NATIONAL TEXTILE

UNIVERSITY

DEPARTMENT OF COMPUTER SCIENC

SUBMITTED BY:

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SECTION SE: 5th (A)

Operating Systems- LAB2 activity

SUBMITTED TO:

Sir Nasir Mahmood

SUBMISSION DATE: 26/9/25

Operating Systems – COC 3071L

SE 5th A – Fall 2025

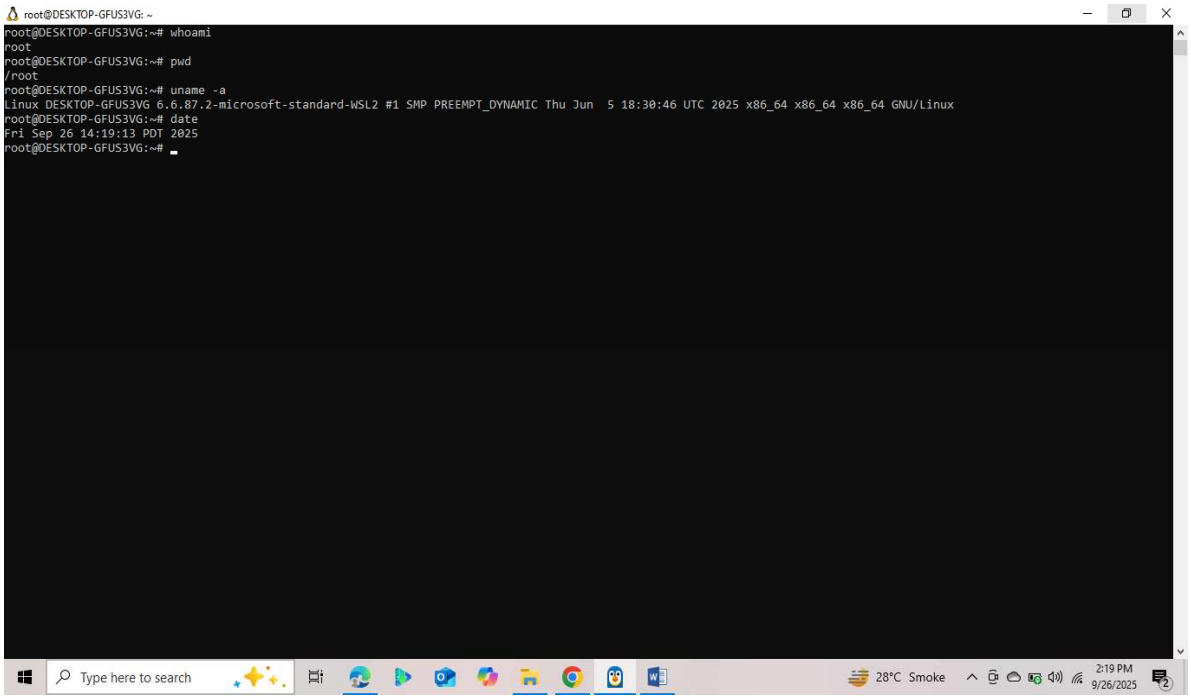
Lab 2: Linux Basics and Introduction

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
```

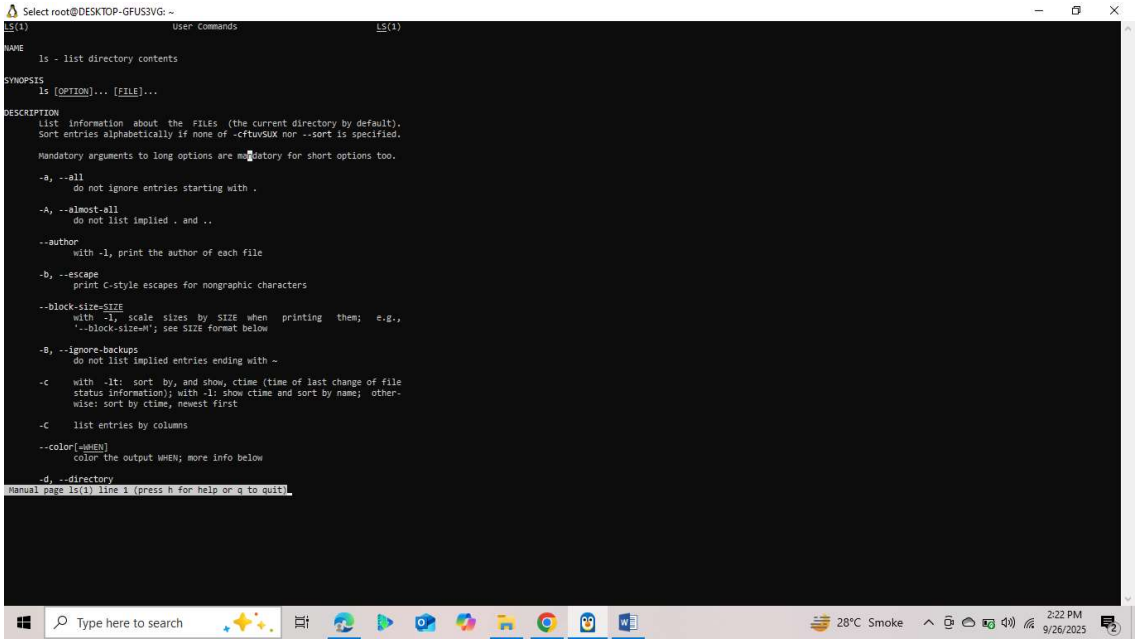


1.2 Getting Help in Linux

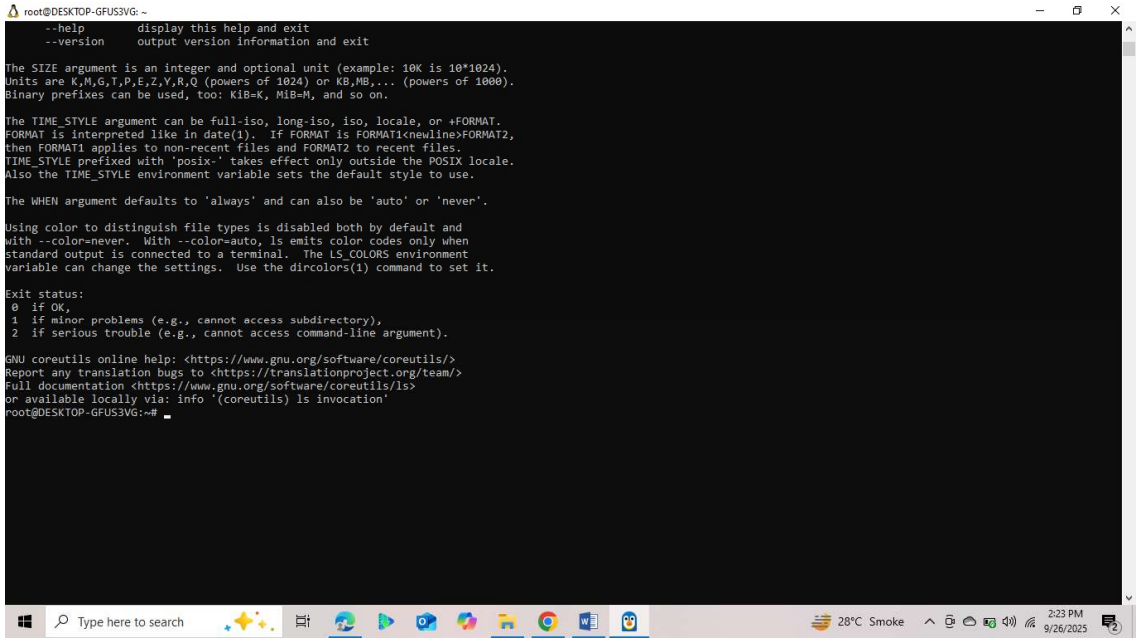
- **Commands to demonstrate:**

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

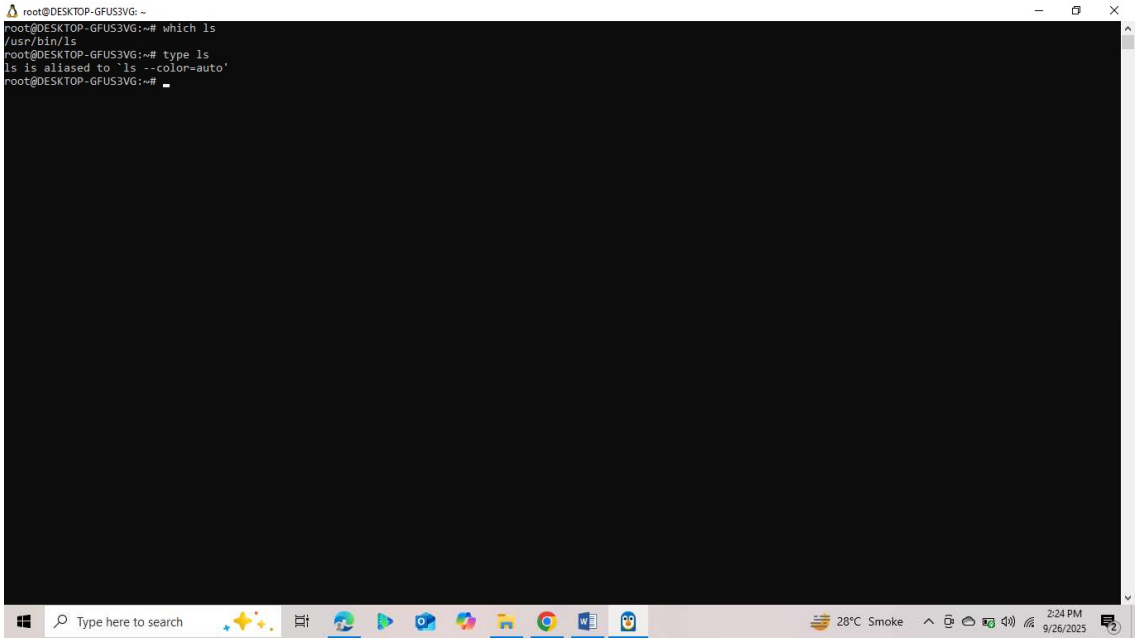
Man ls:



Ls –help



Which ls and type ls

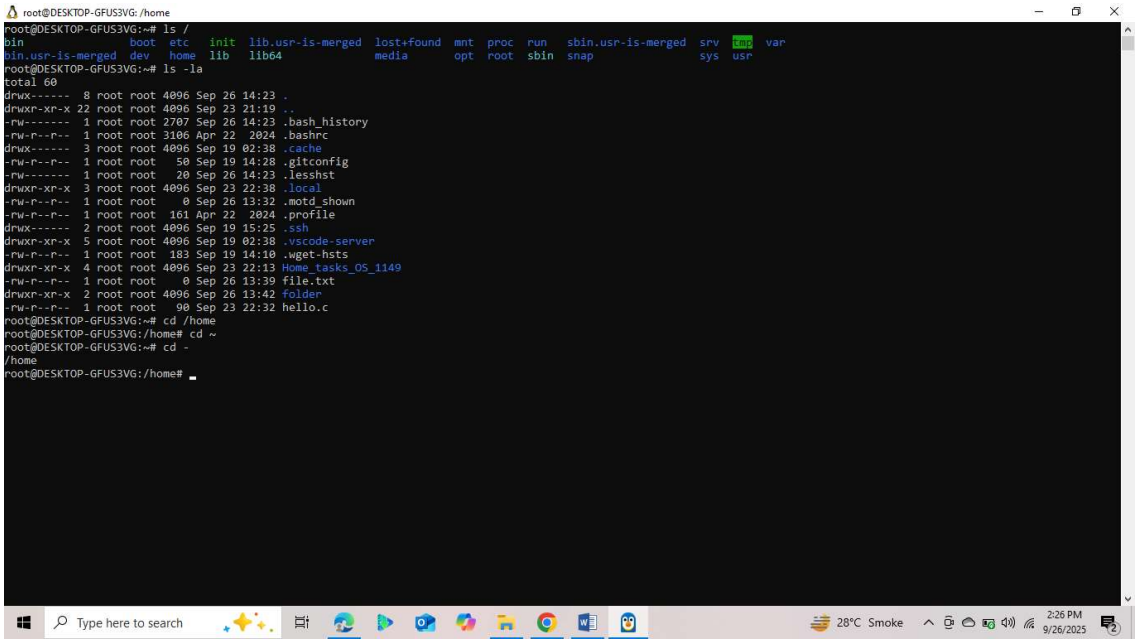


Part 2: File System Navigation

2.1 Understanding Linux Directory Structure

- **Concepts to Cover:**
  - Root directory (/)
  - Important directories: /home, /usr, /etc, /var, /tmp
  - 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
```

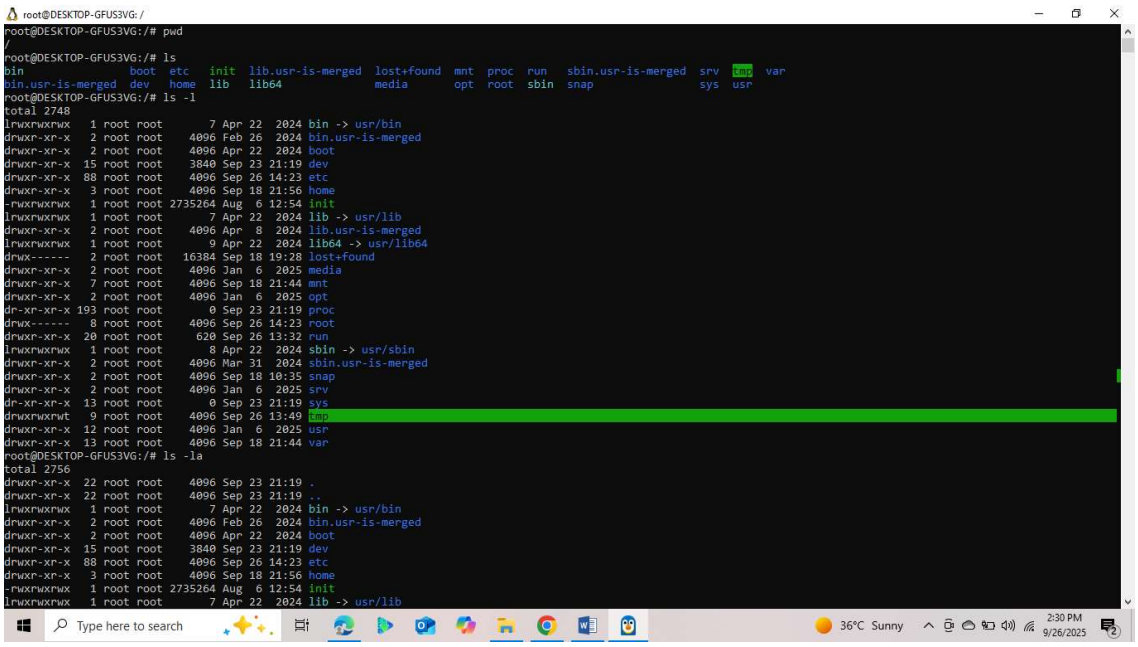


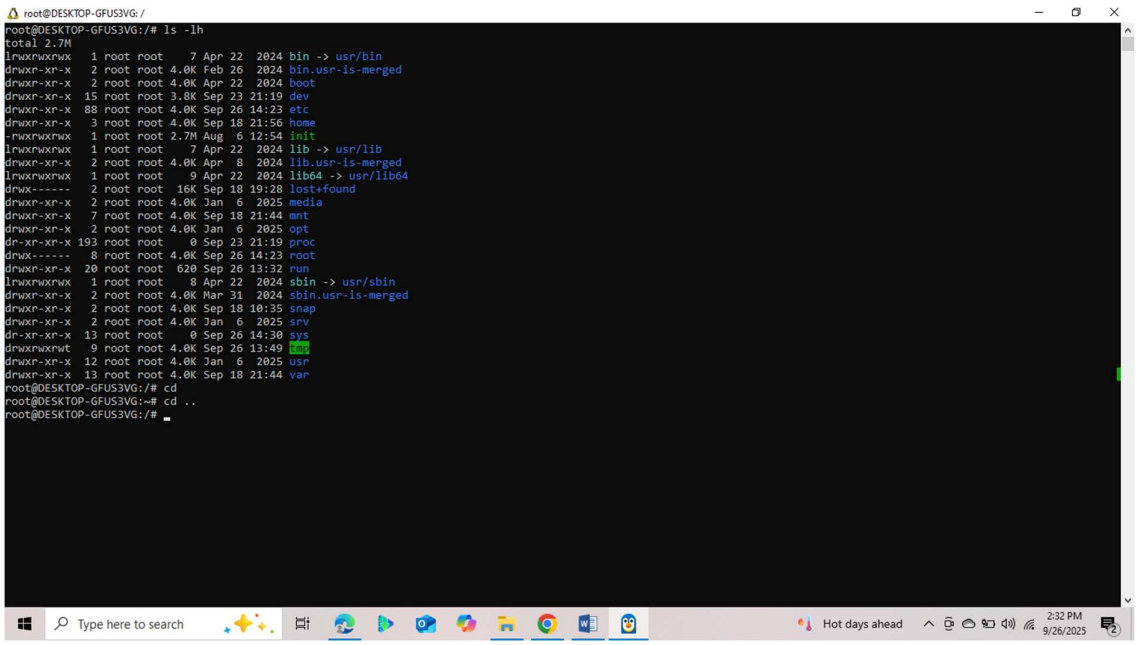
2.2 Basic Navigation Commands (15 minutes)

- **Commands to practice:**

```
pwd             # Present working directory
ls              # List directory contents
ls -l           # Long format
ls -la          # Include hidden files
ls -lh          # Human readable sizes
cd              # Change directory
cd ..           # Parent directory
cd ~            # Home directory
cd /            # Root directory
```

Pwd,ls,ls -l ,ls -la





Part 3: File and Directory Operations

**3.1 Creating and Managing Files/Directories

- **Commands to demonstrate:**

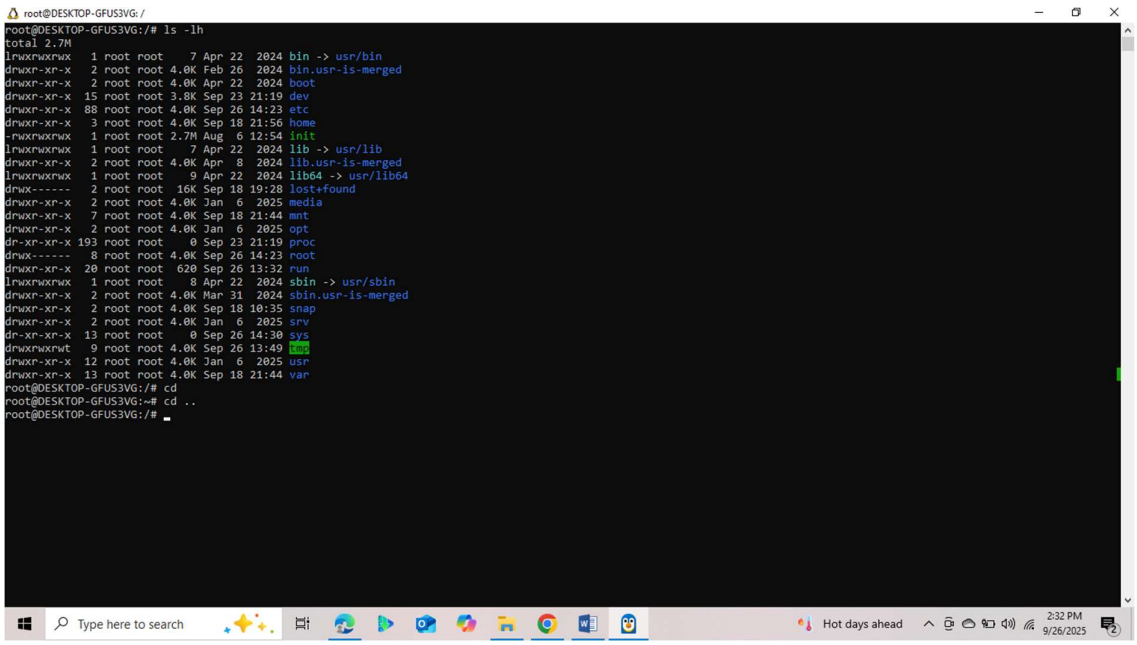
```
mkdir mylab2              # Create directory
mkdir -p test/sub/dir     # Create nested directories
touch file1.txt           # Create empty file
touch file2.txt file3.txt  # Multiple files

# Text editors introduction
nano hello.txt            # Simple text editor
# OR
echo "Hello Linux!" > hello.txt  # Redirect output to file
```

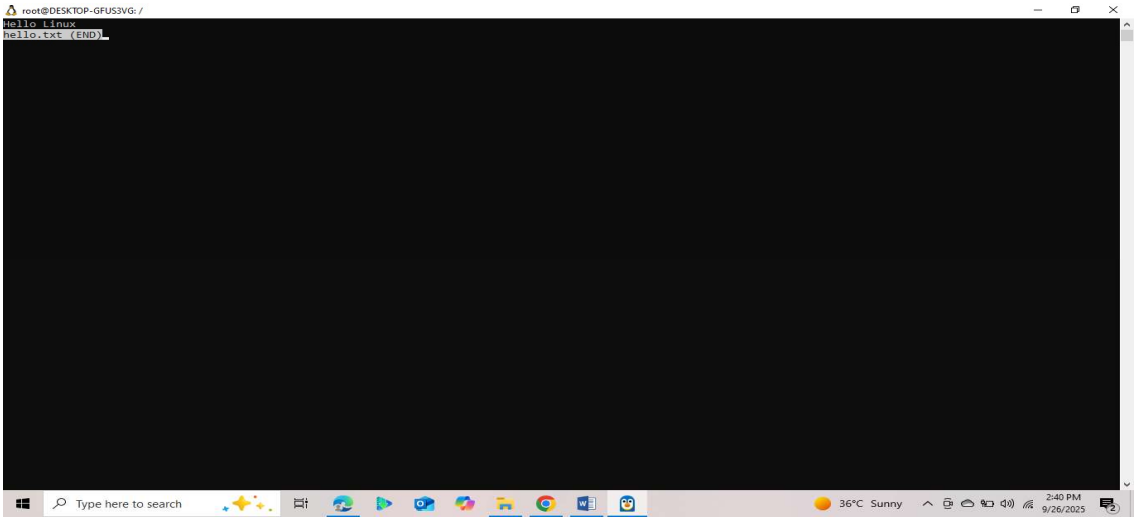
- **File viewing commands:**

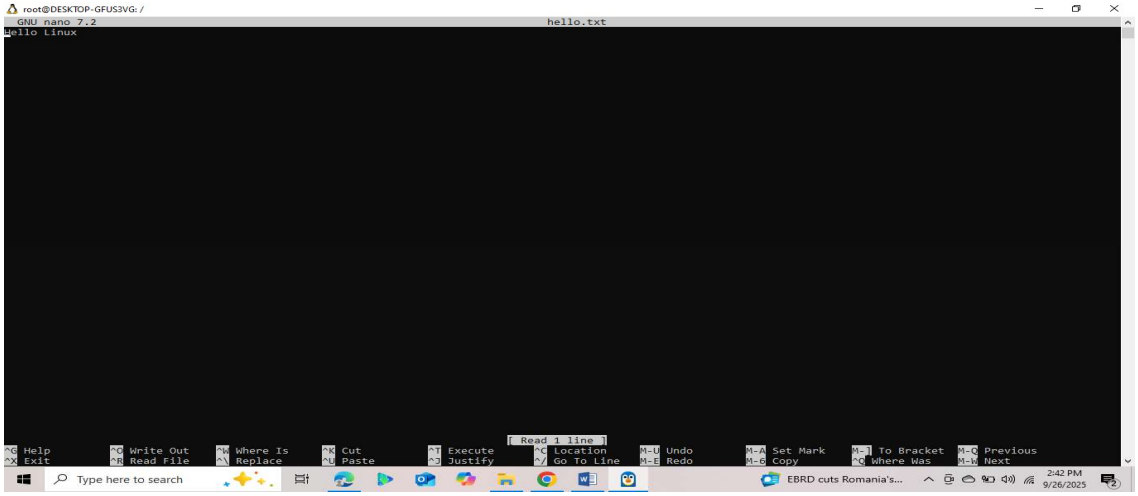
```
cat hello.txt             # Display file contents
less hello.txt            # Page through file
head hello.txt            # First 10 lines


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



Less hello.txt interface:



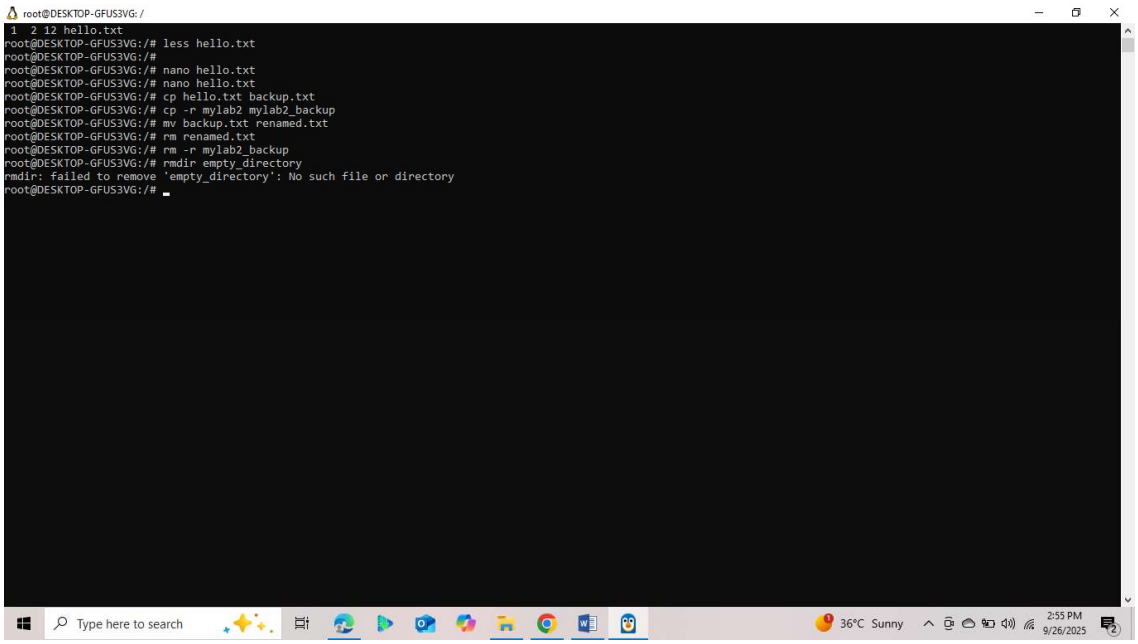


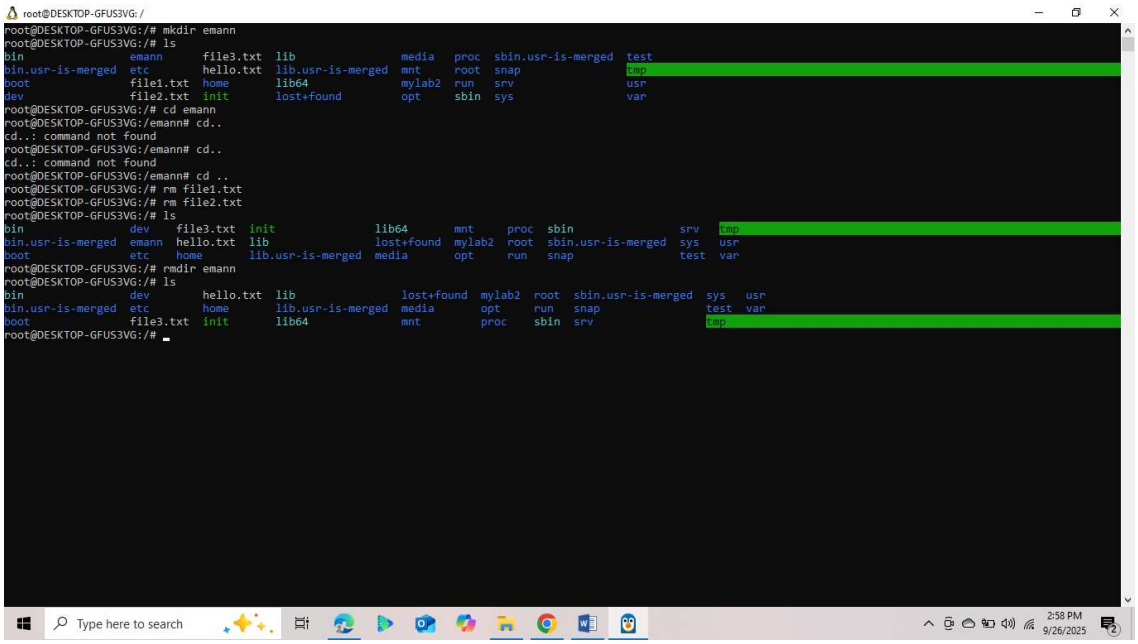
3.2 Copying, Moving, and Deleting

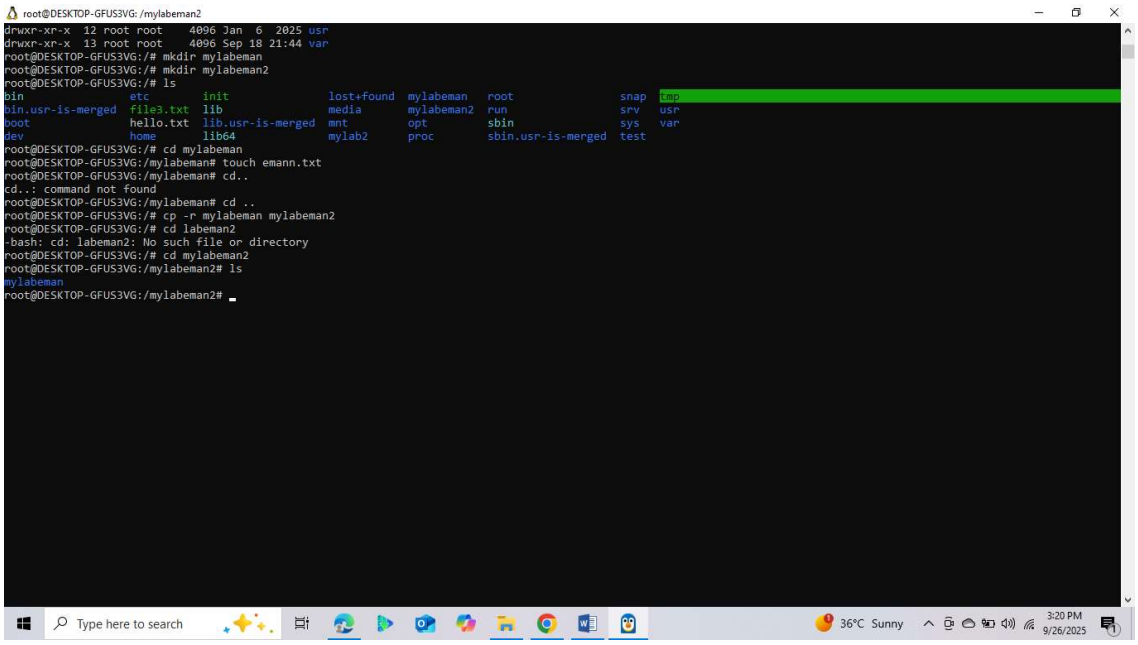
- **Commands to practice:**

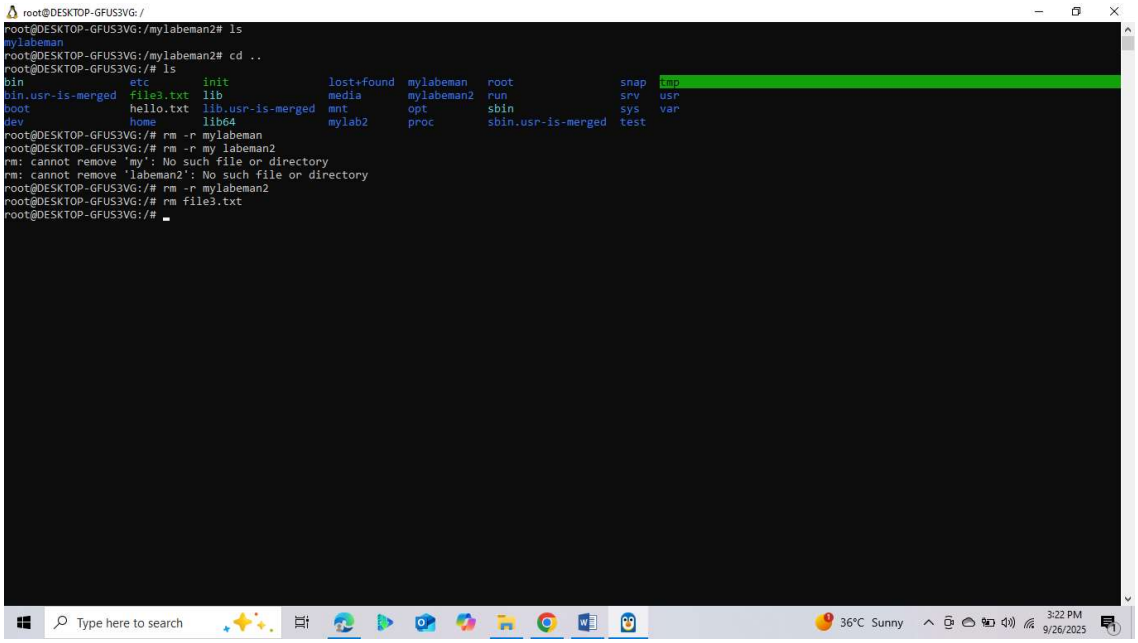
```
cp hello.txt backup.txt      # Copy file
cp -r mylab2 mylab2_backup   # Copy directory recursively
mv backup.txt renamed.txt    # Move/rename file
rm renamed.txt               # Remove file
rm -r mylab2_backup          # Remove directory
rmdir empty_directory        # Remove empty directory
```

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









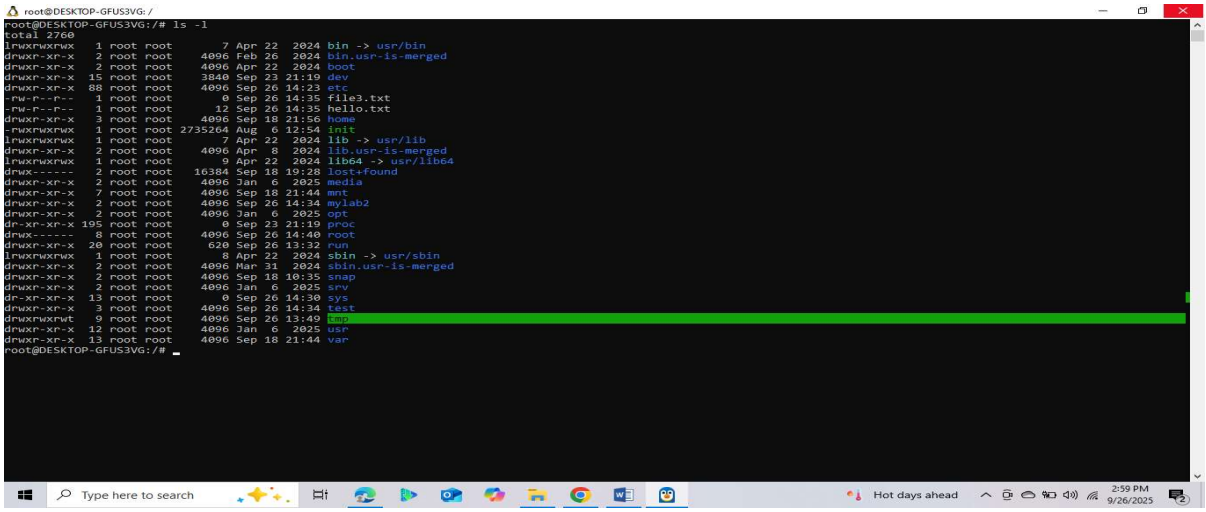
Part 4: File Permissions and Ownership

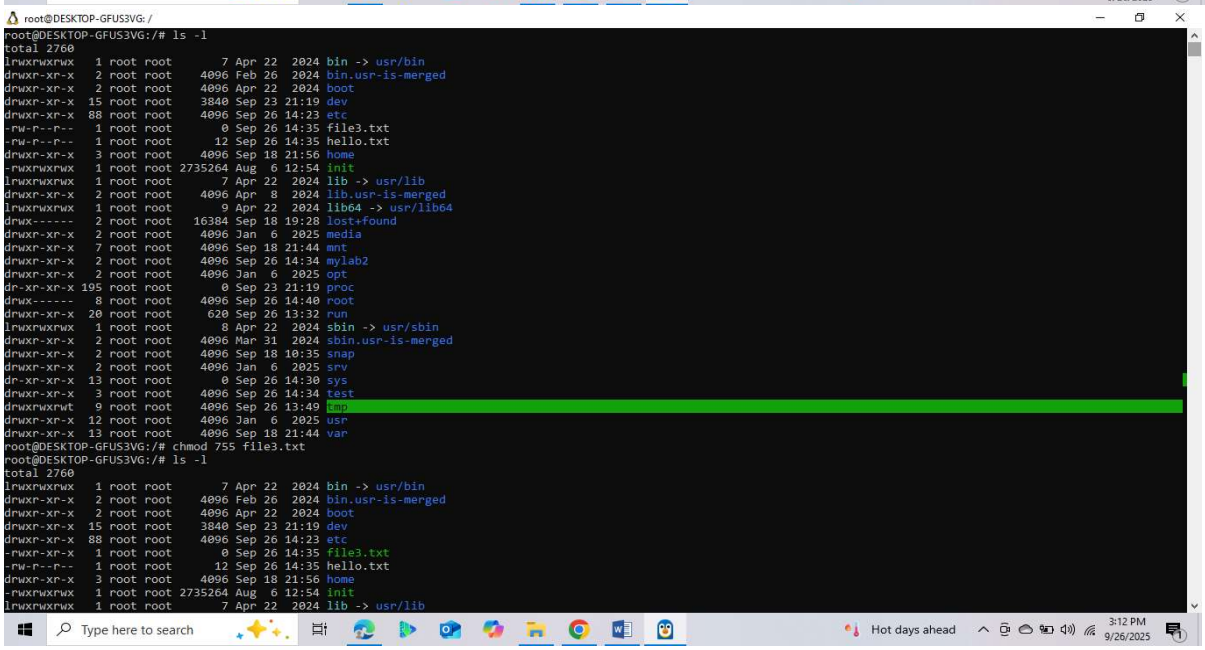
4.1 Understanding File Permissions

- **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:**

```
ls -l                    # View permissions
chmod 755 file.txt       # Change permissions (numeric)
chmod u+x file.txt       # Add execute permission for user
chmod g-w file.txt       # Remove write permission for group
chown user:group file.txt  # Change ownership (if applicable)
```

p


root@DESKTOP-GFUS3VG: /
root@DESKTOP-GFUS3VG:/# ls -l
total 2760
lrwxrwxrwx   1 root root   7 Apr 22 2024 bin -> usr/bin
drwxr-xr-x   2 root root   4096 Feb 26 2024 bin.usr-is-merged
drwxr-xr-x   2 root root   4096 Apr 22 2024 boot
drwxr-xr-x 15 root root   3840 Sep 23 21:19 dev
drwxr-xr-x 88 root root   4096 Sep 26 14:23 etc
-rw-r--r--   1 root root   0 Sep 26 14:35 file3.txt
-rw-r--r--   1 root root   12 Sep 26 14:35 hello.txt
drwxr-xr-x   3 root root   4096 Sep 18 21:56 home
-rwxrwxrwx   1 root root 2735264 Aug 6 12:54 init
lrwxrwxrwx   1 root root   7 Apr 22 2024 lib -> usr/lib
drwxr-xr-x   2 root root   4096 Apr 8 2024 lib.usr-is-merged
lrwxrwxrwx   1 root root   9 Apr 22 2024 lib64 -> usr/lib64
drwx------   2 root root   16384 Sep 18 19:28 lost+found
drwxr-xr-x   2 root root   4096 Jan 6 2025 media
drwxr-xr-x   7 root root   4096 Sep 18 21:44 mnt
drwxr-xr-x   2 root root   4096 Sep 26 14:34 mylab2
drwxr-xr-x   2 root root   4096 Jan 6 2025 opt
dr-xr-xr-x 195 root root   0 Sep 23 21:19 proc
drwx------   8 root root   4096 Sep 26 14:40 root
drwxr-xr-x 20 root root   620 Sep 26 13:32 run
lrwxrwxrwx   1 root root   8 Apr 22 2024 sbin -> usr/sbin
drwxr-xr-x   2 root root   4096 Mar 31 2024 sbin.usr-is-merged
drwxr-xr-x   2 root root   4096 Sep 18 10:35 snap
drwxr-xr-x   2 root root   4096 Jan 6 2025 srv
dr-xr-xr-x 13 root root   0 Sep 26 14:30 sys
drwxr-xr-x   3 root root   4096 Sep 26 14:34 test
drwxrwxrwt   9 root root   4096 Sep 26 13:49 tmp
drwxr-xr-x 12 root root   4096 Jan 6 2025 usr
drwxr-xr-x 13 root root   4096 Sep 18 21:44 var
root@DESKTOP-GFUS3VG:/#
Type here to search
Hot days ahead
2:59 PM
9/26/2025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drwx------   8 root root   4096 Sep 26 14:40 root
drwxr-xr-x 20 root root   620 Sep 26 13:32 run
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drwxr-xr-x   2 root root   4096 Sep 18 10:35 snap
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drwxr-xr-x 12 root root   4096 Jan 6 2025 usr
drwxr-xr-x 13 root root   4096 Sep 18 21:44 var
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root@DESKTOP-GFUS3VG:/# ls -l
total 2760
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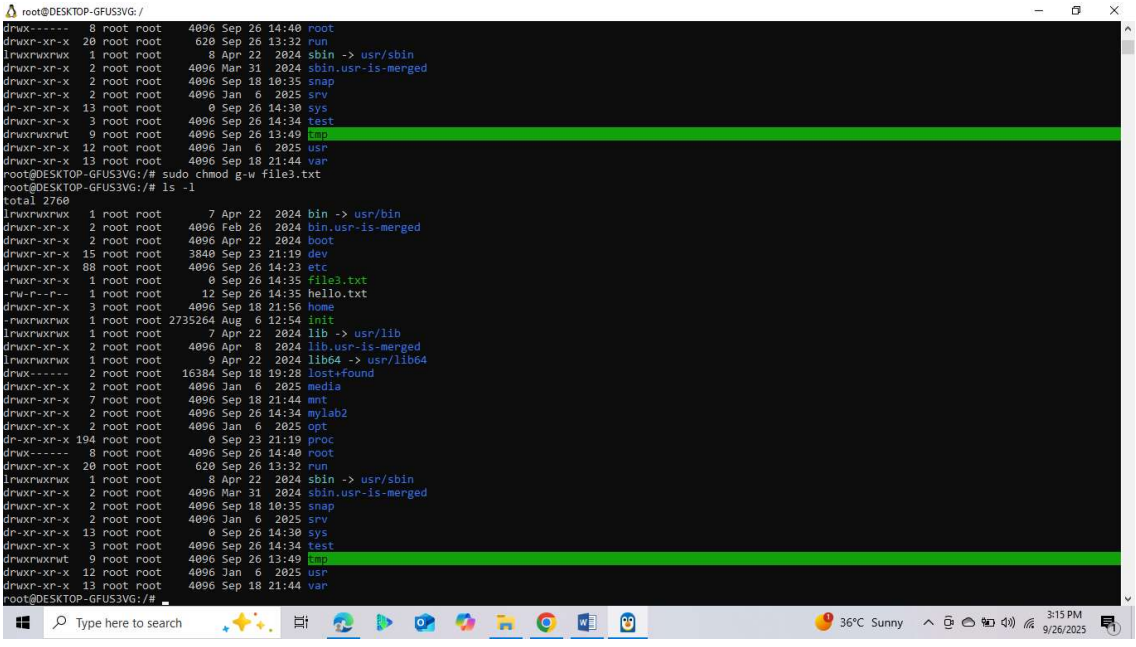
-rwxrwxrwx   1 root root 2735264 Aug 6 12:54 init
lrwxrwxrwx   1 root root   7 Apr 22 2024 lib -> usr/lib
Type here to search
Hot days ahead
3:12 PM
9/26/2025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drwxr-xr-x 20 root root   620 Sep 26 13:32 run
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drwxr-xr-x 13 root root   4096 Sep 18 21:44 var
root@DESKTOP-GFUS3VG:/# sudo chmod g-w file3.txt
root@DESKTOP-GFUS3VG:/# ls -l
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drwxrwxrwt   9 root root   4096 Sep 26 13:49 tmp
drwxr-xr-x 12 root root   4096 Jan 6 2025 usr
drwxr-xr-x 13 root root   4096 Sep 18 21:44 var
root@DESKTOP-GFUS3VG:/#
Type here to search
36°C Sunny
3:15 PM
9/26/2025

Part 5: Text Processing and Utilities

5.1 Essential Text Commands

- **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

- **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

- **Concepts to Cover:**
  - What is a process?
  - Process ID (PID)
  - Parent-child relationships
  - Process states
- **Commands to demonstrate:**

```
ps                  # Show current processes
ps aux              # Detailed process list
ps -ef              # Full format listing
pstree              # Process tree
top                 # Real-time process viewer
htop                # Enhanced process viewer (if available)
kill PID            # Terminate process by PID
killall process_name # Kill processes by name
pkill pattern       # Kill processes matching pattern
```