Linux & Networking Essentials

By Rachit Gupta

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1. Introduction to Linux

Linux is a free and open-source operating system that acts as the foundation for countless systems, including servers, desktops, mobile devices, and embedded systems. It was created by Linus Torvalds in 1991 and is known for its stability, flexibility, and security.

Key Concepts:

- Linux Kernel
- Open Source Philosophy
- Linux Distributions (Ubuntu, CentOS, Fedora, Arch)
- Shell and Terminal

2. Basic Linux Commands

Mastering the terminal is essential to becoming proficient in Linux. Key commands include:

- pwd: Display current directory
- ls: List files
- cd: Change directory
- cp, mv, rm: Copy, move, and delete files
- cat, less, head, tail: View file contents
- man: View command manual

3. User & Group Management

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User management allows you to control access to the system:

- useradd, userdel, usermod
- groupadd, groupdel
- passwd to change passwords
- /etc/passwd and /etc/group files
- File ownership (chown) and permissions (chmod)

4. Package Management

Linux uses package managers to install and manage software:

- Debian-based: apt, dpkg
- Red Hat-based: yum, dnf, rpm
- Updating software and repositories
- Installing from source with make and configure

5. System Services and Processes

Processes represent running programs. Systemd handles service management:

- ps, top, htop: Monitor processes
- systemctl: Start/stop services
- journalctl: View logs

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6. Networking Basics

Understand the basics of networking:

- OSI vs TCP/IP models
- IP Addressing (IPv4/IPv6)
- Subnetting and CIDR
- Common Protocols: TCP, UDP, HTTP, FTP
- Port numbers and sockets

7. Linux Network Configuration

Setting up the network:

- ip and ifconfig commands
- Configuring static IP vs DHCP
- Netplan (Ubuntu) or NetworkManager
- /etc/network/interfaces

8. Common Network Tools

Useful tools for troubleshooting:

- ping: Check connectivity

- traceroute: Trace route path

- netstat, ss: View connections

- curl, wget: Retrieve web content

- nmap: Scan networks

9. Networking Services on Linux

Linux supports multiple services:

- SSH (Secure Shell)

- FTP, SFTP for file transfer

- HTTP servers: Apache, Nginx

- DNS: BIND, dnsmasq

- DHCP configuration

10. Firewall & Security

Securing your Linux system:

- iptables: Legacy firewall tool

- firewalld and UFW: Modern wrappers

- SELinux and AppArmor

- Fail2ban: Brute-force protection

11. Advanced Topics

Further concepts for advanced users:

- NFS, Samba: Network file sharing
- VPN setup: OpenVPN, WireGuard
- Monitoring: Nagios, Zabbix
- Logging: syslog, rsyslog, journald

12. Conclusion

Linux and networking are vast fields. With consistent practice and exploration, you can master server administration, automate tasks, and secure complex systems.

13. About the Author - Rachit Gupta

Rachit Gupta is a passionate technologist with a deep interest in Linux systems, networking, and open-source tools. With experience in system administration and network infrastructure, he believes in sharing knowledge to empower others.