BDBP106: Linux and Python programming

Learning goals: Linux OS commands with piping, shell types, parent/child relationships, internal and external commands, environment variables, PATH variable, variable arrays and other commands not seen in theory classes
NOTE: Save screenshots of each exercise, and upload your work to your github account as Lab6.pdf by end of Thursday Aug 7.

(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-Comp03:~/bin$ echo " My Self Nilesh Sunil Kambale" > Ques1 | cat Ques1 | wc -w
5
```

(Snap No.1)

(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'
ANS;-

```
ibab@IBAB-MSc-BDB-Comp03:~$ 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"
```

(Snap.No.2)

Comand:- cat .bashrc | grep 'PS1'
Cat – lists the details of file
.bashrc - is the file where all bash process program are saved more this is the file which exicuted every time when you open the new terminal
Pipe | command create a sepration between two command thus two command cab be pass is single command line. Previous command is exicuted then next command
grep – command list the data fo file as per given the patten here 'PS1' is patter thus all line of the .bashrc file will be listed by this command with details

(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.
ANS

```
ibab@IBAB-MSc-BDB-Comp03:~$ cat .bashrc | grep 'HIST'
HISTCONTROL=ignoreboth
# for setting history length see HISTSIZE and HISTFILESIZE in bash(1)
HISTSIZE=1000
HISTFILESIZE=2000
ibab@IBAB-MSc-BDB-Comp03:~$ cat .bashrc
# ~/.bashrc: executed by bash(1) for non-login shells.
```

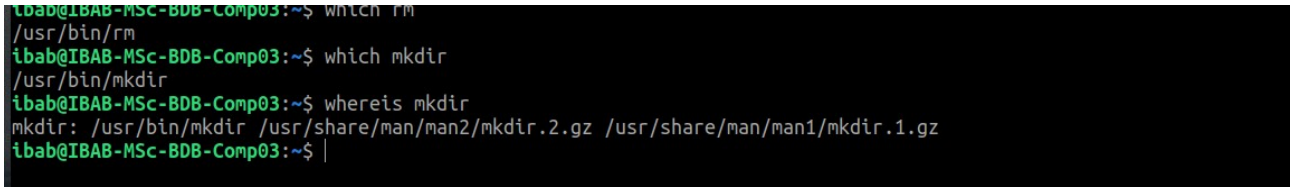
(Snap No.3)

don't put duplicate lines or lines starting with space in the history.
See bash(1) for more options
HISTCONTROL=ignoreboth

for setting history length see HISTSIZE and HISTFILESIZE in bash(1)
HISTSIZE=1000
HISTFILESIZE=2000

(4) The where is 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?

Ans

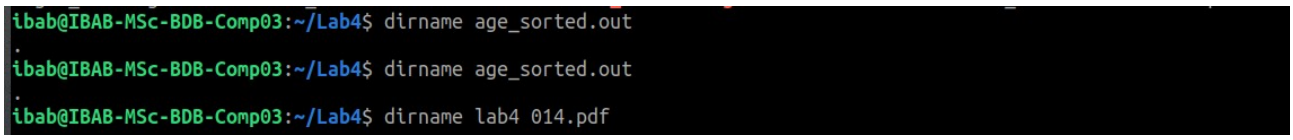


(Snap No.4)

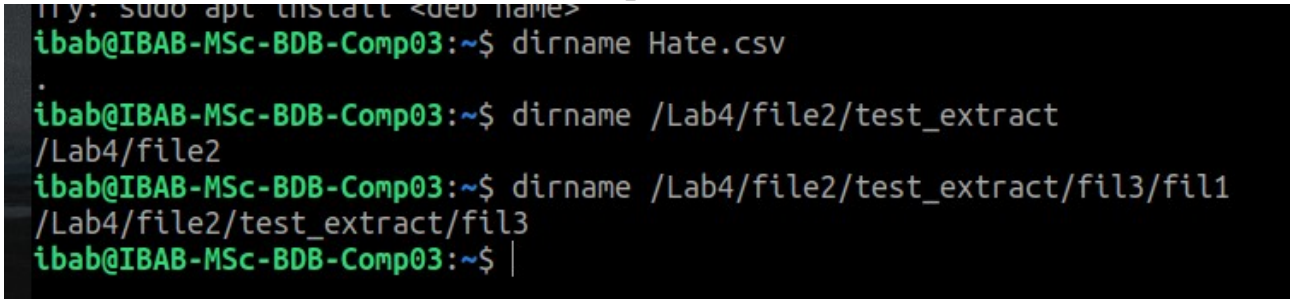
Which < Any Command > = Gives the path of the command where it is saved

Whereis < Any Command > = Searches & Gives locate the binary, source, and manual page files for a command returns path , as well as any source or binary's path where command is mention

(5) The command dirname is used to retrieve the directory name in a given file path. Nav-igate 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?



(Snap No.5)



(Snap No.6)

Ans :- output '.' (meaning the current directory) & strip last component from file name

(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-Comp03:~$ mylabdir=/home/ibab/Lab6
ibab@IBAB-MSc-BDB-Comp03:~$ echo $mylabdir
/home/ibab/Lab6
ibab@IBAB-MSc-BDB-Comp03:~$ ls
```

(Snap No.7)

```
ibab@IBAB-MSc-BDB-Comp03:~$ cd lab
ibab@IBAB-MSc-BDB-Comp03:~/lab$ cd Lab6
ibab@IBAB-MSc-BDB-Comp03:~/lab/Lab6$ ls
lab6.pdf
ibab@IBAB-MSc-BDB-Comp03:~/lab/Lab6$ echo $mylabdir
/home/ibab/Lab6
ibab@IBAB-MSc-BDB-Comp03:~/lab/Lab6$ dirname $mylabdir/lab6.pdf
/home/ibab/Lab6
ibab@IBAB-MSc-BDB-Comp03:~/lab/Lab6$
```

(Snap No.8)

(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-Comp03:~$ unset mylabdir
ibab@IBAB-MSc-BDB-Comp03:~$ export mylabdir=/home/ibab/lab6
ibab@IBAB-MSc-BDB-Comp03:~$ bash
ibab@IBAB-MSc-BDB-Comp03:~$ bash
ibab@IBAB-MSc-BDB-Comp03:~$ bash
ibab@IBAB-MSc-BDB-Comp03:~$ bash
ibab@IBAB-MSc-BDB-Comp03:~$ ps --forest
    PID TTY          TIME CMD
  33898 pts/1    00:00:00 bash
  33918 pts/1    00:00:00  \_ bash
  34038 pts/1    00:00:00      \_ bash
  34045 pts/1    00:00:00          \_ bash
  34051 pts/1    00:00:00              \_ bash
  34057 pts/1    00:00:00                  \_ bash
  34063 pts/1    00:00:00                      \_ ps
ibab@IBAB-MSc-BDB-Comp03:~$ echo mylabdir
mylabdir
ibab@IBAB-MSc-BDB-Comp03:~$ echo $mylabdir
/home/ibab/lab6
ibab@IBAB-MSc-BDB-Comp03:~$
```

(Snap No.8)

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

```
ibab@IBAB-MSc-BDB-Comp03:~$ echo $PATH
/home/ibab/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
ibab@IBAB-MSc-BDB-Comp03:~$ bash
ibab@IBAB-MSc-BDB-Comp03:~$ bash
ibab@IBAB-MSc-BDB-Comp03:~$ bash
ibab@IBAB-MSc-BDB-Comp03:~$ ps --forest
    PID TTY          TIME CMD
  32433 pts/0    00:00:00 bash
  34315 pts/0    00:00:00  \_ bash
  34321 pts/0    00:00:00      \_ bash
  34327 pts/0    00:00:00          \_ bash
  34333 pts/0    00:00:00              \_ ps
ibab@IBAB-MSc-BDB-Comp03:~$ echo $PATH
/home/ibab/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
ibab@IBAB-MSc-BDB-Comp03:~$
```

(Snap.No 9)

1) local vairable shell or terminal specific only if parent shell it works it may not work for child shell thus creating sub shell $PATH gives the same result thus it is global vairable see (Snap.No 9)

```
ibab@IBAB-MSc-BDB-Comp03:~$ env | grep PATH
MANDATORY_PATH=/usr/share/gconf/ubuntu.mandatory.path
WINDOWPATH=2
DEFAULTS_PATH=/usr/share/gconf/ubuntu.default.path
PATH=/home/ibab/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
ibab@IBAB-MSc-BDB-Comp03:~$
```

(Snap.No 10)

2) Another Way to chech $PATH is local vairable or Global vairable command env enlists the All Global Vairable By piping & grep command thrugh PATH pattern we can check thus Path is Global Vairable
Command:- env | grep PATH

(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.
Command :- dirs -v -l
dir :- list directorys content
s:- stands for Stack
-v :- natural sort of (version) numbers within text
-l :- -l use a long listing format

```
ibab@IBAB-MSc-BDB-Comp03:~$ dirs -v -l
 0  /home/ibab
ibab@IBAB-MSc-BDB-Comp03:~$ Lab5
Lab5: command not found
ibab@IBAB-MSc-BDB-Comp03:~$ cd Lab5
ibab@IBAB-MSc-BDB-Comp03:~/Lab5$ dirs -v -l
 0  /home/ibab/Lab5
ibab@IBAB-MSc-BDB-Comp03:~/Lab5$ cd
ibab@IBAB-MSc-BDB-Comp03:~$ cd lab
ibab@IBAB-MSc-BDB-Comp03:~/lab$ cd Lab6
ibab@IBAB-MSc-BDB-Comp03:~/lab/Lab6$ dirs -v -l
 0  /home/ibab/lab/Lab6
ibab@IBAB-MSc-BDB-Comp03:~/lab/Lab6$ lab6.pdf
lab6.pdf: command not found
ibab@IBAB-MSc-BDB-Comp03:~/lab/Lab6$
```

(Snap.No 11)

it gives 0 stack value

(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

```
ibab@IBAB-MSc-BDB-Comp03:~$ pushd /var/log
/var/log ~
ibab@IBAB-MSc-BDB-Comp03:/var/log$ pushd /var/log
/var/log /var/log ~
ibab@IBAB-MSc-BDB-Comp03:/var/log$ pushd /tmp
/tmp /var/log /var/log ~
ibab@IBAB-MSc-BDB-Comp03:/tmp$ pushd /etc
/etc /tmp /var/log /var/log ~
ibab@IBAB-MSc-BDB-Comp03:/etc$ pushd ~/Downloads
~/Downloads /etc /tmp /var/log /var/log ~
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$ pushd ~/Documents
~/Documents ~/Downloads /etc /tmp /var/log /var/log ~
ibab@IBAB-MSc-BDB-Comp03:~/Documents$ dirs -v -l
 0  /home/ibab/Documents
 1  /home/ibab/Downloads
 2  /etc
 3  /tmp
 4  /var/log
 5  /var/log
 6  /home/ibab
ibab@IBAB-MSc-BDB-Comp03:~/Documents$
```

(Snap.No 12)

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

```
ibab@IBAB-MSc-BDB-Comp03:~/Documents$ dirs -v -l
 0  /home/ibab/Documents
 1  /home/ibab/Downloads
 2  /etc
 3  /tmp
 4  /var/log
 5  /var/log
 6  /home/ibab
ibab@IBAB-MSc-BDB-Comp03:~/Documents$
```

(Snap.No 13)

It stacks directores one above one which derived by pushd command current one will be senn latest & having lower values & oldest one will have highest value

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

```
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$ dirs -v -l
 0  /home/ibab/Downloads
 1  /etc
 2  /tmp
 3  /var/log
 4  /var/log
 5  /home/ibab
 6  /home/ibab/Documents
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$
```

(Snap.No 14)

Ans It Pushes newly stack directory as last & all slides one position up

(v)Execute cd -. What happened?

```
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$ cd
ibab@IBAB-MSc-BDB-Comp03:~$ dirs -v -l
 0  /home/ibab
 1  /etc
 2  /tmp
 3  /var/log
 4  /var/log
 5  /home/ibab
 6  /home/ibab/Documents
ibab@IBAB-MSc-BDB-Comp03:~$
```

(Snap.No 15)

Ans cd returns to current directory & dirs -v -l still gives Stack but this time home directory assign as 0 thus it is latest directory

(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.

```
ibab@IBAB-MSc-BDB-Comp03:/tmp$ dirs -v -l
 0  /tmp
 1  /etc
 2  /tmp
 3  /var/log
 4  /var/log
 5  /home/ibab
 6  /home/ibab/Documents
ibab@IBAB-MSc-BDB-Comp03:/tmp$
```

(Snap.No 16)

now present working directory shiftef to /tmp and it is assign to 0 but home directory becomes second last

(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.

ANS it removes the first directory from stacking adds second one as firs see the snap 17.

```
ibab@IBAB-MSc-BDB-Comp03:~/Documents$ dirs -v -l
 0  /home/ibab/Documents
 1  /home/ibab/Downloads
 2  /etc
 3  /tmp
 4  /var/log
 5  /home/ibab
ibab@IBAB-MSc-BDB-Comp03:~/Documents$ popd
~/Downloads /etc /tmp /var/log ~
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$ dirs -v -l
 0  /home/ibab/Downloads
 1  /etc
 2  /tmp
 3  /var/log
 4  /home/ibab
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$
```

(Snap.No 17)

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

ANS :- It removes the second directory from stacking & arranges other acordingly see Snap No 18

```
~/Downloads /etc /tmp /var/log ~
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$ dirs -v -l
 0  /home/ibab/Downloads
 1  /etc
 2  /tmp
 3  /var/log
 4  /home/ibab
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$ popd +2
~/Downloads /etc /var/log ~
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$ dirs -v -l
 0  /home/ibab/Downloads
 1  /etc
 2  /var/log
 3  /home/ibab
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$
```

(Snap.No 18)

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

```
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$ dirs -v -l
 0  /home/ibab/Downloads
 1  /etc
 2  /var/log
 3  /home/ibab
ibab@IBAB-MSc-BDB-Comp03:~/Downloads$
```

(Snap.No 19)

Ans :- entery of 0 represents the current working directory in stackking list & previous one in havving according is FIFO order