

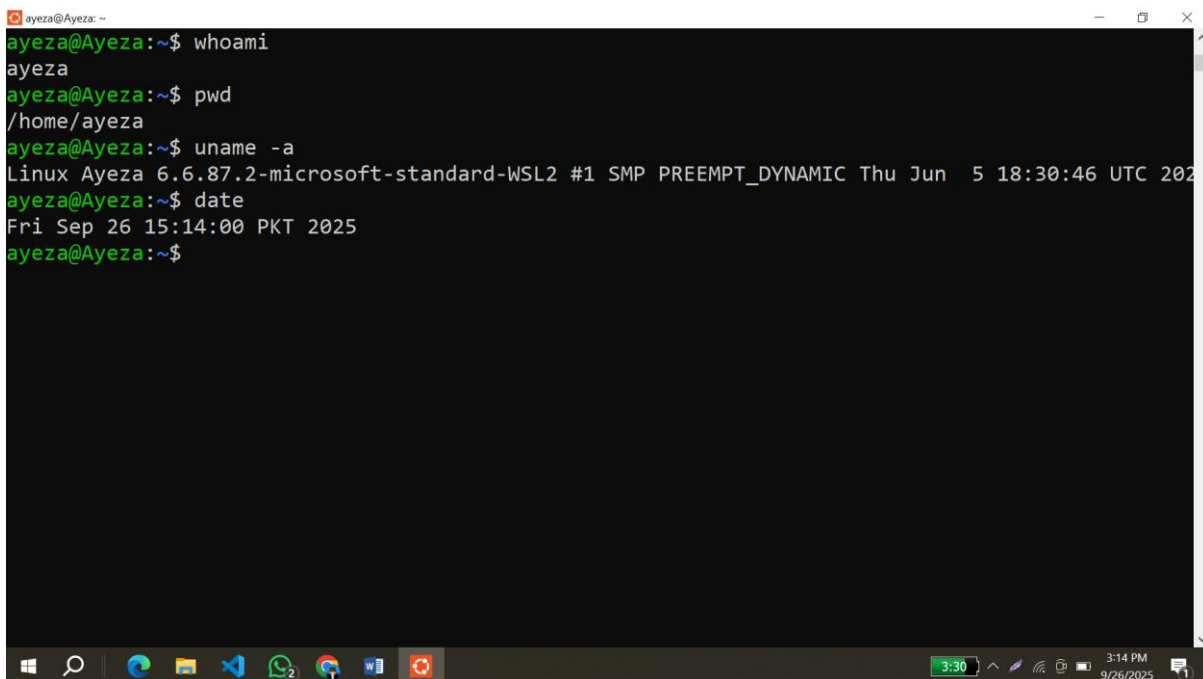
Lab 2: Linux Basics and Introduction

Part 1: Linux Environment Orientation

1.1 Understanding the Linux Environment

- **Concepts to Cover:**
 - What is Linux? Brief history and distributions
 - Linux vs Windows: Key differences
 - Understanding the shell (bash)
 - WSL2 as a Linux environment
- **Hands-on Activity:**

```
# Students open WSL2 terminal and explore
whoami          # Check current user
pwd             # Print working directory
uname -a        # System information
date            # Current date and time
```



```
ayeza@Ayeza: ~
ayeza@Ayeza:~$ whoami
ayeza
ayeza@Ayeza:~$ pwd
/home/ayeza
ayeza@Ayeza:~$ uname -a
Linux Ayeza 6.6.87.2-microsoft-standard-WSL2 #1 SMP PREEMPT_DYNAMIC Thu Jun 5 18:30:46 UTC 2025
ayeza@Ayeza:~$ date
Fri Sep 26 15:14:00 PKT 2025
ayeza@Ayeza:~$
```

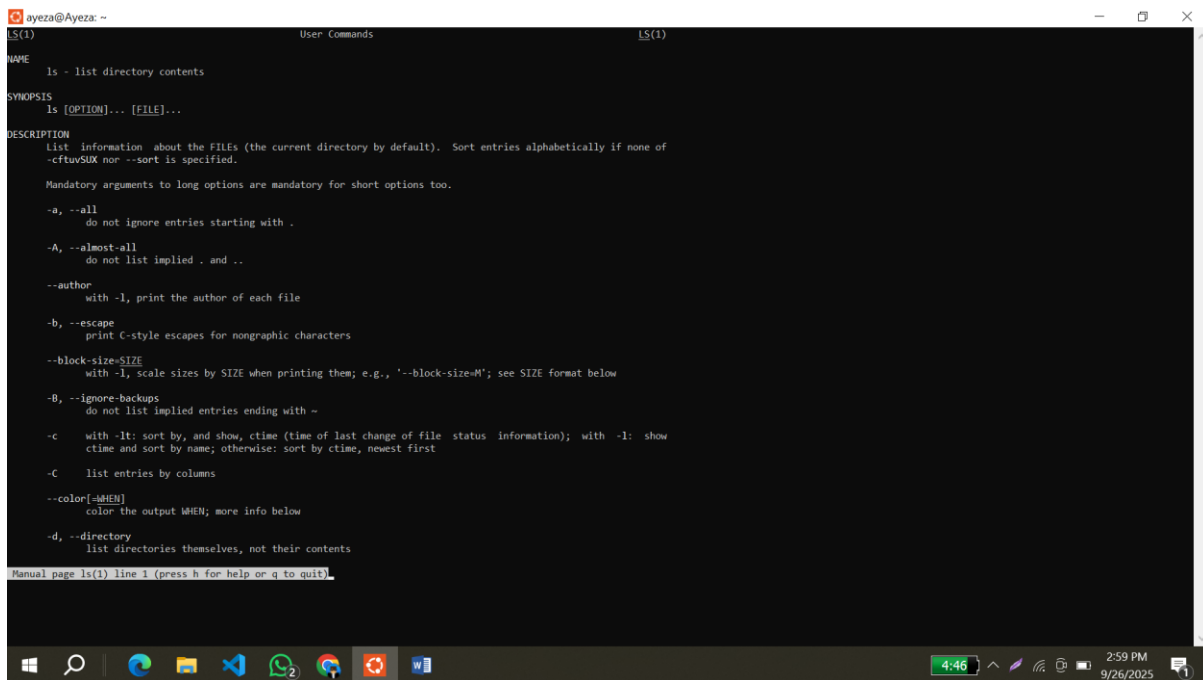
Remarks:

The above output is given by running command of “whoami , pwd,uname -a , date”.

1.2 Getting Help in Linux

- **Commands to demonstrate:**

```
man ls          # Manual pages
ls --help       # Built-in help
which ls        # Location of commands
type ls         # Command type information
```



The screenshot shows a terminal window titled "User Commands" with the command "ls(1)" in the title bar. The terminal displays the manual page for the 'ls' command. The output is as follows:

```
NAME
  ls - list directory contents

SYNOPSIS
  ls [OPTION]... [FILE]...

DESCRIPTION
  List information about the FILES (the current directory by default). Sort entries alphabetically if none of
  -ctuvSUX nor --sort is specified.
  Mandatory arguments to long options are mandatory for short options too.

  -a, --all
      do not ignore entries starting with .

  -A, --almost-all
      do not list implied . and ..

  --author
      with -l, print the author of each file

  -b, --escape
      print C-style escapes for nongraphic characters

  --block-size=SIZE
      with -l, scale sizes by SIZE when printing them; e.g., '--block-size=M'; see SIZE format below

  -B, --ignore-backups
      do not list implied entries ending with ~

  -c      with -lt: sort by, and show, ctime (time of last change of file status information); with -l: show
          ctime and sort by name; otherwise: sort by ctime, newest first

  -C      list entries by columns

  --color[=WHEN]
      color the output WHEN; more info below

  -d, --directory
      list directories themselves, not their contents

Manual page ls(1) line 1 (press h for help or q to quit)
```

Remarks:

The above output is given by running command of “man ls”.

```
ayez@Ayeza: ~  
ayez@Ayeza:~$ ls --help  
Usage: ls [OPTION]... [FILE]...  
List information about the FILES (the current directory by default).  
Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.  
  
Mandatory arguments to long options are mandatory for short options too.  
-a, --all do not ignore entries starting with .  
-A, --almost-all do not list implied . and ..  
--author with -l, print the author of each file  
-b, --escape print C-style escapes for nongraphic characters  
--block-size=SIZE with -l, scale sizes by SIZE when printing them;  
e.g., '--block-size=M'; see SIZE format below  
  
-B, --ignore-backups do not list implied entries ending with ~  
-c with -lt: sort by, and show, ctime (time of last  
change of file status information);  
with -l: show ctime and sort by name;  
otherwise: sort by ctime, newest first  
  
-C list entries by columns  
--color[=WHEN] color the output WHEN; more info below  
-d, --directory list directories themselves, not their contents  
-D, --dired generate output designed for Emacs' dired mode  
-f list all entries in directory order  
-F, --classify[=WHEN] append indicator (one of */=>@|) to entries WHEN  
likewise, except do not append '*'  
--file-type likewise, except do not append '*'  
--format=WORD across -x, commas -m, horizontal -x, long -l,  
single-column -l, verbose -l, vertical -C  
  
--full-time like -l --time-style=full-iso  
like -l, but do not list owner  
-g --group-directories-first  
group directories before files;  
can be augmented with a --sort option, but any  
use of --sort=none (-U) disables grouping  
  
-G, --no-group in a long listing, don't print group names  
-h, --human-readable with -l and -s, print sizes like 1K 234M 2G etc.  
--si likewise, but use powers of 1000 not 1024  
-H, --dereference-command-line follow symbolic links listed on the command line
```

Remarks:

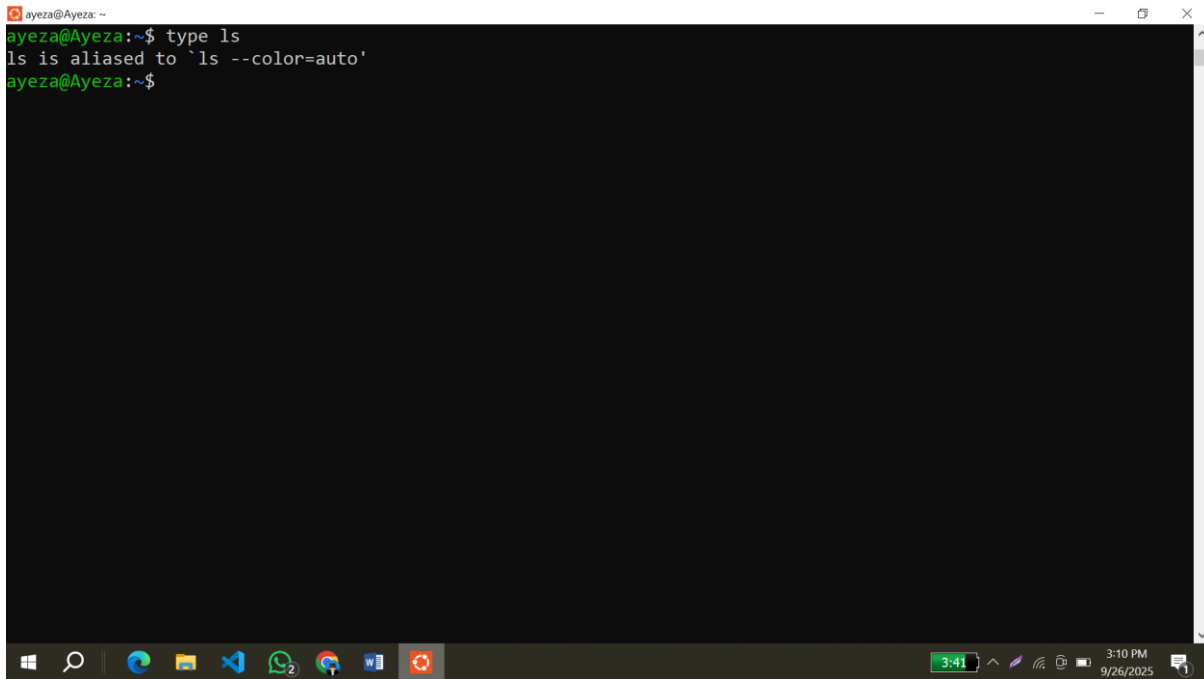
The above output is given by running command of “man --help”

```
ayez@Ayeza: ~  
Full documentation <https://www.gnu.org/software/coreutils/ls>  
or available locally via: info '(coreutils) ls invocation'  
ayez@Ayeza:~$ which ls  
/usr/bin/ls  
ayez@Ayeza:~$
```

Remarks:

The above output is given by running command of “which ls”.

```
ayez@Ayeza: ~  
ayez@Ayeza:~$ type ls  
ls is aliased to `ls --color=auto`  
ayez@Ayeza:~$
```



Remarks:

The above output is given by running command of “type ls”.

Part 2: File System Navigation

2.1 Understanding Linux Directory Structure

- **Concepts to Cover:**
 - Root directory (/)
 -

Important directories: /home, /usr, /etc, /var, /tmp

```
ayeza@Ayeza: /home
ayeza@Ayeza:~$ ls /
bin          boot        etc          init         lib.usr-is-merged  lost+found  mnt          proc         run          sbin.usr-is-merged  srv          tmp          var
bin.usr-is-merged  dev         home         lib          lib64          media       opt          root         sbin         snap           sys          usr
ayeza@Ayeza:~$ ls -la
total 84
drwxr-x--- 6 ayeza ayeza 4096 Sep 26 15:04 .
drwxr-xr-x 3 root  root  4096 Sep 19 10:34 ..
-rw-r----- 1 ayeza ayeza 1803 Sep 26 15:04 .bash_history
-rw-r----- 1 ayeza ayeza 220 Sep 19 10:34 .bash_logout
-rw-r----- 1 ayeza ayeza 3771 Sep 19 10:34 .bashrc
drwx----- 3 ayeza ayeza 4096 Sep 19 14:45 .cache
-rw-r----- 1 ayeza ayeza 53 Sep 25 17:43 .gitconfig
-rw-r----- 1 ayeza ayeza 12288 Sep 26 14:45 .hello.txt.swp
-rw-r----- 1 ayeza ayeza 20 Sep 26 15:04 .lessht
drwxr-xr-x 3 ayeza ayeza 4096 Sep 25 18:01 .local
-rw-rw-r-- 1 ayeza ayeza 0 Sep 26 14:16 .motd_shown
-rw-r----- 1 ayeza ayeza 807 Sep 19 10:34 .profile
drwx----- 2 ayeza ayeza 4096 Sep 25 17:53 .ssh
-rw-r----- 1 ayeza ayeza 0 Sep 19 10:35 .sudo_as_admin_successful
-rw-r----- 1 ayeza ayeza 1186 Sep 26 14:45 .viminfo
drwxr-xr-x 5 ayeza ayeza 4096 Sep 19 14:45 .vscode-server
-rw-r----- 1 ayeza ayeza 80 Sep 25 18:04 hello.c
-rwxr-xr-x 1 ayeza ayeza 15960 Sep 25 18:05 hello.out
ayeza@Ayeza:~$ cd /home
ayeza@Ayeza:/home$ cd ~
ayeza@Ayeza:~$ cd -
/home
ayeza@Ayeza:/home$
```

Remarks:

The above output is given by running command of “ls / , la -la , cd /home , cd ~ , cd -”.

- Absolute vs relative paths
- Hidden files and directories

- **Demonstration:**

```
ls /           # Root directory contents
ls -la        # Long listing with hidden files
cd /home      # Change directory
cd ~          # Home directory shortcut
cd -          # Previous directory
```

2.2 Basic Navigation Commands (15 minutes)

- **Commands to practice:**

```
ayeza@Ayeza: /
ayeza@Ayeza:~$ pwd
/home/ayeza
ayeza@Ayeza:~$ ls
hello.c  hello.out
ayeza@Ayeza:~$ ls -l
total 20
-rw-r--r-- 1 ayeza ayeza 80 Sep 25 18:04 hello.c
-rwxr-xr-x 1 ayeza ayeza 15960 Sep 25 18:05 hello.out
ayeza@Ayeza:~$ ls -la
total 84
drwxr-x--- 6 ayeza ayeza 4096 Sep 26 15:04 .
drwxr-xr-x 3 root  root  4096 Sep 19 10:34 ..
-rw-r----- 1 ayeza ayeza 1951 Sep 26 15:22 .bash_history
-rw-r--r-- 1 ayeza ayeza 220 Sep 19 10:34 .bash_logout
-rw-r--r-- 1 ayeza ayeza 3771 Sep 19 10:34 .bashrc
drwx----- 3 ayeza ayeza 4096 Sep 19 14:45 .cache
-rw-r--r-- 1 ayeza ayeza 53 Sep 25 17:43 .gitconfig
-rw-r--r-- 1 ayeza ayeza 12288 Sep 26 14:45 .hello.txt.swp
-rw-r----- 1 ayeza ayeza 20 Sep 26 15:04 .lessht
drwxr-xr-x 3 ayeza ayeza 4096 Sep 25 18:01 .local
-rw-rw-r-- 1 ayeza ayeza 0 Sep 26 14:16 .motd_shown
-rw-r--r-- 1 ayeza ayeza 807 Sep 19 10:34 .profile
drwx----- 2 ayeza ayeza 4096 Sep 25 17:53 .ssh
-rw-r--r-- 1 ayeza ayeza 0 Sep 19 10:35 .sudo_as_admin_successful
-rw-r----- 1 ayeza ayeza 1186 Sep 26 14:45 .viminfo
drwxr-xr-x 5 ayeza ayeza 4096 Sep 19 14:45 .vscode-server
-rw-r--r-- 1 ayeza ayeza 80 Sep 25 18:04 hello.c
-rwxr-xr-x 1 ayeza ayeza 15960 Sep 25 18:05 hello.out
ayeza@Ayeza:~$ ls -lh
total 20K
-rw-r--r-- 1 ayeza ayeza 80 Sep 25 18:04 hello.c
-rwxr-xr-x 1 ayeza ayeza 16K Sep 25 18:05 hello.out
ayeza@Ayeza:~$ cd
ayeza@Ayeza:~$ cd ..
ayeza@Ayeza:~$ cd ~
ayeza@Ayeza:~$ cd /
ayeza@Ayeza:/$
```

Remarks:

The above output is given by running command of “pwd,ls,ls -l, ls -la ls -lh, cd .. , cd ~ , cd /”.

Part 3: File and Directory Operations

**3.1 Creating and Managing Files/Directories

- **Commands to demonstrate:**

- **File viewing commands:**

```
ayeza@Ayeza: /  
ayeza@Ayeza:/$ sudo mkdir /OSlab2  
ayeza@Ayeza:/$ ls  
OSlab2 bin usr-is-merged dev home lab2 lib usr-is-merged lost+found mnt proc run sbin usr-is-merged srv test usr  
bin boot etc init lib lib64 media opt root sbin snap sys tmp var  
ayeza@Ayeza:/$ sudo mkdir -p test/sub/dir  
ayeza@Ayeza:/$ sudo touch file1.txt  
ayeza@Ayeza:/$ sudo touch file2.txt file3.txt  
ayeza@Ayeza:/$ ls  
OSlab2 bin usr-is-merged dev file1.txt file3.txt init lib lib64 media opt root sbin  
bin boot etc file2.txt home lab2 lib usr-is-merged lost+found mnt proc run sbin usr-is-merged  
ayeza@Ayeza:/$
```

Remarks:

The above output is given by running a command “mkdir , touch”

Text editors introduction:

```
ayeza@Ayeza: ~  
ayeza@Ayeza:~$ sudo echo "hello Linux!" >hello.txt  
[sudo] password for ayeza:  
ayeza@Ayeza:~$ cat hello.txt  
hello Linux!  
ayeza@Ayeza:~$ less hello.txt  
ayeza@Ayeza:~$ head hello.txt  
hello Linux!  
ayeza@Ayeza:~$ less hello.txt  
ayeza@Ayeza:~$ head hello.txt  
hello Linux!  
ayeza@Ayeza:~$ tail hello.txt  
hello Linux!  
ayeza@Ayeza:~$ wc hello.txt  
 1  2 13 hello.txt  
ayeza@Ayeza:~$
```

Remarks:

The above output is given by running the command “echo command,less hello.txt,head hello.txt,tail,wc hello.txt”


```
tail hello.txt      # Last 10 lines
wc hello.txt        # Word count
```

- **Commands to practice:**

3.2 Copying, Moving, and Deleting

Hands-on Exercise: Students create a directory structure, add files, and practice file operations.

```
ayeza@Ayeza: ~$ cp hello.txt backup.txt
ayeza@Ayeza: ~$ cp -r OSlab2 OSlab2_backup
ayeza@Ayeza: ~$ mv backup.txt renamed.txt
ayeza@Ayeza: ~$ rm renamed.txt
ayeza@Ayeza: ~$ rm -r OSlab2_backup
ayeza@Ayeza: ~$
```

Part 4: File Permissions and Ownership

```
ayeza@Ayeza: ~$ ls -l
total 40
drwxr-xr-x 2 ayeza ayeza 4096 Sep 26 15:50 OSlab2
-rw-r--r-- 1 ayeza ayeza 80 Sep 25 18:04 hello.c
-rwxr-xr-x 1 ayeza ayeza 15960 Sep 25 18:05 hello.out
-rw-r--r-- 1 ayeza ayeza 13 Sep 26 16:05 hello.txt
-rw----- 1 root root 7 Sep 26 16:03 hello.txt.save
drwxr-xr-x 2 ayeza ayeza 4096 Sep 26 15:42 lab2
drwxr-xr-x 2 ayeza ayeza 4096 Sep 26 15:28 mylab2
ayeza@Ayeza: ~$ chmod 755 OSlab2
ayeza@Ayeza: ~$ chmod u+x OSlab2
ayeza@Ayeza: ~$ chmod g-w OSlab2
ayeza@Ayeza: ~$ chown ayeza:ayeza OSlab2
ayeza@Ayeza: ~$
```

4.1 Understanding File Permissions

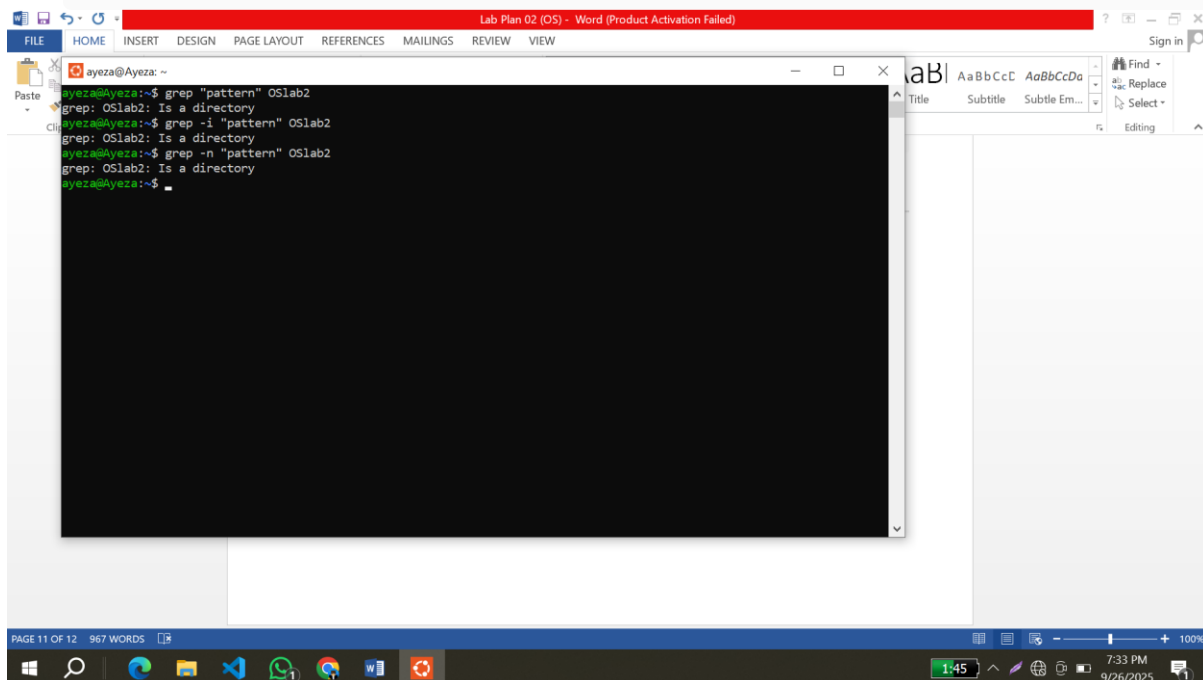
- **Concepts to Cover:**
 - Permission types: read (r), write (w), execute (x)
 - Permission groups: user (u), group (g), others (o)
 - Numeric notation: 755, 644, etc.
- **Commands to demonstrate:**



Part 5: Text Processing and Utilities

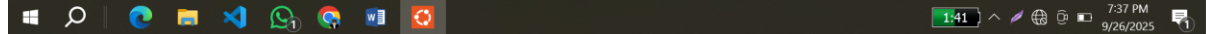
- **Commands to demonstrate:**

```
grep "pattern" file.txt      # Search for patterns
grep -i "pattern" file.txt   # Case-insensitive search
grep -n "pattern" file.txt   # Show line numbers
```



5.2 Pipes and Redirection

```
ayeza@Ayeza: ~  
ayeza@Ayeza:~$ ls -l | grep ".txt"  
-rw-r--r-- 1 ayeza ayeza    0 Sep 26 19:35 combined.txt  
drwxr-xr-x 2 root  root   4096 Sep 26 19:35 file1.txt  
drwxr-xr-x 2 root  root   4096 Sep 26 19:35 file2.txt  
-rw-r--r-- 1 ayeza ayeza   13 Sep 26 16:05 hello.txt  
-rw----- 1 root  root     7 Sep 26 16:03 hello.txt.save  
ayeza@Ayeza:~$ cat file1.txt file2.txt > combined.txt  
cat: file1.txt: Is a directory  
cat: file2.txt: Is a directory  
ayeza@Ayeza:~$ echo "new line" >> file.txt  
ayeza@Ayeza:~$ sort file.txt | uniq  
new line  
ayeza@Ayeza:~$
```



- **Concepts and commands:**

```
ls -l | grep ".txt"           # Pipe output
cat file1.txt file2.txt > combined.txt # Redirect output
echo "new line" >> file.txt # Append to file
sort file.txt | uniq          # Chain commands
```

Part 6: Introduction to Processes

6.1 Understanding Processes

```

ayez@Ayeza:~$ ps
  PID TTY          TIME CMD
  481 pts/0    00:00:00 bash
  495 pts/0    00:00:00 ps

ayez@Ayeza:~$ ps aux
USER        PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1  0.2  0.3 21788 12384 ?        Ss   19:30   0:01 /sbin/init
root         2  0.0  0.0   3072  1664 ?        S1   19:30   0:00 /init
root         7  0.0  0.0   3072  1792 ?        S1   19:30   0:00 plan9 --control-socket 7 --log-level 4 --server-fd 8
root        43  0.0  0.4  66744 16608 ?        S<s  19:30   0:00 /usr/lib/systemd/systemd-journald
root        96  0.0  0.1  25272  6400 ?        Ss   19:30   0:00 /usr/lib/systemd/systemd-udev
systemd+   111  0.0  0.3  21456 12416 ?        Ss   19:30   0:00 /usr/lib/systemd/systemd-resolved
systemd+   112  0.0  0.1  91024  7680 ?        Ssl  19:30   0:00 /usr/lib/systemd/systemd-timesyncd
root       156  0.0  0.0   4236  2560 ?        Ss   19:30   0:00 /usr/sbin/cron -f -P
message+   157  0.0  0.1   9620  4992 ?        Ss   19:30   0:00 @dbus-daemon --system --address=systemd: --nofork --nroot
20 ?        Ss  19:30   0:00 /usr/lib/systemd/systemd-logind
root       169  0.0  0.3 1755840 12800 ?        Ssl  19:30   0:00 /usr/libexec/wsl-pro-service -vv
root       171  0.0  0.0   3160  1920 hvsc ?        Ss+  19:30   0:00 /sbin/agetty -o -p -- \u --noclear - 1152root
92 tty1     Ss+  19:30   0:00 /sbin/agetty -o -p -- \u --noclear - linux
syslog     176  0.0  0.1  222508  5376 ?        Ssl  19:30   0:00 /usr/sbin/rsyslogd -n -iNONE
root       188  0.0  0.5 107032 22528 ?        Ssl  19:30   0:00 /usr/bin/python3 /usr/share/unattended-upgrades/unattroot
52 pts/1    Ss  19:30   0:00 /bin/login -f
ayez       339  0.0  0.2  20312 11008 ?        Ss   19:30   0:00 /usr/lib/systemd/systemd --user
ayez       340  0.0  0.0   21152  3520 ?        S   19:30   0:00 (sd-pam)
ayez       360  0.0  0.1   6072  4864 pts/1    S+   19:30   0:00 -bash
root       474  0.0  0.0   3076  1028 ?        Ss   19:38   0:00 /init
root       476  0.0  0.0   3092  1160 ?        S   19:38   0:00 /init
ayez       481  1.1  0.1   6072  5120 pts/0    Ss   19:38   0:00 -bash
ayez       496  0.0  0.1   8280  4096 pts/0    R+   19:38   0:00 ps aux

```

Remarks:

The above output is given by running “ps” and “ps aux”.

```

ayez@Ayeza:~$ ps -ef
UID        PID  PPID  C  STIME TTY          TIME CMD
root         1    0  0 19:30 ?        00:00:01 /sbin/init
root         2    1  0 19:30 ?        00:00:00 /init
root         7    2  0 19:30 ?        00:00:00 plan9 --control-socket 7 --log-level 4 --server-fd 8 --pipe-fd 10 --log-truncate
root        43    1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-journald
root        96    1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-udev
systemd+   111    1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-resolved
systemd+   112    1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-timesyncd
root       156    1  0 19:30 ?        00:00:00 /usr/sbin/cron -f -P
message+   157    1  0 19:30 ?        00:00:00 @dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation --syslog-only
root       167    1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-logind
root       169    1  0 19:30 ?        00:00:00 /usr/libexec/wsl-pro-service -vv
root       171    1  0 19:30 hvsc    00:00:00 /sbin/agetty -o -p -- \u --noclear - 115200,38400,9600 vt220
root       175    1  0 19:30 tty1    00:00:00 /sbin/agetty -o -p -- \u --noclear - linux
syslog     176    1  0 19:30 ?        00:00:00 /usr/sbin/rsyslogd -n -iNONE
root       188    1  0 19:30 ?        00:00:00 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-signal
root       293    2  0 19:30 pts/1    00:00:00 /bin/login -f
ayez       339    1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd --user
ayez       340   339  0 19:30 ?        00:00:00 (sd-pam)
ayez       360   293  0 19:30 pts/1    00:00:00 -bash
root       474    2  0 19:38 ?        00:00:00 /init
root       476   474  0 19:38 ?        00:00:00 /init
ayez       481   476  0 19:38 pts/0    00:00:00 -bash
ayez       498   481  0 19:40 pts/0    00:00:00 ps -ef

```

Remarks:

The above output is given by running “ps -ef”.

```
Select ayeza@Ayeza: ~
ayeza 340 339 0 19:30 ? 00:00:00 (sd-pam)
ayeza 360 293 0 19:30 pts/1 00:00:00 -bash
root 474 2 0 19:38 ? 00:00:00 /init
root 476 474 0 19:38 ? 00:00:00 /init
ayeza 481 476 0 19:38 pts/0 00:00:00 -bash
ayeza 498 481 0 19:40 pts/0 00:00:00 ps -ef
ayeza@Ayeza:~$ pstree
systemd--2*[agetty]
--cron
--dbus-daemon
--init-systemd(Ub)
|   SessionLeader--Relay(481)--bash--pstree
|   |   init--{init}
|   |   login--bash
|   |   {init-systemd(Ub)}
--rsyslogd--3*[{rsyslogd}]
--systemd--(sd-pam)
--systemd-journal
--systemd-logind
--systemd-resolve
--systemd-timesyn--{systemd-timesyn}
--systemd-udev
--unattended-upgr--{unattended-upgr}
--wsl-pro-service--7*[{wsl-pro-service}]
ayeza@Ayeza:~$
```

Remarks:

The above output is given by running “pstree”.

```
ayeza@Ayeza: ~
top - 19:42:09 up 11 min, 1 user, load average: 0.02, 0.02, 0.00
Tasks: 23 total, 1 running, 22 sleeping, 0 stopped, 0 zombie
%Cpu(s):  0.0 us,  2.2 sy,  0.0 ni, 97.8 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem : 3857.2 total, 3419.8 free, 454.5 used, 101.3 buff/cache
MiB Swap: 1024.0 total, 1024.0 free,  0.0 used. 3402.7 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM     TIME+ COMMAND
    1 root        20   0   21788  12384  9312  S   0.0   0.3   0:01.01 systemd
    2 root        20   0   3072   1664   1664  S   0.0   0.0   0:00.01 init-systemd(Ub
    7 root        20   0   3072   1792   1792  S   0.0   0.0   0:00.00 init
   43 root       19  -1  66744  16608  15712  S   0.0   0.4   0:00.30 systemd-journal
   96 root       20   0  25272   6400   4864  S   0.0   0.2   0:00.24 systemd-udev
  111 systemd+   20   0  21456  12416  10240  S   0.0   0.3   0:00.18 systemd-resolve
  112 systemd+   20   0  91024  7680   6784  S   0.0   0.2   0:00.19 systemd-timesyn
  156 root       20   0   4236   2560   2432  S   0.0   0.1   0:00.01 cron
  157 message+   20   0   9620   4992   4480  S   0.0   0.1   0:00.09 dbus-daemon
  167 root       20   0   17964   8320   7424  S   0.0   0.2   0:00.11 systemd-logind
  169 root       20   0 1755840 12800  10880  S   0.0   0.3   0:00.17 wsl-pro-service
  171 root       20   0   3160   1920   1792  S   0.0   0.0   0:00.01 agetty
  175 root       20   0   3116   1792   1664  S   0.0   0.0   0:00.00 agetty
  176 syslog    20   0 222508   5376   4224  S   0.0   0.1   0:00.09 rsyslogd
  188 root       20   0 107032 22528  13184  S   0.0   0.6   0:00.23 unattended-upgr
  293 root       20   0   6824   4352   3712  S   0.0   0.1   0:00.01 login
  339 ayeza       20   0  20312  11008   9088  S   0.0   0.3   0:00.17 systemd
  340 ayeza       20   0  21152   3520   1792  S   0.0   0.1   0:00.00 (sd-pam)
  360 ayeza       20   0   6072   4864   3456  S   0.0   0.1   0:00.04 bash
  474 root       20   0   3076   1028    896  S   0.0   0.0   0:00.00 SessionLeader
  476 root       20   0   3092   1160   1024  S   0.0   0.0   0:00.01 Relay(481)
  481 ayeza       20   0   6072   5120   3456  S   0.0   0.1   0:00.10 bash
  502 ayeza       20   0   9284   5120   3072  R   0.0   0.1   0:00.01 top
```

Remarks:

The above output is given by running “top”.

```
0[          0.0%] Tasks: 26, 29 thr, 0 kthr; 1 running
1[          0.5%] Load average: 0.01 0.02 0.00
2[          0.0%] Uptime: 00:20:07
3[          0.5%]
Mem[|||||] 333M/3.77G
Swp[|||||] 0K/1.00G

Main I/O
PID USER      PRI  NI  VIRT   RES   SHR  S  CPU% MEM%   TIME+  Command
1059 ayeza        20    0 6032   4608  3328  R   0.5   0.1   0:00.04  httpd
1 root         20    0 21788 12384  9312  S   0.0   0.3   0:01.19  /sbin/init
2 root         20    0 3072   1664  1664  S   0.0   0.0   0:00.01  /init
7 root         20    0 3072   1792  1792  S   0.0   0.0   0:00.00  plan9 --control-socket 7 --log-level 4 --server-fd 8 --pipe-fd 10 --log-truncate
8 root         20    0 3072   1792  1792  S   0.0   0.0   0:00.00  plan9 --control-socket 7 --log-level 4 --server-fd 8 --pipe-fd 10 --log-truncate
9 root         20    0 3072   1664  1664  S   0.0   0.0   0:00.00  /init
43 root        19   -1 66744 16864 15968  S   0.0   0.4   0:00.34  /usr/lib/systemd/systemd-journald
96 root         20    0 25272  6400  4864  S   0.0   0.2   0:00.31  /usr/lib/systemd/systemd-udev
111 systemd-re  20    0 21456 12416 10240  S   0.0   0.3   0:00.17  /usr/lib/systemd/systemd-resolved
112 systemd-ti  20    0 91024  7680  6784  S   0.0   0.2   0:00.15  /usr/lib/systemd/systemd-timesyncd
148 systemd-ti  20    0 91024  7680  6784  S   0.0   0.2   0:00.06  /usr/lib/systemd/systemd-timesyncd
156 root         20    0 4236   2560  2432  S   0.0   0.1   0:00.01  /usr/sbin/cron -f -P
157 messagebus  20    0 9620   4992  4480  S   0.0   0.1   0:00.15  dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation --syslog-only
167 root         20    0 17964  8320  7424  S   0.0   0.2   0:00.13  /usr/lib/systemd/systemd-logind
169 root         20    0 1714M 12800 10880  S   0.0   0.3   0:00.11  /usr/libexec/wsl-pro-service -vv
171 root         20    0 3160   1920  1792  S   0.0   0.0   0:00.01  /sbin/agetty -o -p -- \u --noclear --keep-baud - 115200,38400,9600 vt220
175 root         20    0 3116   1792  1664  S   0.0   0.0   0:00.00  /sbin/agetty -o -p -- \u --noclear - linux
176 syslog       20    0 217M   5376  4224  S   0.0   0.1   0:00.07  /usr/sbin/rsyslogd -n -iNONE
188 root         20    0 104M 22528 13184  S   0.0   0.6   0:00.23  /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-signal
198 root         20    0 1714M 12800 10880  S   0.0   0.3   0:00.02  /usr/libexec/wsl-pro-service -vv
199 root         20    0 1714M 12800 10880  S   0.0   0.3   0:00.00  /usr/libexec/wsl-pro-service -vv
200 root         20    0 1714M 12800 10880  S   0.0   0.3   0:00.00  /usr/libexec/wsl-pro-service -vv
201 root         20    0 1714M 12800 10880  S   0.0   0.3   0:00.01  /usr/libexec/wsl-pro-service -vv
202 root         20    0 1714M 12800 10880  S   0.0   0.3   0:00.00  /usr/libexec/wsl-pro-service -vv
203 syslog       20    0 217M   5376  4224  S   0.0   0.1   0:00.02  /usr/sbin/rsyslogd -n -iNONE
204 syslog       20    0 217M   5376  4224  S   0.0   0.1   0:00.00  /usr/sbin/rsyslogd -n -iNONE
205 syslog       20    0 217M   5376  4224  S   0.0   0.1   0:00.00  /usr/sbin/rsyslogd -n -iNONE
206 root         20    0 1714M 12800 10880  S   0.0   0.3   0:00.01  /usr/libexec/wsl-pro-service -vv
212 root         20    0 1714M 12800 10880  S   0.0   0.3   0:00.00  /usr/libexec/wsl-pro-service -vv
235 root         20    0 104M 22528 13184  S   0.0   0.6   0:00.00  /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-signal
```

Remarks:

The following output is given by running “htop”.

```
ayeza@Ayeza: ~$ kill PID
-bash: kill: PID: arguments must be process or job IDs
ayeza@Ayeza: ~$ pkill pattern
ayeza@Ayeza: ~$
```

Remarks:

The above output is given by running kill commands.