

Unit II: Hardware and Software

Chapter 7: Computer Software

7.1: Goal:

In this chapter, you will explore the different types of software that enable computers to perform useful tasks. You will learn the differences between system software and application software, discover how software is developed and distributed, and examine how software improves productivity, creativity, communication, and entertainment.

7.2: Objectives:

- Differentiate between hardware and software.
- Explain the role of system software and application software.
- Describe the functions of an operating system.
- Identify common types of application software and their uses.
- Distinguish between desktop, web-based, and mobile applications.
- Explain how software is installed, updated, and removed.
- Compare commercial, open-source, freeware, and subscription software.
- Describe the importance of software licensing, updates, and security.
- Recognize emerging trends such as cloud software and AI-powered applications.

7.3: Think About It

Imagine buying the fastest, most expensive computer available. It has a powerful processor, lots of memory, and a huge solid-state drive.

Now imagine turning it on and discovering that it has **no software installed**.

What could you actually do with it?

Just as a musical instrument needs a musician, computer hardware needs software to tell it what to do. Without software, even the most advanced computer is simply a collection of electronic components.

7.4: Opening Scenario

Jordan has just purchased a new laptop for college. When he turns it on for the first time, it asks him to create an account, connect to Wi-Fi, and choose language settings. Soon

afterward, he installs Microsoft Word, Zoom, and a web browser. Later, he downloads a photo-editing app and installs updates that improve security and add new features.

Jordan quickly realizes that the computer's hardware provides the physical capability, but the software makes the computer useful. Every assignment, video call, game, and website depends on software working together with the hardware.

By understanding different types of software, Jordan can choose the right tools for school, work, and everyday life.

7.5: Why This Chapter Matters

Every task you perform on a computer depends on software. Whether you're writing a paper, editing a photo, browsing the internet, or attending an online class, software provides the instructions that tell the hardware what to do.

Understanding software also helps you make better decisions about installing applications, protecting your computer from malware, managing updates, and choosing software that meets your needs. Nearly every career today requires familiarity with common software tools, making software literacy an essential workplace skill.

Software and Hardware work together



Behind the Scenes

What Happens When You Double-Click an Application?

Students often think that clicking an icon simply "opens" a program. In reality, the operating system performs a series of steps in just a fraction of a second:

1. The mouse sends the click to the operating system.
2. The operating system identifies which application was selected.
3. The program is located on the storage drive.
4. The executable files are copied from the SSD or HDD into RAM.
5. The CPU begins executing the program's instructions.
6. The graphics processor draws the application window on the screen.
7. The application becomes ready for user input.

This process demonstrates how hardware and software cooperate every time an application is launched.

System Software

System software is the software that manages a computer's hardware and provides the basic environment needed for other programs to run. It works mostly behind the scenes, coordinating resources such as the processor, memory, storage devices, and input and output devices. Without system software, application programs such as web browsers, word processors, and games would not be able to communicate effectively with the computer's hardware.

The most important type of system software is the **operating system (OS)**, such as Windows, macOS, Linux, Android, or iOS. Other types include **device drivers**, which allow the operating system to communicate with hardware such as printers and graphics cards, and **utility programs**, which perform maintenance and security tasks such as backing up files, scanning for malware, managing storage, and compressing files. Together, these programs keep the computer functioning efficiently and provide the foundation on which application software runs.

Software Layers



The illustration shows application software (Word, Excel, etc.) at the top. The middle layer is the system software (Operating system, device drivers, utilities). The bottom layer is the hardware (CPU, memory, storage, devices).

Application Software

Application software consists of programs designed to help users perform specific tasks. Unlike system software, which manages the computer and its hardware, application software focuses on the work or activities the user wants to accomplish. For example, people use application software to write documents, create presentations, browse the web, communicate with others, edit photographs, manage finances, or play games.

Common types of application software include **word processors, spreadsheets, presentation programs, web browsers, email applications, graphics and video-editing programs, database programs, and educational software**. Applications may be installed directly on a computer or mobile device, or they may run through a web browser as **web applications**. Many modern applications also store files in the cloud, allowing users to access their work from multiple devices.

Categories of Application Software

The illustrations shows some categories of application software: Productivity, Creative, Business, Communications, Education, and Entertainment.



Desktop, Mobile, and Web Applications

Application software can be grouped according to where and how it runs. **Desktop applications** are installed on a desktop or laptop computer and are designed to work with operating systems such as Windows, macOS, or Linux. Examples include word processors, photo-editing programs, games, and specialized programs used in business or education. Many desktop applications can be used without an Internet connection, although some features may require one.



Mobile applications, commonly called **apps**, are designed for smartphones and tablets. They are usually downloaded from an app store and are often designed for touchscreens, smaller displays, cameras, GPS, and other mobile-device features. **Web applications** run through a web browser rather than being installed as traditional desktop software. Examples include online email, document editors, learning management systems, and banking applications. Because web applications store much of their software and data online, users can often access them from different devices as long as they have an Internet connection.

The illustrations shows the same application running on a desktop, a smartphone and the web.

Software Installation

Software installation is the process of adding a program to a computer or mobile device so that it can be used. On a computer, software may be downloaded from a developer's website or an online software store. An **installer** typically guides the user through the process, copies the necessary files to the device, and configures the program to work with the operating system. On smartphones and tablets, applications are usually installed through an **app store**, where the installation process is largely automatic.

Before installing software, users should check the program's **system requirements**, including the operating system version, available storage space, memory, and processor requirements. Software should be obtained from trusted sources to reduce the risk of malware or unwanted programs. Users should also review any permissions the software requests and keep installed programs updated. If an application is no longer needed, it should generally be removed using the operating system's **uninstall** feature rather than simply deleting its files.

Installing Software: Step-by-Step



The illustration shows the steps to install software.

1. Download the installer
2. Allow installation to begin
3. Accept terms and choose options
4. Wait... Installation in progress

5. Installation complete
6. Application ready to use

Software Licensing

A **software license** is a legal agreement that explains how a software program may be used, copied, shared, or modified. When people purchase or download software, they usually purchase the **right to use the software**, rather than ownership of the software itself. The license may specify how many devices can use the program, whether it can be shared with others, and how long the user has access to it.

Software can be distributed under several types of licenses. **Commercial or proprietary software** is owned by a company or individual and usually places restrictions on copying and modification. **Subscription software** requires users to pay periodically to continue using the program. **Freeware** is available at no cost but is still protected by copyright and may have restrictions on its use. **Open-source software** makes its source code available under a license that permits users to study, modify, and redistribute it according to the terms of that license. Understanding software licensing helps users use software legally, ethically, and responsibly.

Software Licensing Options



- **Commercial Software:** Paid to own and license
- **Open-Source Software:** Free to use and modify
- **Freeware:** Free to use with no payment
- **Shareware:** Try before you buy (limited features)
- **Subscription Software:** Pay periodically (monthly/yearly)

Utility Software

Utility software is a type of system software designed to help maintain, protect, and improve the operation of a computer or mobile device. While an operating system manages the computer's basic functions, utility programs perform more specialized maintenance and security tasks. Some utilities are included with the operating system, while others can be installed separately.

Common utility programs include **antivirus and anti-malware software, backup and recovery tools, file compression programs, storage management tools, and firewalls.** For example, a backup utility creates copies of important files so they can be recovered if the originals are lost or damaged, while storage utilities help identify and remove unnecessary files. Using appropriate utility software and keeping it updated can help a device remain secure, organized, and reliable.



Software Security

Software security refers to the practices and technologies used to protect software, computers, and data from unauthorized access, malware, and other threats. Security problems can occur when software contains vulnerabilities or weaknesses that attackers may exploit. Developers regularly release **updates and security patches** to correct these weaknesses, so keeping operating systems and applications up to date is an important part of computer security.

Users also play an important role in software security. Software should be downloaded only from **trusted sources**, and users should be cautious about unfamiliar programs, browser extensions, and unexpected links or attachments. Security tools such as **antivirus**

and anti-malware software, firewalls, and automatic updates provide additional protection. Using strong passwords and **multi-factor authentication (MFA)** can further reduce the risk of unauthorized access. Good software security combines secure technology with careful user behavior.

Software Security: Protecting Your Computer



- Keep software updated
- Use strong passwords
- Enable multi-factor authentication
- Download from trusted sources

AI-Powered Software

AI-powered software uses artificial intelligence to perform tasks that traditionally required human judgment, recognition, or decision-making. AI features can analyze data, recognize images and speech, understand and generate language, identify patterns, and make recommendations. Today, AI is increasingly built into familiar applications such as word processors, search tools, photo editors, navigation systems, customer-service applications, and educational software.

For example, AI can help users **summarize documents, check writing, generate images, translate languages, organize information, remove unwanted objects from photographs, or suggest efficient travel routes.** Some applications also include **AI assistants or agents** that can complete multiple steps on a user's behalf. However, AI-generated results are not always accurate or unbiased. Users should review important information, protect private or sensitive data, and use AI responsibly rather than assuming that every AI-generated answer is correct.

Choosing the Right Software

Choosing the right software means finding a program that meets the user's needs while working well with the devices and systems available. Before selecting software, users should consider **what tasks they need to accomplish**, the software's features, ease of use, accessibility, system requirements, and compatibility with other programs and file formats. For example, a student may need software that can open the file formats required by an instructor, while a business may need software that allows several employees to collaborate on the same documents.

Cost and licensing are also important considerations. Software may require a one-time purchase, a monthly or yearly subscription, or may be available free of charge or as open-source software. Users should also consider **security, privacy, technical support, updates, cloud storage, and backup options**. Before installing an unfamiliar program, it is helpful to read reviews and verify that it comes from a trustworthy source. The most expensive or popular program is not necessarily the best choice; the best software is the one that safely and reliably meets the user's needs.

Computer software gives hardware its functionality by providing the instructions that control every operation a computer performs. System software manages the computer's resources, while application software enables users to accomplish specific tasks. Understanding software types, licensing, installation, updates, and security helps users make informed technology decisions and safely use computers in school, work, and everyday life.