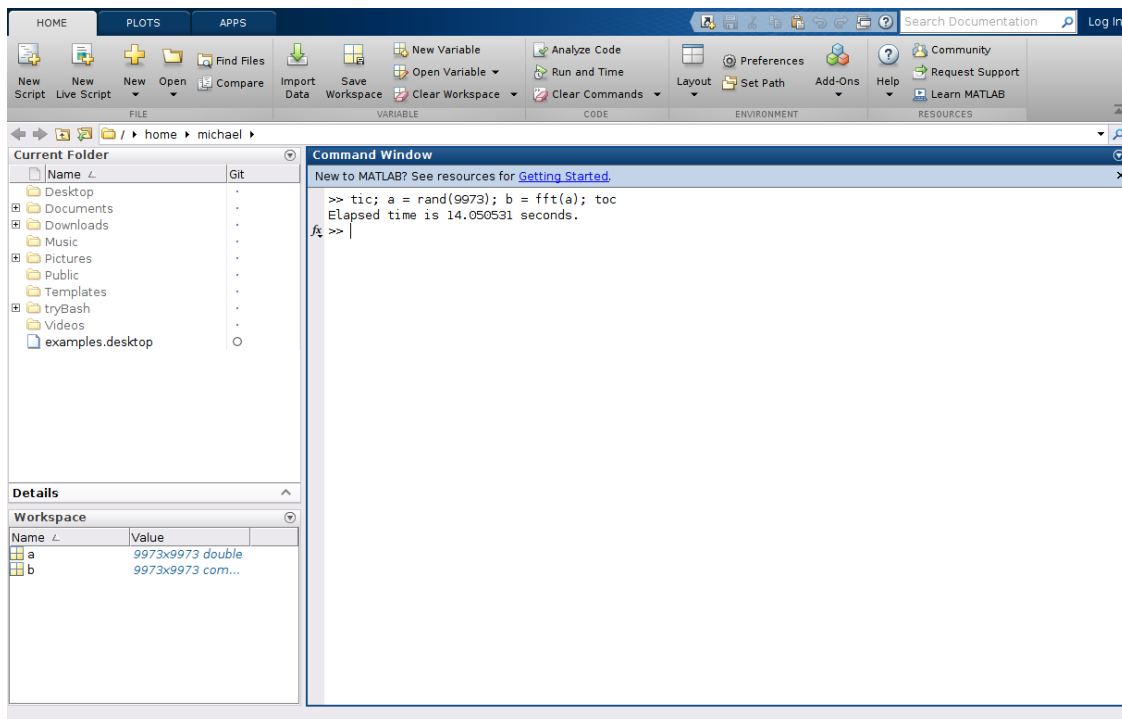


Figure 15: Matlab time

Quit MATLAB and restart MATLAB as a background process using the nice command with a nice argument of -15. Verify MATLAB is running with a nice value of -15. Within the niced MATLAB session, again enter the commands: `tic; a = rand(9973); b = fft(a); toc`

List how long it takes MATLAB to run the commands. How does this compare to the run without nice? Is this what you expect? Why?

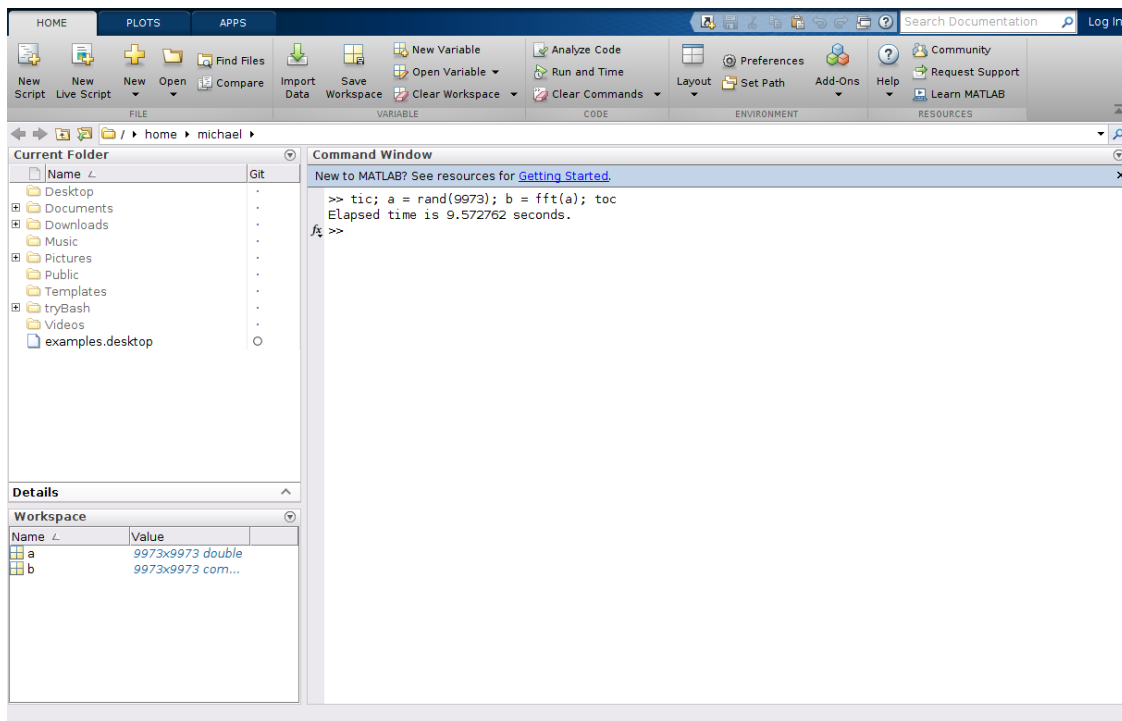


Figure 16: matlab time using niced session

The 'niced' version of matlab runs much quicker than the un-niced version. This is expected as the nice command is meant to optimize a program. This command allocates more CPU power to the program, resulting in it working faster.

8. Where is the actual executable for MATLAB located? Why can you start it without the full pathname from the command line?

Files MATLAB R2017b bin matlab is where the actual executable path for MATLAB is located. You are able to start it with the command "matlab", because the download for matlab created an executable path that is linked to the command "matlab". This can be done for any program in unix.

9. In what directories does the bash shell search for programs to run on your VM? Where is that information stored? Can it be changed?

The PATH variable stores the directories in which the bash shell will search for programs. This information is stored in plain text files created whenever the program is downloaded. These files can be changed if the text file is edited.

10. Using only a single command line instruction with pipes and redirection, take the combined contents of /bin and /usr/bin, sort them, and write them to a file in the /Documents directory called useful-programs.txt.

```
michael@michael-VirtualBox:~$ ls -l /bin | sort > ~/Documents/usefulprograms.txt | ls -l /usr/bin | sort >> ~/Documents/usefulprograms.txt
michael@michael-VirtualBox:~$
```

Figure 17: piping files together

11. Determine the default terminal for your VM and where the environment variable storing this information is set.

```
michael@michael-VirtualBox:~$ echo $term
michael@michael-VirtualBox:~$ echo $TERM
xterm-256color
michael@michael-VirtualBox:~$
```

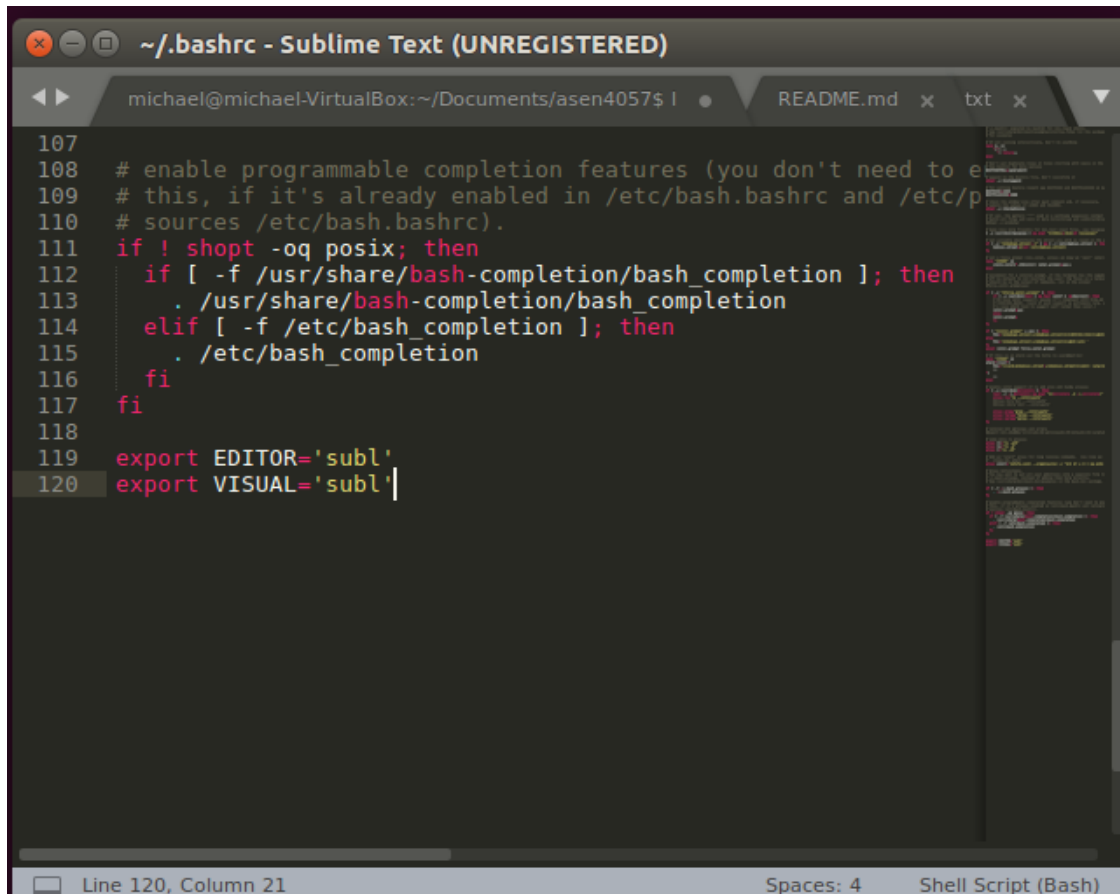
Figure 18: Default terminal

12. Verify that there is no default editor currently associated with your VM. Fix this by assigning a default



editor (e.g., nano or vim) at login. Describe the fix.

echo \$EDITOR came up blank. I assigned Sublime as my default text editor by adding the following lines to my .bashrc file.



```
107
108 # enable programmable completion features (you don't need to e
109 # this, if it's already enabled in /etc/bash.bashrc and /etc/p
110 # sources /etc/bash.bashrc).
111 if ! shopt -oq posix; then
112     if [ -f /usr/share/bash-completion/bash_completion ]; then
113         . /usr/share/bash-completion/bash_completion
114     elif [ -f /etc/bash_completion ]; then
115         . /etc/bash_completion
116     fi
117 fi
118
119 export EDITOR='subl'
120 export VISUAL='subl'
```

Figure 19: Editing default text editor

## II. Part 3

1. Of the group members should create a new branch `Current_Assignment` within his or her local repository. The group member who initializes this branch shall be referred to henceforth as Member #1 and the other as Member #2. Member #1 should push the new branch to GitHub.
2. Member #1 should create the directory: `Assignments/Assignment_4/Part_3/SubmissionwithintheCurrent_Assignment` branch of his or her local repository.

To being, we created the file structure. This structure is then initiated a a git repository.

```
git add Assignments/
git commit -m "Committing Assignments"
git remote add origin https://github.com/Aerospace-Software/Tzimourakas.git
git push -u origin master
Username for 'https://github.com':
Password for 'https://Tzimo@github.com':
```

3. Member #1 should create a new file, `README.md`, containing the text Member #1 of Group # edited this file. within the new directory.

*VirtualBox : /Documents/asen4057/Assignments/Assignment\_4/Part\_3\$touchREADME.md*  
*VirtualBox : /Documents/asen4057/Assignments/Assignment\_4/Part\_3\$echo"Member#1ofGroup#11editedthisfile"*  
*README.md*

4. Member #1 should add, commit, and push the file README.md to the branch Current\_Assignment.

```
git add Assignments/  
git commit -m "Committing Change to README"  
git push -u origin master  
Username for 'https://github.com':  
Password for 'https://Tzimo@github.com':
```

5. Member #2 should clone Member #1s repository from GitHub.

```
git clone https://github.com/Aerospace-Software/Tzimourakas
```

6. Member #2 should locally edit the file README.md in *Assignments/Assignment\_4/Part\_3/Submission* within the Current\_Assignment branch by adding the line Member #2 of Group # edited this file.

*VirtualBox : /Documents/asen4057/Assignments/Assignment\_4/Part\_3\$touchREADME.md*  
*VirtualBox : /Documents/asen4057/Assignments/Assignment\_4/Part\_3\$echo"Member#2ofGroup#11editedthisfile" >*  
*README.md*

7. Member #2 should add, commit, and push the file README.md to the branch Current\_Assignment.

```
git add Assignments/  
git commit -m "Committing Change to README"  
git push -u origin master  
Username for 'https://github.com':  
Password for 'https://shen@github.com':
```

8. Member #1 should locally edit the file README.md in *Assignments/Assignment\_4/Part\_3/SubmissionwithintheCurrent* branch by adding the line Member #1 of Group # edited this file.

*VirtualBox : /Documents/asen4057/Assignments/Assignment\_4/Part\_3\$touchREADME.md*  
*VirtualBox : /Documents/asen4057/Assignments/Assignment\_4/Part\_3\$echo"Member#1ofGroup#11editedthisfile" >*  
*README.md*

9. Member #1 should add and commit the file README.md to the local branch Current\_Assignment.

```
git add Assignments/  
git commit -m "Committing Change to README"
```

10. Member #1 should attempt to locally pull Member #2s changes to the branch Current\_Assignment. Explain why an error arises.

```
git pull origin master
```

The error arises due to the fact that I have locally edited the README.md file and when the pull tries to merge the files, they are different. Pulling a file with the same name as a file that I have locally edited and not pushed will results in this error.

11. Member #1 should execute the necessary commands to incorporate both Member #1 and Member #2 edits to README.md, and add, commit, and push the modified file README.md to the branch Current\_Assignment.

```
git add Assignments/  
git commit -m "Committing Change to README"  
git push -u origin master  
Username for 'https://github.com':  
Password for 'https://Tzimo@github.com':
```

12. Member #2 should locally pull Member #1s changes to the branch Current\_Assignment.

```
git pull origin master
```

13. Member #2 should locally merge the branch Current\_Assignment into master.

```
git fetch  
git checkout master  
git pull origin master
```

14. Member #2 should push the file README.md to the remote branch master.

```
git add Assignments/  
git commit -m "Committing Change to README"  
git push -u origin master  
Username for 'https://github.com':  
Password for 'https://shen@github.com':
```

```

michael@michael-VirtualBox:~/Documents/asen4057$ ls
Assignments
michael@michael-VirtualBox:~/Documents/asen4057$ git commit -m "Committing
Assignments"
On branch master

Initial commit

Untracked files:
  Assignments/

nothing added to commit but untracked files present
michael@michael-VirtualBox:~/Documents/asen4057$ git add Assignments/
lmichael@michael-VirtualBox:~/Documents/asen4057$ clera
No command 'clera' found, did you mean:
  Command 'clear' from package 'ncurses-bin' (main)
clera: command not found
michael@michael-VirtualBox:~/Documents/asen4057$ clear

michael@michael-VirtualBox:~/Documents/asen4057$ git add Assignments/
michael@michael-VirtualBox:~/Documents/asen4057$ git commit -m "Committing
Assignments"
[master (root-commit) aeda0ad] Committing Assignments
8 files changed, 0 insertions(+), 0 deletions(-)
create mode 100644 Assignments/Assignment_1/HW1 (2).zip
create mode 100644 Assignments/Assignment_2/Part_1/test.txt
create mode 100644 Assignments/Assignment_2/Part_2/test.txt
create mode 100644 Assignments/Assignment_2/test.txt
create mode 100644 Assignments/Assignment_3/Michael_Tzimourakas_HW_3
(1).zip
create mode 100644 Assignments/Assignment_4/Part_2/test.txt
create mode 100644 Assignments/Assignment_4/Part_3/test.txt
create mode 100644 Assignments/Assignment_4/test.txt
michael@michael-VirtualBox:~/Documents/asen4057$ git status
On branch master
nothing to commit, working directory clean
michael@michael-VirtualBox:~/Documents/asen4057$ ls -a
. .. Assignments .git
michael@michael-VirtualBox:~/Documents/asen4057$ git remote add origin
https://github.com/Aerospace-Software/Tzimourakas.git
michael@michael-VirtualBox:~/Documents/asen4057$ git push -u origin
master
Username for 'https://github.com': Tzimo
Password for 'https://Tzimo@github.com':
Counting objects: 11, done.
Compressing objects: 100% (7/7), done.
Writing objects: 100% (11/11), 17.18 MiB | 6.21 MiB/s, done.
Total 11 (delta 0), reused 0 (delta 0)
To https://github.com/Aerospace-Software/Tzimourakas.git
 * [new branch]      master -> master
Branch master set up to track remote branch master from origin.
michael@michael-VirtualBox:~/Documents/asen4057$ ls
Assignments
michael@michael-VirtualBox:~/Documents/asen4057$ cd Assignments/ls
bash: cd: Assignments/ls: No such file or directory

```

Figure 20: Code inputs and outputs sort of