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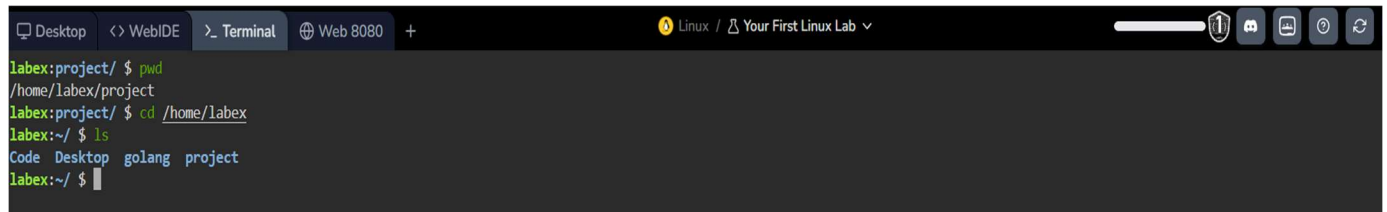
HPC LAB EXPERIMENT 1

Familiarization with Linux commands

1. Navigation Commands:

- pwd: Print working directory.
- ls: List directory contents.
- cd: Change directory.

Output :

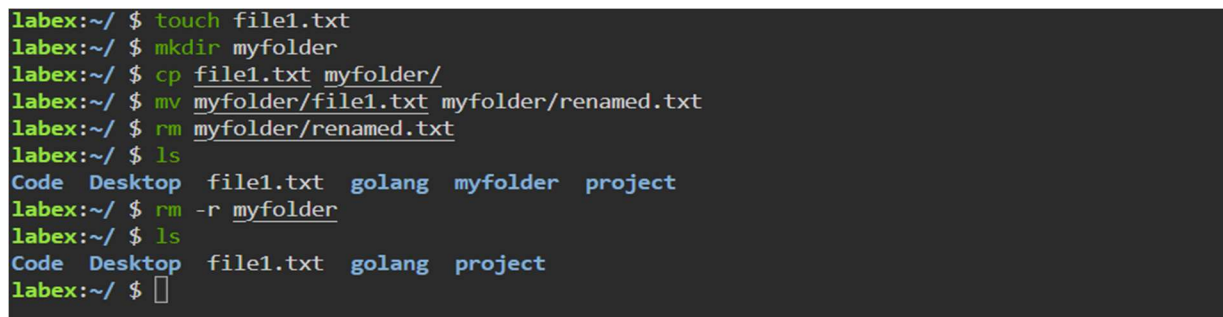


```
labex:project/ $ pwd
/home/labex/project
labex:project/ $ cd /home/labex
labex:~/ $ ls
Code Desktop goLang project
labex:~/ $
```

1. File and Directory Operations:

- touch: Create a new file.
- mkdir: Create a new directory.
- rm: Remove files or directories.
- cp: Copy files or directories.
- mv: Move or rename files or directories.

Output:



```
labex:~/ $ touch file1.txt
labex:~/ $ mkdir myfolder
labex:~/ $ cp file1.txt myfolder/
labex:~/ $ mv myfolder/file1.txt myfolder/renamed.txt
labex:~/ $ rm myfolder/renamed.txt
labex:~/ $ ls
Code Desktop file1.txt goLang myfolder project
labex:~/ $ rm -r myfolder
labex:~/ $ ls
Code Desktop file1.txt goLang project
labex:~/ $
```

1. Permission Management:

- chmod: Change file permissions.
- chown: Change file owner and group.
- ls -l: Display detailed file information including permissions.

Output :

```
labex:project/ $ touch demo.txt
labex:project/ $ ls -l demo.txt
-rw-rw-r-- 1 labex labex 0 Jul 14 15:19 demo.txt
labex:project/ $ chmod u+x demo.txt
labex:project/ $ ls -l demo.txt
-rwxrw-r-- 1 labex labex 0 Jul 14 15:19 demo.txt
labex:project/ $ chmod o-r demo.txt
labex:project/ $ ls -l demo.txt
-rwxrw---- 1 labex labex 0 Jul 14 15:19 demo.txt
labex:project/ $ sudo chown root:root demo.txt
labex:project/ $ ls -l demo.txt
-rwxrw---- 1 root root 0 Jul 14 15:19 demo.txt
labex:project/ $
```

1. Text Processing:

- cat: Concatenate and display file content.
- less, more: View file content page by page.
- grep: Search text using patterns.
- awk, sed: Text processing and transformation.

```
labex:project/ $ echo -e "Hello\nLinux\nWorld" > file.txt
labex:project/ $ cat file.txt
Hello
Linux
World
labex:project/ $ less file.txt
labex:project/ $ more file.txt
Hello
Linux
World
labex:project/ $ less /var/log/syslog
/var/log/syslog: No such file or directory
labex:project/ $ grep "Linux" file.txt
Linux
labex:project/ $ echo -e "Name Age\nNilesh 21\nAmit 22" > data.txt
labex:project/ $ awk '{print $2}' data.txt
Age
21
22
labex:project/ $ sed 's/Linux/Unix/' file.txt
Hello
Unix
World
labex:project/ $
```

1. System Monitoring:

- top: Display running processes.
- ps: Report a snapshot of current processes.
- df: Report file system disk space usage.
- du: Estimate file space usage

Output :

```
top - 15:27:43 up 266 days, 2:21, 0 users, load average: 0.91, 0.50, 0.57
Tasks: 76 total, 1 running, 75 sleeping, 0 stopped, 0 zombie
%Cpu(s): 1.6 us, 0.9 sy, 0.0 ni, 97.5 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 15728.3 total, 2388.0 free, 6249.1 used, 7099.2 buff/cache
MiB Swap: 0.0 total, 0.0 free, 0.0 used, 9029.9 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM     TIME+ COMMAND
    1 root        20   0  11204   3808   3528  S   0.0   0.0   0:00.00 init.sh
   21 root        20   0  40824  28560  10792  S   0.0   0.2   0:00.67 supervisord
   22 root        20   0  15424   9268   7636  S   0.0   0.1   0:00.02 sshd
   23 root        20   0  14040   4360   3816  S   0.0   0.0   0:00.00 su
   24 labex      20   0  40320  30812   6748  S   0.0   0.2   0:00.53 vncserver
   36 labex      20   0  939664 135996  68984  S   0.0   0.8   0:06.59 Xvnc
   46 labex      20   0  11204   3392   3144  S   0.0   0.0   0:00.00 sh
   47 labex      20   0  11204   1904   1640  S   0.0   0.0   0:00.00 sh
   48 labex      20   0  454060  76896  61108  S   0.0   0.5   0:00.17 xfce4-session
   57 labex      20   0   8300   1988   1528  S   0.0   0.0   0:00.00 dbus-launch
   58 labex      20   0   8512   3456   2816  S   0.0   0.0   0:00.04 dbus-daemon
   60 labex      20   0  309460  7520   6868  S   0.0   0.0   0:00.00 at-spi-bus-laun
   65 labex      20   0   8424   4468   4004  S   0.0   0.0   0:00.00 dbus-daemon
   69 labex      20   0  231000   6380   5564  S   0.0   0.0   0:00.06 xfconfd
   75 labex      20   0  162748   7196   6504  S   0.0   0.0   0:00.01 at-spi2-registr
   80 labex      20   0   7972   1076     0  S   0.0   0.0   0:00.00 ssh-agent
   85 labex      20   0  11496    284     0  S   0.0   0.0   0:00.00 gpg-agent
   86 labex      20   0  388924  38772  31872  S   0.0   0.2   0:00.19 xfwm4
   90 labex      20   0  241744   8032   7240  S   0.0   0.0   0:00.00 gvfsd
  101 labex      20   0  227988  24960  19404  S   0.0   0.2   0:00.11 xfsettingsd
  104 labex      20   0  417736  30192  24484  S   0.0   0.2   0:00.13 xfce4-panel
  108 labex      20   0  340480  22500  17684  S   0.0   0.1   0:00.05 Thunar
  113 labex      20   0  556784  83256  48452  S   0.0   0.5   0:00.80 xfdesktop
  114 labex      20   0  339772  23468  18684  S   0.0   0.1   0:00.04 panel-6-systray
  131 labex      20   0  262940  17648  15572  S   0.0   0.1   0:00.02 xfce4-notifyd
  135 labex      20   0  189084  17968  15808  S   0.0   0.1   0:00.04 xfce4-power-man
  141 labex      20   0  159612   7264   6600  S   0.0   0.0   0:00.00 xiccd
  162 labex      20   0  242280   7944   7192  S   0.0   0.0   0:00.00 gvfs-udisks2-vo
```

```
labex:project/ $ ps
  PID TTY          TIME CMD
 1564 pts/15        00:00:00 zsh
 1763 pts/15        00:00:00 ps
labex:project/ $
```

```
labex:project/ $ df -h

Filesystem      Size  Used Avail Use% Mounted on
overlay          20G  127M   20G   1% /
tmpfs            64M    0    64M   0% /dev
tmpfs            7.7G    0   7.7G   0% /sys/fs/cgroup
shm              64M    0    64M   0% /dev/shm
/dev/vdb         100G   19G   82G  19% /etc/hosts
tmpfs            7.7G    0   7.7G   0% /proc/acpi
tmpfs            7.7G    0   7.7G   0% /proc/scsi
tmpfs            7.7G    0   7.7G   0% /sys/firmware
labex:project/ $
```

```
labex:project/ $ du -sh *

4.0K    data.txt
0       demo.txt
4.0K    file.txt
labex:project/ $
```

1. Networking Commands:

- ping: Check network connectivity.
- ifconfig or ip addr: Display network interfaces.
- netstat: Network statistics.
- ssh: Secure shell for remote login.

Output :

```
labex:project/ $ ping google.com

PING google.com (142.251.46.174) 56(84) bytes of data.
```

```
labex:project/ $ ip addr

1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
343862: eth0@if343863: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default
    link/ether 02:42:ac:13:00:03 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 172.19.0.3/16 brd 172.19.255.255 scope global eth0
        valid_lft forever preferred_lft forever
```

```
labex:project/ $ ifconfig

eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.19.0.3 netmask 255.255.0.0 broadcast 172.19.255.255
    ether 02:42:ac:13:00:03 txqueuelen 0 (Ethernet)
    RX packets 15763 bytes 1259212 (1.2 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 13892 bytes 21858855 (21.8 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 56 bytes 4348 (4.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 56 bytes 4348 (4.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
labex:project/ $ netstat -tuln
```

```
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp      0      0 0.0.0.0:13100           0.0.0.0:*               LISTEN
tcp      0      0 0.0.0.0:13101           0.0.0.0:*               LISTEN
tcp      0      0 0.0.0.0:13102           0.0.0.0:*               LISTEN
tcp      0      0 127.0.0.11:46351        0.0.0.0:*               LISTEN
tcp      0      0 0.0.0.0:22              0.0.0.0:*               LISTEN
tcp      0      0 0.0.0.0:3001            0.0.0.0:*               LISTEN
tcp      0      0 0.0.0.0:3002            0.0.0.0:*               LISTEN
tcp6     0      0 :::22                   :::*                     LISTEN
udp      0      0 127.0.0.11:45980        0.0.0.0:*               LISTEN
udp      0      0 0.0.0.0:3001            0.0.0.0:*               LISTEN
```

1. Scripting Basics:

- Shell scripts: Basic scripts to automate tasks, usually with .sh extension.
- Common script commands: echo, read, if, for, while.

2. echo – Print text

```
bash
echo "Welcome, Nilesh!"
```

3. read – Get user input

```
4. bash
   read -p "Enter your name: " name
   echo "Hello, $name!"
```

Conclusion

Familiarization with Linux commands provides a fundamental skill set for working effectively in a Linux environment. By understanding and practicing these commands, users can navigate the file system, manage files and directories, monitor system performance, handle permissions, and perform basic network troubleshooting. Additionally, learning the basics of shell scripting enables automation of repetitive tasks, significantly enhancing productivity.

The hands-on experience gained through practicing these commands helps build confidence and competence in using the Linux operating system, which is crucial for both personal use and professional development in fields such as system administration, software development, and IT operations.