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LINUX FUNDAMENTALS

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www.africahackon.com

Course Introduction

Why Learn Linux?

- Backbone of modern computing and cybersecurity.
- Powers servers, cloud infrastructure, and IoT devices.
- Essential for system administration, automation, and penetration testing.

What You'll Learn

- Master Linux basics and the command line.
- Automate tasks with Bash scripting.
- Get started with Python for simple automation.
- Solve real-world challenges in OverTheWire labs.

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What you will learn…

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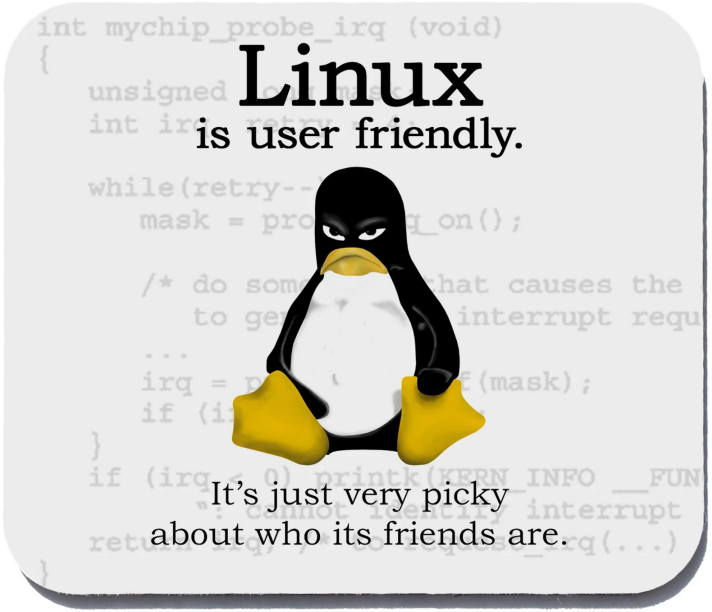
1. Basics of Linux Operating System
2. Command-Line Interface (CLI) Essentials
3. File System Navigation and Basic Commands
4. Bash Scripting Basics
5. Python 101
6. OverTheWire Challenges

1: Basics of Linux Operating System

Understanding the Foundation of Linux and Its Architecture



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Gentle Introduction

Linux is an open-source operating system based on the Unix family. It is highly customizable, secure, and free to use.

Created by Linus Torvalds in 1991, Linux has evolved into a dominant force in the tech world.

Key Features of Linux

- **Open-source**: Anyone can view, modify, and distribute Linux code.
- **Multi-user**: Multiple users can interact with the system simultaneously.
- **Multi-tasking**: Linux can run multiple programs at the same time.
- **Secure**: Linux is known for its strong security model, minimizing vulnerabilities.
- **Portable**: Linux can run on almost any hardware, from smartphones to supercomputers.

Common Linux Distributions

- **Ubuntu**: User-friendly, popular for desktops and beginners.
- **CentOS**: Free and open-source, ideal for servers.
- **Kali Linux**: A specialized Linux distribution for cybersecurity and penetration testing.
- **Debian**: Known for stability, often used for servers.

Key Components of Linux Architecture

Kernel:

- The heart of Linux, managing hardware and system resources.
- Handles processes, memory, device drivers, and communication between software and hardware.

Shell:

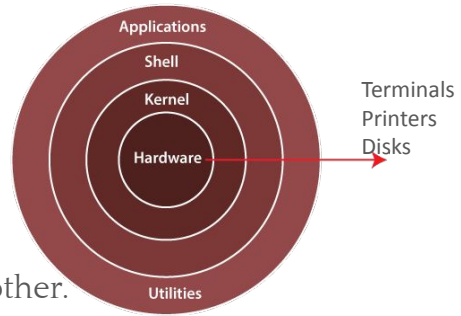
- The command-line interface (CLI) through which users interact with the operating system.
- Examples: Bash, Zsh, Fish.

File System:

- Linux organizes data in a hierarchical file system structure (directories, files).
- Key directories: /home, /etc, /bin, /var.

Processes:

- Linux manages running programs as processes, which are isolated from each other.
- The operating system manages resources, priorities, and scheduling.



More

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Why Linux?

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Why Linux?

1. Popular in Servers and Cloud

- Linux powers over **70%** of the world's web servers.
- It is the backbone of cloud infrastructure and services like **AWS**, **Google Cloud**, and **Azure**.

2. Stability and Reliability

- Known for its **uptime** and **performance**, making it ideal for mission-critical applications.
- It rarely needs reboots and can run for years without issues.

3. Open-Source and Free

- **Cost-effective**: Free to download, use, and modify.
- **Transparency**: The open-source nature ensures that bugs and vulnerabilities are quickly identified and patched by the community.

Why Linux?

4. Customization and Flexibility

- **Highly customizable**: Users can modify the OS to suit their needs (from embedded systems to servers).
- **Variety of distributions**: Choose from desktop-friendly (Ubuntu) to server-oriented (CentOS, Debian) or specialized distributions (Kali Linux for cybersecurity).

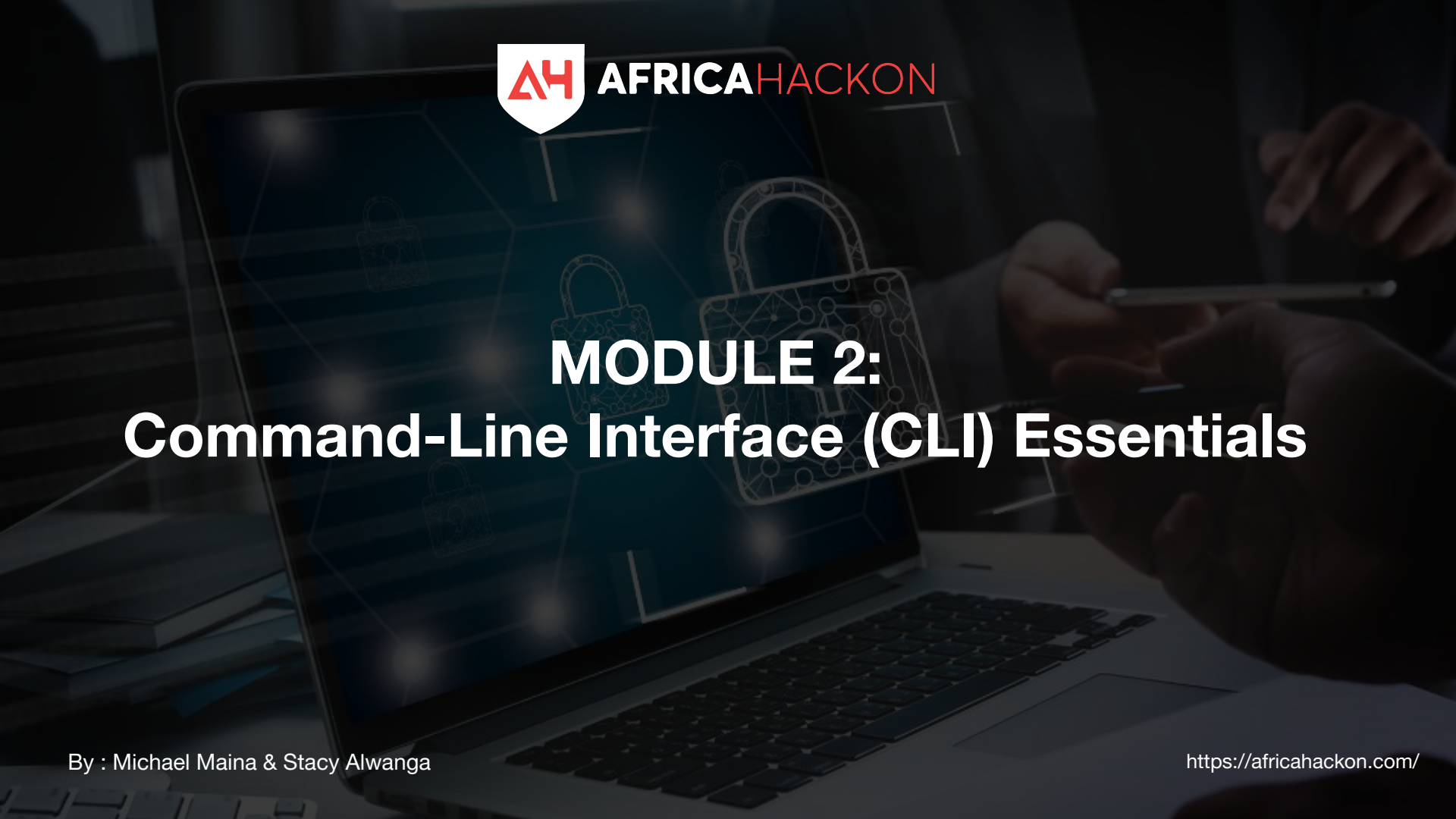
5. Security

- Linux is known for its **strong security model**, minimizing vulnerabilities.
- Advanced security features like **AppArmor**, **SELinux**, and **iptables** help secure systems.
- Regular updates and a proactive community ensure continuous protection.

Quick Activity

Activity:

- **Question**: *What devices or systems around you might be using Linux?*
    - Consider smartphones, smart TVs, gaming consoles, routers, and servers.



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MODULE 2:
Command-Line Interface (CLI) Essentials

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Command-Line Interface (CLI) Essentials

The **Command-Line Interface (CLI)** is a powerful tool for interacting with Linux systems.

It allows users to execute commands, navigate files, and perform administrative tasks without a graphical interface.

Why Learn the CLI?

1. Efficiency

- Perform tasks faster compared to using the GUI.
- Example: Copying files between directories with a single command.

2. Flexibility

- Access advanced features and system configurations not available in the GUI.
- Example: Scheduling tasks with cron or editing files using vim.

3. Full Control

- Allows precise system management and troubleshooting.
- Example: Monitoring running processes using top or htop.

4. Universality

- The CLI remains consistent across Linux distributions, making skills transferable.
- Example: Commands like ls, cd, and mkdir work in all Linux environments.

Basic CLI Concepts

1. Terminal

- The interface where you type and execute commands.
- Accessible through applications like **Terminal** (Ubuntu) or **Konsole** (KDE).

2. Shell

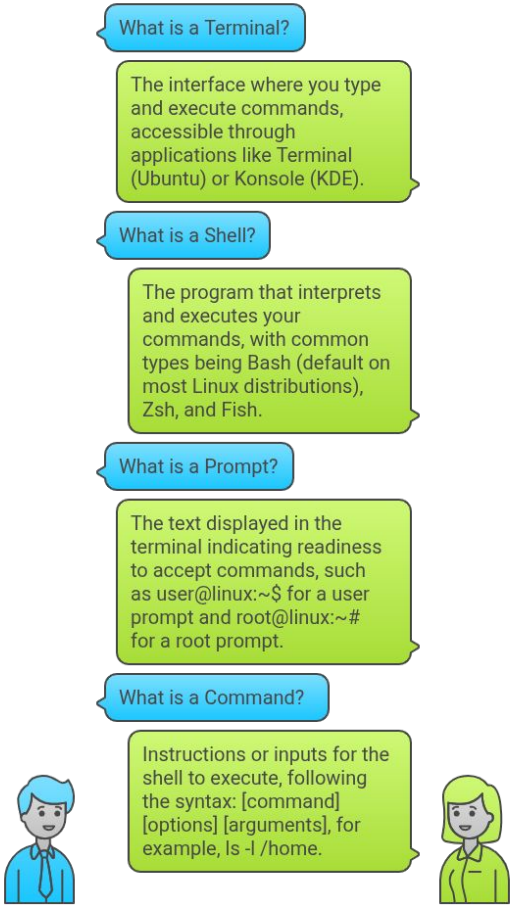
- The program that interprets and executes your commands.
- Common shells:
  - **Bash** (default on most Linux distributions).
  - **Zsh**, **Fish** (alternative shells with additional features).

3. Prompt

- The text displayed in the terminal indicating readiness to accept commands.
- Example:
  - **User prompt**: user@linux:~$
  - **Root prompt**: root@linux:~#

4. Command

- Instructions or inputs for the shell to execute.
- Syntax: [command] [options] [arguments]
  - Example: ls -l /home



Common Linux Commands

ls	Lists files and directories in the current directory.
cd	Changes the current directory.
pwd	Prints the current working directory.
mkdir	Creates a new directory.
rm	Removes files or directories.
cp	Copies files or directories.
chmod	Changes file permissions.
sudo	Executes a command with superuser privileges.

Resources

Geeks for Geeks: 25 basic linux commands

Activity: CLI Basics

Open the Terminal

- If you're using Ubuntu: Press Ctrl + Alt + T.

Try These Commands:

- **pwd**: Check your current directory.
- **ls**: List the files and directories in your current location.
- **mkdir practice**: Create a new folder called **practice.**
- **cd practice**: Navigate into the practice folder.
- **touch example.txt**: Create an empty file named **example.txt.**
- **rm example.txt**: Delete the example.txt file.

Explore Help Options:

- Run **man ls** to learn about the command.
- Try ls --help to see quick usage information.

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Assignment

Quid libi te docere potest de vita? Consuetudo illa perficit, et si semel aliquid conaris, fortasse non erit perfectum, et opus in eo habebis, si bonum esse vis.

Thank You!

We have no words to thank you enough for making it this far, so we just copied the message above and pasted it down here again saying “Thank you!”

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