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# Linux Essentials in a Nutshell

2024 Edition

Dimitar Zahariev

Volunteer at the Linux Professional Institute

# The Linux Professional Institute

Our mission is to **promote the use of open source**  
**by supporting the people who work with it.**

# LPI Certifications

Linux  
Professional



Open  
Technology



Essentials



# Linux Essentials Certification

Current version is 1.6 (Exam code 010-160)

40 questions for 60 minutes

No prerequisites

Lifetime validity

# Linux Essentials Topics

The Linux Community and a Career in Open Source

Finding Your Way on a Linux System

The Power of the Command Line

The Linux Operating System

Security and File Permissions



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# Part 1

The Linux Community and a Career in Open Source

# Linux Evolution and Popular Operating Systems

## What is (not) Linux

- Linus Torvalds
- Linux Kernel

## Linux Distributions

- Components
- Families

## Linux is Everywhere

- Desktops, Servers, and Cloud
- Mobile and Embedded Systems
- Science Labs and Space

## Notable Distributions

- Debian, Ubuntu, Linux Mint
- RHEL, Fedora, CentOS
- SLES, openSUSE (Tumbleweed, Leap)
- Arch Linux, Slackware, Gentoo, Alpine

# Major Open Source Applications

## Software Distribution

- Building from Source
- Software Packages

## Package Management

- Package Types
- Package Managers

## Available Software

- Office Applications
- Web Browsers
- Multimedia and Games
- Server Software and Services
- Programming Languages

## Notable Commands

- **rpm** and **dpkg**
- **apt**, **apt-get**, **apt-cache**
- **yum** and **dnf**
- **zypper**



# Open Source Software and Licensing

## Free and Open Source Software

- Free Software Foundation (FSF)
- Open Source Initiative (OSI)

## Licenses

- Copyleft
- Permissive
- Creative Commons

## Business Models

- Crowdfunding
- Dual Licensing
- Subscriptions and Additional Services

## Free as in “free speech”, not as in “free beer”.

Richard  
Stallman

## Four Freedoms

0. Run the program as you wish, for any purpose
1. Study how the program works and change it as you wish
2. Redistribute copies so you can help others
3. Distribute copies of your modified versions to others

# ICT Skills and Working in Linux

## Linux User Interfaces

- Desktop Environments
- Command Line

## Industry Uses of Linux

- Internet
- *Something* as a Service

## Privacy Issues on the Internet

- Cookie Tracking
- Do Not Track (DNT)
- “Private” Windows
- Right Passwords

## Encryption

- Transport Layer Security (TLS)
- Encryption with GnuPG
- Disk Encryption



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# Part 2

Finding Your Way on a Linux System

# Command Line Basics

## Shell 101

- Pick up a Shell
- Shell Prompt

## Commands

- Command Types
- Command Line Structure

## Environment Variables

- General Rules
- **echo**
- **export**

# Using the Command Line to Get Help

## Built-in Commands

- **help** *command*

## Built-in Help

- *command --help*
- *command -h*

## Find Files

- **locate** (*and updatedb*)
- **find**

## Man and Info Pages

- **man**
- **info**

## Additional Documentation

- */usr/share/doc/\**

# Using Directories and Listing Files

## Files and Directories

- Hidden objects (starts with .)
- Home directories
- Home shortcut (~)

## Absolute vs Relative Path

- Absolute always starts with (/)
- **pwd**

## Exploring and Navigating

- Explore with **ls**
- Navigate with **cd**

# Creating, Moving and Deleting Files

## Basic Commands

- **touch**
- **cp, mv, rm**
- **mkdir, rmdir**

## Work with Multiple File Objects

- Use **\***, **?**, and **[]** for globbing

## Warning

File and folder names are case-sensitive!

*file <> File <> FILE*



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# Part 3

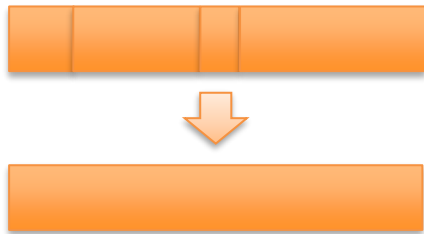
The Power of the Command Line



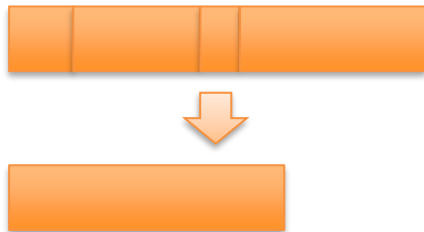
# Archiving Files on the Command Line

## Archiving vs Compression

- Archiving – same\* size



- Compression – smaller\* size



## Notable Utilities

- **tar**
- **zip, unzip**
- **gzip, gunzip**
- **bzip2, bunzip2**
- **xz, unxz**

# Searching and Extracting Data from Files

## Explore Files and Extract Data

- **grep**
- **more, less**
- **cat, tac**
- **head, tail**
- **sort, uniq**
- **cut, paste, join**
- **wc, nl**

## Basic Regular Expressions

- Work with **. \* ? [ ]**

## Manage Data Flow

- Link commands via pipes (**|**)
- Use stream redirection (**>, <, >>**)

# Turning Commands into a Script

## Bash Scripts Building Blocks

- Script signature
- Variables
- Arguments
- Exit status

## Scripts Control Structures

- Loops (**for**, **while**, **until**)
- Control flow (**if**, **case**)

## Text Editors

- **vim**
- **nano**



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# Part 4

The Linux Operating System

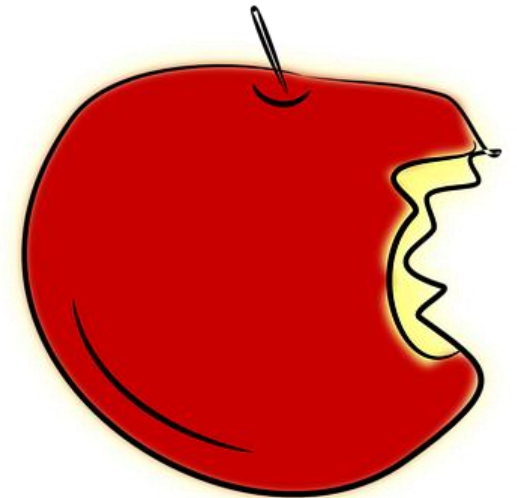
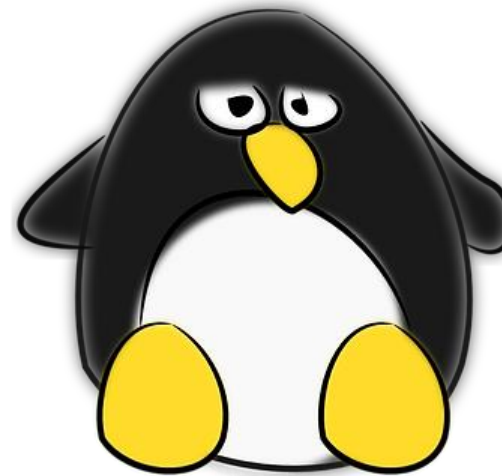
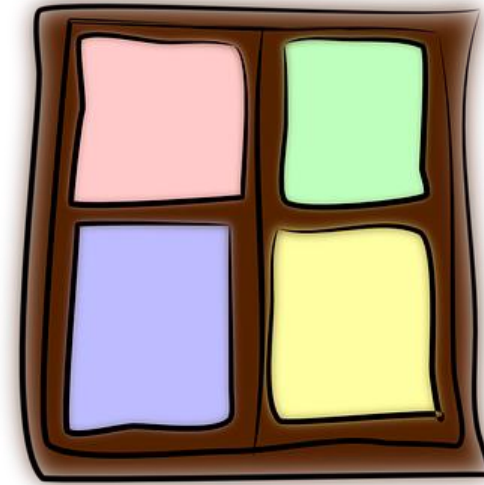
# Choosing an Operating System

What is an Operating System

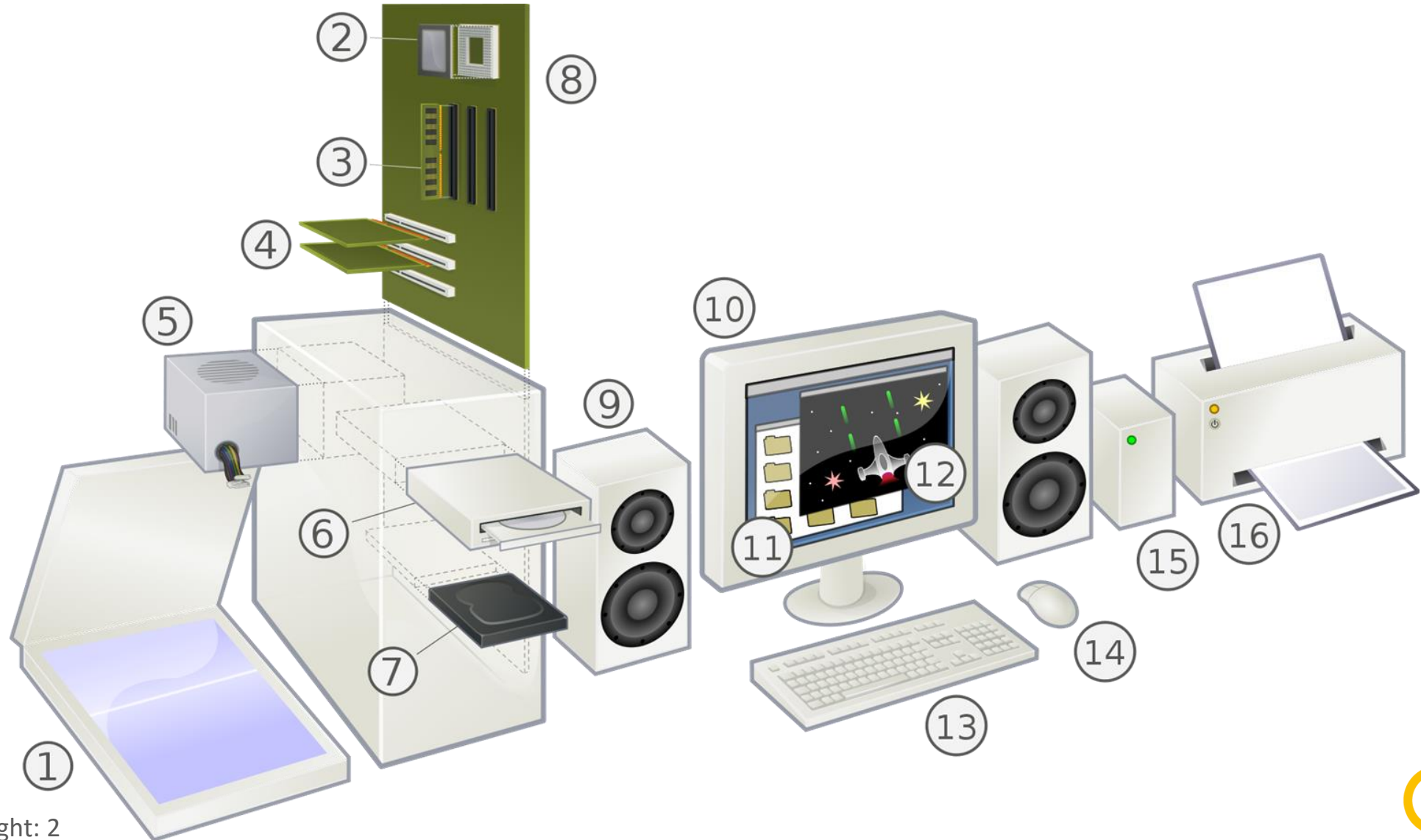
Choosing a Linux Distribution

- Types
- Lifecycle
- Desktop vs Server

Non-Linux Operating Systems



# Understanding Computer Hardware



Weight: 2

# Where Data is Stored

## Configurations

- `/etc/*`
- `/boot/*`

## Events and Logs Exploration

- `/var/log/*`
- **journalctl**
- **dmesg**

## Process, Resources, and Disks

- **ps, top**
- **free, df, du**
- **lsblk, fdisk**

## Special Folders

- `/proc/*`
- `/sys/*`
- `/dev/*`

# Your Computer on the Network

## Main Topics

- Network, interface, gateway
- IPv4 and IPv6 addresses
- DNS

## Monitoring and Troubleshooting

- **netstat, ss**
- **ping**
- **host**

## Network Configuration

- **route, ip route show**
- **ifconfig, ip address show**

## Notable Files

- `/etc/resolv.conf`
- `/etc/hosts`





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# Part 5

Security and File Permissions

# Basic Security and Identifying User Types

## User Types

- Super user
- System users
- Regular (standard) users

## Notable Files

- /etc/passwd
- /etc/shadow
- /etc/group

## Helpful Commands

- **id, last, who, w**
- **sudo, su**

# Creating Users and Groups

## User Management

- **useradd**
- **usermod**
- **userdel**

## Group Management

- **groupadd**
- **groupmod**
- **groupdel**

## Password Management

- **passwd**
- **chpasswd**

## Alternative Commands

- **adduser**
- **deluser**

# Managing File Permissions and Ownership

**- rwxrw- r - -**  
                  **user group others**

Object Type \*  
d = folder  
- = file  
l = symbolic link

## Permissions Meaning

- r = Read
- w = Write
- x = Execute

## Explore Permissions

- Long listing with **ls -l**

## Manage Permissions & Ownership

- **chmod**
- **chown**
- **chgrp**

# Special Directories and Files

## Special Directories

- /tmp
- /var/tmp
- /run

## Symbolic and Hard Links

- Difference
- Working with **ln**



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# Is This All?

# Nooo! There is Much More!

Go deeper with topics like

- Users and groups management
- Permissions (incl. special ones) and ownership management
- Special folders and files
- Bash building blocks (if, case, and loop structures)
- Package management

Explore the detailed objectives at

[https://wiki.lpi.org/wiki/Linux\\_Essentials\\_Objectives\\_V1.6](https://wiki.lpi.org/wiki/Linux_Essentials_Objectives_V1.6)

# Where Can I Study What is Missing?

Start with

<https://learning.lpi.org/pdfstore/LPI-Learning-Material-010-160-en.pdf>

Continue with other materials available at

<https://learning.lpi.org>





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# Questions?



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# Demo

<https://github.com/shekeriev/linux-essentials>



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# Thank you!

Submit your feedback here:



Dimitar Zahariev  
[mitko@tuionui.com](mailto:mitko@tuionui.com)