Lecture #02: Mastering the Terminal

Lecture Objectives

By the end of this lecture, students will:

- Understand what the terminal is and its role in Linux.
- Gain hands-on experience with Bash and other popular shells like Zsh and Fish.
- Learn essential Linux terminal commands.
- Master command chaining and redirection techniques.
- Use keyboard shortcuts and command history to enhance productivity.
- Explore 50 essential terminal commands for everyday use and hacking prep.

Topic 1: Terminal and Shell Overview

What is the Terminal?

- A text-based interface to interact with the OS.
- Allows control over all aspects of Linux using typed commands.

Shell: Bash, Zsh, Fish

Shell	Description	Key Features
Bash	Default shell in Ubuntu	Widely supported, scripting friendly
Zsh	Z Shell	Powerful autocomplete, themes (Oh My Zsh)
Fish	Friendly Interactive Shell	Syntax highlighting, intuitive defaults

Real-life Analogy:

Think of the shell as a translator. You speak English, the OS speaks binary — the shell does the interpreting.

Topic 2: Essential Navigation Commands

Command	Function	Example
pwd	Print current directory	pwd
ls	List contents	ls -l, ls -a, ls /etc
cd	Change directory	cd /home/user, cd .., cd ~
tree	Display directory tree (needs sudo apt install tree)	tree
echo	Print messages	echo "Hello, Linux!"
whoami	Show current user	whoami

Engagement Activity:

Navigate to the Desktop, print your working directory, and list all hidden files.

Topic 3: Command Chaining

Symbol	Purpose	Example
;	Run multiple commands sequentially	cd ~; ls (echo “lists”; ls; echo “Done!”
&&	Run second command only if first succeeds	mkdir test && cd test
`	Backtick	Pipe output of one command to another

Command Piping in Action:

bash

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ps aux | grep firefox

- Filters all running processes for “firefox”.

Topic 4: Input/Output Redirection

Symbol	Meaning	Example
>	Redirect output (overwrite)	echo "data" > file.txt
>>	Append output	echo "more" >> file.txt
<	Take input from file	wc -l < file.txt
2>	Redirect standard error	ls nonexist 2> err.txt
&>	Redirect both output and error	cmd &> out.log

Real-Life Analogy:

Think of > as a pen writing on paper, and >> as adding a note in the margin.

Topic 5: Keyboard Shortcuts

Shortcut	Action
Ctrl + C	Cancel running process
Ctrl + Z	Pause background process
Ctrl + D	End input (EOF)
Ctrl + R	Reverse search history
Ctrl + L	Clear terminal
!!	Repeat last command
Tab	Autocomplete commands/paths

Topic 6: Bash History & Tab Completion Tricks

History Commands

- history: Show command history.
- !n: Run command number n from history.
- !grep: Run last command that started with grep.
- !!: Repeat last command.

Tab Completion Tips

- Press Tab to autocomplete file/folder names.
- Double Tab shows available options.

Topic 7: 50 Essential Linux Terminal Commands

Here's a categorized list of **50 commands** with usage examples:

A. System Navigation

1. pwd
2. ls -l
3. cd
4. tree
5. find / -name filename
6. du -sh *
7. df -h
8. stat filename
9. realpath file
10. basename path

B. File Management

11. touch file.txt
12. cp file1 file2
13. mv file1 newname
14. rm file.txt
15. mkdir dir
16. rmdir dir
17. nano file.txt
18. cat file
19. more file
20. less file

C. Permissions & Ownership

21. chmod +x script.sh
22. chown user:group file
23. ls -lah
24. umask
25. id

D. Process Management

26. ps aux
27. top
28. htop (install with sudo apt install htop)
29. kill PID
30. pkill processname
31. jobs
32. fg
33. bg

E. Networking

34. ip a (show comprehensive information about all network interfaces (also called network adapters))
35. ping google.com
36. ifconfig (install net-tools)
37. netstat -tulnp
38. curl example.com
39. wget http://file
40. hostname
41. nmap *(Advanced, install separately)*

F. Package Management

42. sudo apt update
43. sudo apt upgrade
44. sudo apt install package
45. sudo apt remove package
46. dpkg -i file.deb

G. Utilities

47. history
48. alias
49. clear
50. date

Summary

- The terminal is a powerful tool that grants complete control over your system.
- Bash is your best friend; Zsh and Fish add flair.
- Mastering command chaining, redirection, and history boosts your productivity.
- Use keyboard shortcuts to save time.
- The 50 essential commands form the foundation for becoming a power user and hacker.

Homework

1. Create a folder named linux_lab, move into it, and create 5 dummy files.

2. Redirect the output of ls -l into a file called list.txt.
3. Use command chaining to:

   bash

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   mkdir test && cd test && touch hello.txt
4. Find all .txt files in /home using the find command
5. Practice Ctrl+R, !!, and Tab until fluent.