

Unit I: Introduction: Understanding Computers

Chapter 3: Operating Systems and File Management

3.1: Goal:

In this chapter, you will learn how operating systems manage the hardware and software that make computers usable. You will explore how files and folders are organized, discover strategies for managing digital information, and understand how cloud storage makes files accessible across multiple devices. These skills will help you work more efficiently and keep your digital information organized.

3.2: Objectives:

- Define an operating system and explain its purpose.
- Identify the major functions of an operating system.
- Compare the features of common operating systems, including Microsoft Windows, macOS, Linux, Android, and iOS.
- Explain how the operating system manages hardware, software, memory, files, and user interfaces.
- Describe the difference between files, folders, and directories.
- Create, rename, move, copy, and delete files and folders.
- Explain the importance of organizing files using an effective folder structure.
- Identify common file types and file extensions.
- Describe different storage locations, including local drives, external drives, network drives, and cloud storage.
- Explain best practices for backing up and protecting important files.
- Apply file management skills to organize digital information efficiently.

3.3: Think About It

Imagine that tomorrow morning every operating system in the world suddenly stopped working.

- Your computer would not start.
- Your smartphone would only display a blank screen.
- ATMs could not process transactions.
- Airline reservation systems would stop functioning.
- Hospitals would lose access to patient records.
- Traffic lights and many factory control systems could stop operating.

- Although most people rarely think about operating systems, they are the software that makes every modern computer, smartphone, tablet, and many everyday devices usable.

Questions to Consider:

- How many devices have you used today that rely on an operating system?
- Have you ever lost an important file because you couldn't remember where you saved it?
- What file organization system do you currently use? Does it help you find documents quickly?

As you read this chapter, think about how an operating system quietly manages your computer and how good file organization can save time, reduce frustration, and protect important information.

3.4: Opening Scenario

Emma is a first-year college student taking five classes. During the first week of the semester, she saves assignments wherever it's convenient: some on her laptop's desktop, others in the Downloads folder, and a few in cloud storage. She gives files names like "Homework," "Essay," and "Final Version."

A month later, one of her instructors asks her to revise a paper she submitted earlier in the semester. Emma searches her laptop but finds six different files with similar names:

- Essay
- Essay Final
- Essay Final New
- Essay Final Really Final
- Essay Latest
- Essay Final Revised

She can't remember which one she submitted, and some versions are missing important changes. Frustrated, she spends more time searching for the correct file than revising the assignment. After learning basic file management skills, Emma creates folders for each course, uses meaningful file names that include dates or version numbers, and regularly backs up her work to cloud storage. Finding documents becomes quick and easy, and she no longer worries about losing important assignments. Good file management is more than keeping your computer organized, it is an essential skill for success in college and the workplace.

3.5: Why This Chapter Matters

Every computer, smartphone, tablet, and smart device relies on an **operating system** to function. The operating system acts as the manager of the computer, coordinating hardware, running

applications, organizing files, and providing the interface that allows users to interact with their devices.

Equally important is learning how to manage your files. Whether you are writing research papers, creating presentations, editing photographs, or preparing business reports, your ability to organize, locate, and protect your digital files will affect your productivity and efficiency.

Employers expect workers to know how to navigate operating systems, organize information, and protect valuable data. These skills are essential in nearly every profession, from healthcare and education to business, engineering, and information technology.

By mastering the concepts in this chapter, you will develop practical computer skills that will help you succeed in college, in your career, and in your personal life.

3.6: Introduction

The operating system does much more than simply start the computer. It acts as the computer's manager, making sure that hardware and software work together efficiently. Every time you open an application, print a document, save a file, or connect to the Internet, the operating system is coordinating dozens of tasks behind the scenes.

Without an operating system, each application would have to communicate directly with every hardware device. This would make computers much more difficult to use and software much harder to develop.

Major Functions of an Operating System

1. Process Management

A **process** is a program that is currently running. The operating system allows multiple programs to run at the same time by deciding:

- which program uses the CPU
- how long each program runs
- when programs should pause or resume

For example, you can:

- listen to music
- browse the web
- edit a document
- receive email notifications

All at the same time because the operating system rapidly switches the CPU between tasks.

2. Memory Management

The operating system manages the computer's **Random Access Memory (RAM)**. It decides:

- which applications receive memory
- how much memory each application may use
- when memory should be released

Efficient memory management allows many applications to operate without interfering with one another.

3. Device Management

Computers contain many hardware devices including:

- keyboards
- printers
- monitors
- webcams
- speakers
- storage devices

The operating system communicates with these devices using **device drivers**.

A device driver is software that allows the operating system to communicate with a specific piece of hardware.

4. File Management

One of the most visible responsibilities of the operating system is organizing files. It allows users to:

- create folders
- save files
- rename files
- copy files
- move files

- delete files
- search for files

5. Security

Operating systems help protect computers by providing:

- user accounts
- passwords
- permissions
- encryption
- antivirus support
- automatic security updates

These features help prevent unauthorized access to information.

6. User Interface

The operating system provides the interface that allows people to interact with the computer. This includes:

- desktop
- icons
- windows
- menus
- taskbar or dock • touch gestures

Without a user interface, operating a computer would require typing complex commands.

Putting It All Together

Every time you use a computer, the operating system performs thousands of tasks every second. Although most of this work happens behind the scenes, it is essential for keeping the computer organized, secure, and responsive.

Technology in Action

Suppose you are writing a paper while listening to music and participating in a video meeting. The operating system is simultaneously:

- managing the CPU
- allocating memory
- sending sound to your speakers
- displaying video
- saving your document
- monitoring your internet connection

All of these activities happen automatically.

Quick Check

1. What is a process?
2. Why is memory management important?
3. What is a device driver?
4. What is the purpose of file management?
5. Give two examples of operating system security features.

3.7: Major Functions of an Operating System

FUNCTION	WHAT IT DOES	EXAMPLE
Process Management	Runs multiple programs	Switching between a browser and Word
Memory Management	Allocates RAM	Giving memory to an application
Device Management	Controls hardware	Sending a document to a printer
File Management	Organizes data	Saving files into folders
Security	Protects users and data	Passwords and permissions
User Interface	Allows user interaction	Desktop, icons, and windows

3.8: Types of Operating Systems

Learning Outcomes: After completing this section, you should be able to:

- Identify the major operating systems.

- Compare desktop and mobile operating systems.
- Describe where each operating system is commonly used.

Introduction

Although all operating systems perform similar basic functions, they are designed for different types of devices and users.

The five operating systems encountered most often are:

- Windows
- macOS
- Linux
- Android
- iOS

Windows

Microsoft Windows is the most widely used desktop operating system. It is commonly found on:

- home computers
- schools
- businesses
- gaming computers

Advantages include:

- broad software compatibility
- extensive hardware support
- large user community

macOS

macOS is Apple's operating system for Macintosh computers. It is known for:

- ease of use
- strong integration with Apple devices

- creative software
- stability

Linux

Linux is an open-source operating system. It is widely used for:

- servers
- cloud computing
- programming
- cybersecurity
- supercomputers

Many versions of Linux exist, called **distributions**.

Android

Android is Google's mobile operating system. It powers many:

- smartphones
- tablets
- televisions
- wearable devices

Because it is open source, many manufacturers customize Android for their own devices.

iOS

iOS is Apple's mobile operating system. It is used on iPhones.

Apple's iPad uses **iPadOS**, which is closely related to iOS but includes additional features designed specifically for tablets. iOS is known for:

- security
- reliability
- consistent user experience

Comparing Operating Systems

Although each operating system has a different appearance, they all perform the same fundamental responsibilities:

- managing hardware
- running applications
- organizing files
- providing security
- offering a user interface

Common Operating Systems

Operating System	Common Devices	Developed By	Typical Users
Windows	PCs	Microsoft	Home, education, business
macOS	Macintosh computers	Apple	Education, creative professionals
Linux	Servers and PCs	Open-source community	Developers, businesses, researchers
Android	Phones and tablets	Google	Mobile users
iOS / iPadOS	iPhone and iPad	Apple	Mobile users

Quick Check

1. Which operating system is open source?
2. Which company develops Windows?
3. Which operating system is commonly used on iPhones?
4. Which operating system powers many servers?
5. Name two similarities shared by all operating systems.

3.9: The User Interface

Learning Outcomes: After completing this section, you should be able to:

- Identify common graphical user interface (GUI) elements.
- Navigate a desktop environment.
- Explain how windows, icons, and menus improve usability.

The **user interface (UI)** is the part of the operating system that allows people to interact with a computer. Most modern operating systems use a **Graphical User Interface (GUI)**, which enables users to interact with pictures, icons, buttons, and menus instead of typing commands. Although Windows, macOS, Linux, Android, and iOS look different, they all include similar interface elements.

Desktop

The desktop is the main workspace that appears after you sign in. It may contain:

- shortcuts
- folders
- files
- wallpaper
- taskbar or dock

Think of the desktop as the top of a physical desk where frequently used items are kept within easy reach.

Icons

Icons are small pictures that represent:

- applications
- files
- folders
- storage devices
- system settings

Double-clicking (or tapping) an icon usually opens it.

Menus

Menus display lists of commands and options.

Examples include:

- File
- Edit
- View
- Help

Menus organize commands so users can easily find them.

Windows

A **window** is a rectangular area where a program runs. Most windows include:

- title bar
- minimize button
- maximize button
- close button
- scroll bars

Multiple windows allow users to multitask efficiently.

Taskbar or Dock

Most operating systems provide quick access to applications.

- **Windows** uses the **Taskbar**.
- **macOS** uses the **Dock**.

These areas display frequently used applications and programs that are currently running.

Touch Interfaces

Smartphones and tablets replace the mouse with gestures such as:

- tap
- swipe
- pinch
- drag

Touch interfaces make mobile devices easy to operate.

Common User Interface Elements

INTERFACE ELEMENT	PURPOSE
Desktop	Main workspace
Icons	Represent programs, files, and folders
Windows	Display running applications
Menus	Organize commands
Taskbar / Dock	Quick access to applications
Pointer or Touch	Selects and manipulates objects

Technology in Action

Whether you use Windows, a Mac, an Android phone, or an iPhone, you'll notice many familiar interface features. Once you learn the basic concepts of desktops, icons, windows, and menus, adapting to a new operating system becomes much easier because the underlying ideas remain similar.

Quick Check

1. What is a graphical user interface?
2. What is the purpose of an icon?
3. What is displayed inside a window?
4. How is a taskbar similar to a dock?
5. Name two common touch gestures.