LAB-06 Date- 07/08/2025

1.The echo command can be used simply to display a piece of text (useful in programs).
Use echo to create a sentence. Pipe the output of this command to count the number of
words in the sentence. How do I use the wc to count the number of lines in this sentence?

```
ibab@IBAB-MSc-BDB-Comp06:~$ pwd
/home/ibab
ibab@IBAB-MSc-BDB-Comp06:~$ echo "This is my life" | wc -w
4
ibab@IBAB-MSc-BDB-Comp06:~$ echo "This is my life" | wc -l
1
ibab@IBAB-MSc-BDB-Comp06:~$
```

2. Execute the following command, and explain the meaning of the output. This concerns
the appearance of the command prompt, and you should be able to dissect the output
completely and explain it part by part. Make a list of the parts of the output and write
your explanations against each part. The command is cat .bashrc | grep 'PS1'

.bashrc file finds lines contailing PS1 which defines my shell prompt

```
ibab@IBAB-MSc-BDB-Comp06:~$ cat .bashrc | grep 'PS1'
    PS1='${debian_chroot:+($debian_chroot)}\[\033[01;32m\]\u@\h\[\033[00m\]:\[\033[01;34m\]\w\[\033[00m\]\$ '
    PS1='${debian_chroot:+($debian_chroot)}\u@\h:\w\$ '
    PS1="\[\e]0;${debian_chroot:+($debian_chroot)}\u@\h: \w\a\]$PS1"
ibab@IBAB-MSc-BDB-Comp06:~$
```

\u Username
\h Hostname
\w Full working directory
\$ for normal user
\s Shell name
\v shell version
debian_chroot : font name

3.In the above exercise, filter the output based on 'HIST' pattern. You will see a list
of environment variables. Figure out what they stand for and what the current values
mean.

```
ibab@IBAB-MSc-BDB-Comp06:~$ cat .bashrc | grep 'HIST' .bashrc
HISTCONTROL=ignoreboth
# for setting history length see HISTSIZE and HISTFILESIZE in bash(1)
HISTSIZE=1000
HISTFILESIZE=2000
ibab@IBAB-MSc-BDB-Comp06:~$
```

HISTFILESIZE- maximum number of commands written to the history file
HISTFILE- specifies the file path
HISTCONTROL- commands are excluded from history
HISTIGNORE- allows specifying patterns of commands to ignore

4.The whereis command searches for a program in a predefined set of standard binary directories such as /bin, /usr/bin and /usr/sbin. Type whereis ls and study the output. What is the difference between which and whereis commands?

which ls – shows where the **executable** ls is located (usr/bin/ls)
whereis ls – returns a **broader results**: binary, man pages, even source locations
(/bin/ls /usr/share/man/man1/la.1.gz)

5.The command dirname is used to retrieve the directory name in a given file path. Navigate to a previous lab folder such as Lab4 and list the files. Then type the command

dirname <filename> where give some existing filename in this command. What is the output?

6.Create a local variable called mylabdir, and set it to the following value: /home/ibab/Lab6 (which means that if you have not created a Lab6 folder you should do so). Print the value of this variable using the echo command, and then the dirname command output with a file you are working with, under the Lab6 directory.

```
ibab@IBAB-MSc-BDB-Comp06:~$ cd Downloads/
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ mkdir LAB6
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ cd LAB6/
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ mylabdir="/home/ibab/LAB6"
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "$mylabdir"
/home/ibab/LAB6
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ dirname "$mylabdir"/test.txt
/home/ibab/LAB6
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ 
```

```
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ cd LAB6
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ touch /Downloads/LAB6/test.txt
touch: cannot touch '/Downloads/LAB6/test.txt': No such file or directory
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ touch /test.txt
touch: cannot touch '/test.txt': Permission denied
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ touch test.txt
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ ls
test.txt
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ touch /Downloads/LAB6/test.txt
```

(7) Create a new bash subshell in this terminal. Prove that you have created a subshell using the ps command with the appropriate options. Inside this subshell print the value of the variable mylabdir. What is the value? If it is empty, how do you convert it to a global variable? Do the conversion and show that mylabdir is indeed a global variable.

```
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ bash # starts subshell
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "$mylabdir"

ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ 
```

its empty beacuse local vbariables are not passed to subshells unless it is exported. To make it a environment (global) variable:

```
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ bash # starts subshell
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "$mylabdir"

ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ export mylabdir
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ bash
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "$mylabdir"

ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Shell level: $SHLVL"
Shell level: 3
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ 
```

It now shows the Shell Level which proves its in Sub shell

```
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ bash # starts subshell
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "$mylabdir"

ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ export mylabdir
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ bash
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "$mylabdir"

ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Shell level: $SHLVL"
Shell level: 3
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "PArent shell PID
>
bash: unexpected EOF while looking for matching `"'
bash: syntax error: unexpected end of file
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Parent shell PID
>
bash: unexpected EOF while looking for matching `"'
bash: syntax error: unexpected end of file
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Parent shell PID"
Parent shell PID
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Parent shell PID: $PSPID
Parent shell PID:
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Parent shell PID: $$"
Parent shell PID: 45885
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ ps --forest
    PID TTY          TIME CMD
  41932 pts/1    00:00:00 bash
  45838 pts/1    00:00:00  \_ bash
  45885 pts/1    00:00:00      \_ bash
  46273 pts/1    00:00:00          \_ ps
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Current BASH PID: $$"
Current BASH PID: 45885
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Current BASH PID: $BASHP
Current BASH PID: 45885
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Shell level: $SHLVL"
Shell level: 3
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "Current BASH PID: $BASHP
Current BASH PID: 45885
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ 
```

(8) Display the output of the command echo $PATH. Is PATH local or global variable? Describe two ways of finding this out.

```
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ echo "$PATH"
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/snap/bin
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ 
```

It is a GLOBAL (Environmental) variable

```
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ ps --forest
    PID TTY          TIME CMD
  41932 pts/1    00:00:00 bash
  45838 pts/1    00:00:00  \_ bash
  45885 pts/1    00:00:00      \_ bash
  46912 pts/1    00:00:00          \_ ps
ibab@IBAB-MSc-BDB-Comp06:~/Downloads/LAB6$ 
```

2 ways

a. using /*etc*/profile *etc*profile.d

b. I can modify using /.profile, /.bashrc, or /.bash_profile

(9) The concept of a directory stack. Learning about this will allow you to know the powerful navigation mechanisms in Linux. The key commands in this exercise are dirs,cd -, pushd and popd. The directory stack operates like a stack of plates – the last plate on top is the first to be taken out. Try the following exercises to understand this.

(i) Execute dirs -v -l. What is the output? Learn more about the command and the options by looking up the man pages of what these options did. For each command below execute dirs -v -l to understand what happened to the directory stack.

(ii) By default the directory stack contains only one entry – the path to your $HOME. Let's add some entries to this stack using the following commands:

(a) pushd /var/log

(b) pushd /tmp

(c) pushd /etc

(d) pushd ~/Downloads

(e) pushd ~/Documents

(iii) Now execute dirs -v -l again. Explain the output.

(iv) Execute the command pushd +1. Explain what happened.

(v) Execute cd -. What happened?

(vi) Execute cd /tmp. What happened? In this case, note that we simply changed directory to an entry in the directory stack without reference to the stack in any way.

(vii) Execute popd. What happened? popd is responsible for removing the topmost "plate" in the stack and changes to the directory entry against index 1.

(viii) Execute popd +2. What happened? How is this different from pushd +2?

(ix) In all the above, what was happening the entry that was indexed against '0'? Explain what this entry represents.

Ans 9 Index 0 always represents the curent working directory

If cd or pushd this value changes immediately

It is essentially the top of the plate stack

```
ibab@IBAB-MSc-BDB-Comp06:/$ pushd
bash: pushd: no other directory
ibab@IBAB-MSc-BDB-Comp06:/$ dirs -v -l
 0  /
ibab@IBAB-MSc-BDB-Comp06:/$ cd
ibab@IBAB-MSc-BDB-Comp06:~$
ibab@IBAB-MSc-BDB-Comp06:~$ cd Downloads/
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ dirs -v -l
 0  /home/ibab/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ push /var/log
Command 'push' not found, did you mean:
  command 'pwsh' from snap powershell (7.5.2)
  command 'rush' from deb rush (1.8+dfsg-1.1)
  command 'posh' from deb posh (0.14.1)
  command 'pdsh' from deb pdsh (2.31-3build2)
  command 'ppsh' from deb ppsh (1.10-1build3.1)
See 'snap info <snapname>' for additional versions.
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ push /tmp
Command 'push' not found, did you mean:
  command 'pwsh' from snap powershell (7.5.2)
  command 'ppsh' from deb ppsh (1.10-1build3.1)
  command 'pdsh' from deb pdsh (2.31-3build2)
  command 'rush' from deb rush (1.8+dfsg-1.1)
  command 'posh' from deb posh (0.14.1)
See 'snap info <snapname>' for additional versions.
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ pushd /tmp
/tmp ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:/tmp$ cd ..
ibab@IBAB-MSc-BDB-Comp06:/$ cd
ibab@IBAB-MSc-BDB-Comp06:~$ pushd /var/log
/var/log ~ ~/Downloads
```

```
1009  history
ibab@IBAB-MSc-BDB-Comp06:~$ pushd +1
~/Downloads /tmp /var/log ~ ~/Downloads ~
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ cd -
/home/ibab
ibab@IBAB-MSc-BDB-Comp06:~$ cd /tmp
ibab@IBAB-MSc-BDB-Comp06:/tmp$ popd
/tmp /var/log ~ ~/Downloads ~
ibab@IBAB-MSc-BDB-Comp06:/tmp$ popd =2
bash: popd: =2: invalid argument
popd: usage: popd [-n] [+N | -N]
ibab@IBAB-MSc-BDB-Comp06:/tmp$ popd +2
/tmp /var/log ~/Downloads ~
ibab@IBAB-MSc-BDB-Comp06:/tmp$ □
```

```
ibab@IBAB-MSc-BDB-Comp06:/tmp$ cd ..
ibab@IBAB-MSc-BDB-Comp06:/$ cd
ibab@IBAB-MSc-BDB-Comp06:~$ pushd /var/log
/var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:/var/log$ pushd /tmp
/tmp /var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:/tmp$ pushd /etc
/etc /tmp /var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:/etc$ push ~/Downloads
Command 'push' not found, did you mean:
  command 'pwsh' from snap powershell (7.5.2)
  command 'rush' from deb rush (1.8+dfsg-1.1)
  command 'ppsh' from deb ppsh (1.10-1build3.1)
  command 'pdsh' from deb pdsh (2.31-3build2)
  command 'posh' from deb posh (0.14.1)
See 'snap info <snapname>' for additional versions.
ibab@IBAB-MSc-BDB-Comp06:/etc$ push /Downloads
Command 'push' not found, did you mean:
  command 'pwsh' from snap powershell (7.5.2)
  command 'rush' from deb rush (1.8+dfsg-1.1)
  command 'ppsh' from deb ppsh (1.10-1build3.1)
  command 'pdsh' from deb pdsh (2.31-3build2)
  command 'posh' from deb posh (0.14.1)
See 'snap info <snapname>' for additional versions.
ibab@IBAB-MSc-BDB-Comp06:/etc$ pushd /Downloads
bash: pushd: /Downloads: No such file or directory
ibab@IBAB-MSc-BDB-Comp06:/etc$ pushd ~/Downloads
~/Downloads /etc /tmp /var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ pushd ~/Documents
~/Documents ~/Downloads /etc /tmp /var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Documents$ dirs -v -l
 0   /home/ibab/Documents
 1   /home/ibab/Downloads
 2   /etc
 3   /tmp
 4   /var/log
 5   /home/ibab
 6   /home/ibab/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Documents$ popd
~/Downloads /etc /tmp /var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ popd +1
~/Downloads /tmp /var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ dirs -v -l
 0   /home/ibab/Downloads
 1   /tmp
 2   /var/log
 3   /home/ibab
 4   /home/ibab/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ cd -
/home/ibab/Documents
```

```
ibab@IBAB-MSc-BDB-Comp06:~/Documents$ dirs -v -l
 0   /home/ibab/Documents
 1   /home/ibab/Downloads
 2   /etc
 3   /tmp
 4   /var/log
 5   /home/ibab
 6   /home/ibab/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Documents$ popd
~/Downloads /etc /tmp /var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ popd +1
~/Downloads /tmp /var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ dirs -v -l
 0   /home/ibab/Downloads
 1   /tmp
 2   /var/log
 3   /home/ibab
 4   /home/ibab/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ cd -
/home/ibab/Documents
ibab@IBAB-MSc-BDB-Comp06:~/Documents$ dirs -v -l
 0   /home/ibab/Documents
 1   /tmp
 2   /var/log
 3   /home/ibab
 4   /home/ibab/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Documents$ cd -
/home/ibab/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ pushd /etc
/etc ~/Downloads /tmp /var/log ~ ~/Downloads
ibab@IBAB-MSc-BDB-Comp06:/etc$ cd -
/home/ibab/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ cd -
/etc
ibab@IBAB-MSc-BDB-Comp06:/etc$ cd -
/home/ibab/Downloads
ibab@IBAB-MSc-BDB-Comp06:~/Downloads$ cd
ibab@IBAB-MSc-BDB-Comp06:~$ 
```