

# **Introduction to Information and Communication Technologies**

## **Chapter 1**

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## **Agenda**

- Introduction to Computers
- Data and Information
- Information Processing Cycle,
- Components of a Computer,
- Advantages and Disadvantages of Using Computers.
- Networks and the Internet.
- Computer Software
- Categories of Computers
- Examples of Computer Usage
- Computer Applications in Society

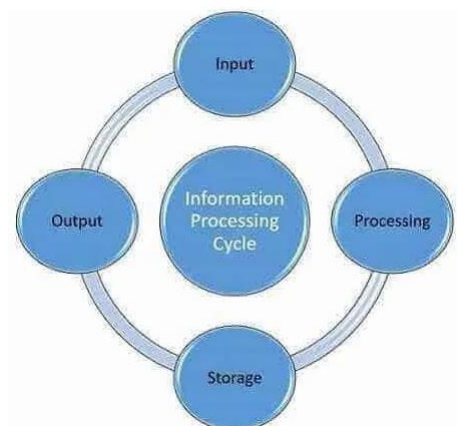
# Introduction

- A **Computer** is an electronic device, operating under the control of instructions stored in its own memory, that can accept data, process the data according to specified rules, produce results, and store the results for future use.
- Computers process data into information. **Data** is a collection of unprocessed items, which can include text, numbers, images, audio, and video. **Information** conveys meaning and is useful to people.
- Computers are everywhere: at work, at school, and at home. They are a primary means of local and global communication for billions of people. Employees correspond with clients, students with classmates and teachers, and family with friends and other family members.
- Many people believe that computer literacy is vital to success. **Computer literacy** involves having a knowledge and understanding of computers and their uses.
- This Course presents the knowledge you need to be computer literate.

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## Information processing cycle

- Computers process data (input) into information (output).
- A computer often holds data, information, and instructions in storage for future use.
- Instructions are the steps that tell the computer how to perform a particular task. Some people refer to the series of input, process, output, and storage activities as the **information processing cycle**.



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# The Components of Computer

- **Input Devices:** An **input device** is any hardware component that allows you to enter data and instructions into a computer.
- E.g. keyboard, mouse, microphone, scanner, digital camera, and PC video camera.
- **Output Devices :** An **output device** is any hardware component that conveys information to one or more people.
- E.g. printer, monitor, speakers, and a portable media player
- **System Unit:** The **system unit** is a case that contains electronic components of the computer that are used to process data. Two main components on the motherboard are the processor and memory.
- The **processor**, also called the **central processing unit (CPU)**, is the electronic component that interprets and carries out the basic instructions that operate the computer.
- **Memory** consists of electronic components that store instructions waiting to be executed and data needed by those instructions. Most memory keeps data and instructions temporarily, which means its contents are erased when the computer is shut off.

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# The Components of Computer

- **Storage Devices:** Storage holds data, instructions, and information for future use. A computer keeps data, instructions, and information on **storage media**.
- Examples of storage media are USB flash drives, hard disks, CDs, DVDs, and memory cards.
- A **storage device** records (writes) and/or retrieves (reads) items to and from storage media. Storage devices often function as a source of input because they transfer items from storage to memory.
- E.g. USB, Hard Disk, CD, DVD, Memory card etc.
- **Communication Devices:** A hardware component that enables a computer to send (transmit) and receive data, instructions, and information to and from one or more computers. A widely used communications device is a modem.

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**FIGURE 1-3** Common computer hardware components include the keyboard, mouse, microphone, scanner, digital camera, PC video camera, printer, monitor, speakers, portable media player, system unit, hard disk drive, external hard disk, USB flash drive, card reader/writer, and modem.

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## Advantages of computer

- The benefits of computers are numerous because computers have the advantages of speed, reliability, consistency, storage, and communications.
- **Speed:** When data, instructions, and information flow along electronic circuits in a computer, they travel at incredibly fast speeds. Many computers process billions or trillions of operations in a single second.
- **Reliability:** The electronic components in modern computers are dependable and reliable because they rarely break or fail.
- **Consistency:** Given the same input and processes, a computer will produce the same results — consistently. Computers generate error-free results, provided the input is correct and the instructions work.
- **Storage:** Computers store enormous amounts of data and make this data available for processing anytime it is needed.
- **Communications:** Most computers today can communicate with other computers, often wirelessly. Computers allow users to communicate with one another.

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# Disadvantages of computer

- **Violation of Privacy:** In many instances, where personal and confidential records were not properly protected, individuals have found their privacy violation.
- **Public Safety:** Adults, teens, and children around the world are using computers to share publicly their photos, videos, journals, music, and other personal information. Some of these users have fallen victim to crimes committed by dangerous strangers.
- **Impact on Labor Force:** A separate impact on the labor force is that some companies are outsourcing jobs to foreign countries instead of keeping their homeland labor force employed.
- **Health Risks:** Prolonged or improper computer use can lead to health injuries or disorders.
- **Impact on Environment:** Computer manufacturing processes and computer waste are depleting natural resources and polluting the environment.

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# Networks and The Internet

- A **network** is a collection of computers and devices connected together, often wirelessly, via communications devices and transmission media. When a computer connects to a network, it is **online**.
- Networks allow computers to share resources, such as hardware, software, data, and information. Sharing resources saves time and money.
- The **Internet** is a worldwide collection of networks that connects millions of businesses, government agencies, educational institutions, and individuals .
- People around the world use the Internet daily for a variety of reasons as follows:
- to communicate with and meet other people;
- to access a wealth of information, news, and research findings;
- to shop for goods and services;
- to bank and invest;
- to take a class;
- to access sources of entertainment and leisure, such as online games, music, videos, books, and magazines;
- to download music and videos; and to share information.

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# Computer Software

- **Software**, also called a **program**, is a series of instructions that tells the computer what to do and how to do it.
- You interact with a program through its user interface. Software today often has a graphical user interface. With a **graphical user interface (GUI pronounced gooey)**, you interact with the software using text, graphics, and visual images such as icons.
- The two categories of software are system software and application software.

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## System Software

- **System software** consists of the programs that control or maintain the operations of the computer and its devices.
- System software serves as the interface between the user, the application software, and the computer's hardware.
- Two types of system software are the operating system and utility programs.
- An **operating system** is a set of programs that coordinates all the activities among computer hardware devices. It provides a means for users to communicate with the computer and other software.
- A **utility program** allows a user to perform maintenance-type tasks usually related to managing a computer, its devices, or its programs.

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# Application Software

- **Application software** consists of programs designed to make users more productive and/or assist them with personal tasks.
- A widely used type of application software related to communications is a Web browser, which allows users with an Internet connection to access and view Web pages.
- Other popular application software includes word processing software, spreadsheet software, database software, and presentation graphics software.
- **Customized Software:** for the specific person or organization.
- **Package Software:** for the sale of general public.

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## Categories of Computer

Category	Physical Size	Number of Simultaneously Connected Users	General Price Range
Personal computers (desktop)	Fits on a desk	Usually one (can be more if networked)	Several hundred to several thousand dollars
Mobile computers and mobile devices	Fits on your lap or in your hand	Usually one	Less than a hundred dollars to several thousand dollars
Game consoles	Small box or handheld device	One to several	Several hundred dollars or less
Servers	Small cabinet	Two to thousands	Several hundred to a million dollars
Mainframes	Partial room to a full room of equipment	Hundreds to thousands	\$300,000 to several million dollars
Supercomputers	Full room of equipment	Hundreds to thousands	\$500,000 to several billion dollars
Embedded computers	Miniature	Usually one	Embedded in the price of the product

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# Personal Computer

- A **personal computer** is a computer that can perform all of its input, processing, output, and storage activities by itself.
- A personal computer contains a processor, memory, and one or more input, output, and storage devices.
- Two types of personal computers are desktop computers and notebook computers.
- A **desktop computer** is designed so the system unit, input devices, output devices, and any other devices fit entirely on or under a desk or table.
- In some models, the monitor sits on top of the system unit, which is placed on the desk. The more popular style of system unit is the tall and narrow tower, which can sit on the floor vertically.

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# Mobile Computer

- A **mobile computer** is a personal computer you can carry from place to place.
- A **notebook computer**, also called a **laptop computer**, is a portable, personal computer designed to fit on your lap. Notebook computers are thin and lightweight, yet can be as powerful as the average desktop computer.
- These computers weigh on average between 2.5 and 9 pounds, which allows users easily to transport the computers from place to place.
- **Tablet PC** is a special type of notebook computer that allows you to write or draw on the screen using a digital pen.

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# Mobile Devices

- **Mobile devices**, which are small enough to carry in a pocket, usually store programs and data permanently on memory inside the system unit or on small storage media such as memory cards.
- A **handheld computer** is a computer small enough to fit in one hand. Industry-specific handheld computers serve mobile employees, such as parcel delivery people, whose jobs require them to move from place to place.
- A **PDA** (personal digital assistant) provides personal organizer functions such as a calendar, an appointment book, an address book, a calculator, and a notepad.
- A **smart phone** is an Internet-enabled telephone that usually also provides PDA capabilities. In addition to basic telephone capabilities, a smart phone allows you to send and receive e-mail messages, access the Web, listen to music, and share photographs or videos

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# Game Console

- A **game console** is a mobile computing device designed for single-player or multiplayer video games.
- Standard game consoles use a handheld controller(s) as an input device(s); a television screen as an output device; and hard disks, CDs, DVDs, and/or memory cards for storage.
- The compact size and light weight of game consoles make them easy to use at any location
- Three popular models are Microsoft's Xbox 360, Nintendo's Wii, and Sony's PlayStation 3.



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# Server

- A **server** controls access to the hardware, software, and other resources on a network and provides a centralized storage area for programs, data, and information.
- Servers support from two to several thousand connected computers at the same time.
- People use personal computers or terminals to access data information, and programs on a server. A terminal is a device with a monitor, keyboard, and memory.



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# MainFrames

- A **mainframe** is a large, expensive, powerful computer that can handle hundreds or thousands of connected users simultaneously.
- Mainframes store huge amounts of data, instructions, and information. Most major corporations use mainframes for business activities.
- With mainframes, large businesses are able to bill millions of customers, prepare payroll for thousands of employees, and manage thousands of items in inventory.
- One study reported that mainframes process more than 83 percent of transactions around the world.
- Servers and other mainframes can access data and information from a mainframe. People also can access programs on the mainframe using terminals or personal computers.



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# Super Computer

- A **supercomputer** is the fastest, most powerful computer and the most expensive.
- The fastest supercomputers are capable of processing more than 442 quadrillions calculations in a single second.
- Applications requiring complex, sophisticated mathematical calculations use supercomputers.
- Largescale simulations and applications in medicine, aerospace, automotive design, online banking, weather forecasting, nuclear energy research, and petroleum exploration use a supercomputer.



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# Embedded Computer

- An **embedded computer** is a special-purpose computer that functions as a component in a larger product.
- A variety of everyday products contain embedded computers:
  - Consumer electronics
  - Home automation devices
  - Automobiles
  - Process controllers and robotics
  - Computer devices and office machines
- Because embedded computers are components in larger products, they usually are small and have limited hardware. Embedded computers perform various functions, depending on the requirements of the product in which they reside.

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## Examples of Computer Usage

- Each family member, or **Home User**, spends time on the computer for different reasons. These include budgeting and personal financial management, Web access, communications, and entertainment.
- On the Internet, home users access a huge amount of information, take college classes, pay bills, manage investments, shop, listen to the music, watch movies, read books, play games, file taxes, book airline reservations, and make telephone calls.
- They also communicate with others around the world through e-mail, blogs, instant messaging, and chat rooms.

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## Examples of Computer Usage

- Computers assist small business and home office users in managing their resources effectively.
- A **small office/home office (SOHO)** includes any company with fewer than 50 employees, as well as the self-employed who work from home.
- SOHO users typically use a desktop computer. Many also use PDAs.
- SOHO users access the Internet — often wirelessly — to look up information such as addresses, directions, postal codes, flights, and package shipping rates or to make telephone calls.
- Nearly all SOHO users communicate through e-mail. Many are entering the e-commerce arena and conduct business on the Web.
- Their Web sites advertise products and services and may provide a means for taking orders. To save money on hardware and software, small offices often network their computers. For example, the small office connects one printer to a network for all employees to share.

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## Examples of Computer Usage

- Today, businesses and schools are expanding to serve people across the country and around the world.
- Thus, increasingly more employees and students are **mobile users**, who work on a computer while away from a main office or school.
- Another category of user, called a **power user**, requires the capabilities of a powerful desktop computer, called a workstation. Examples of power users include engineers, scientists, architects, desktop publishers, and graphic artists.
- Power users typically work with multimedia, combining text, graphics, audio, and video into one application. These users need computers with extremely fast processors because of the nature of their work.

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## Computer Applications in Society

- The computer has changed society today as much as the industrial revolution changed society in the eighteenth and nineteenth centuries.
- People interact directly with computers in fields such as education, finance, government, health care, science, publishing, travel, and manufacturing.
- In addition, they can reap the benefits from breakthroughs and advances in these fields.
- The following pages describe how computers have made a difference in people's interactions with these disciplines.

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# Computer Applications in Society

## • Education

- Many schools and companies equip labs and classrooms with computers. Some schools require students to have a notebook computer or PDA to access the school's network or Internet wirelessly. Students use software to assist with learning or to complete assignments.

## • Finance

- Many people and companies use computers to help manage their finances. Some use finance software to balance checkbooks, pay bills, track personal income and expenses, manage investments, and evaluate financial plans. This software usually includes a variety of online services. For example, computer users can track investments and do online banking

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# Computer Applications in Society

## • Government

- A government provides society with direction by making and administering policies. To provide citizens with up-to-date information, most government offices have Web sites. People access government Web sites to file taxes, apply for permits and licenses, pay parking tickets, buy stamps, report crimes, apply for financial aid, and renew vehicle registrations and driver's licenses.

## • Health Care

- Nearly every area of health care uses computers.
- Hospitals and doctors use computers to maintain patient records.
- Computers monitor patients' vital signs in hospital rooms and at home.
- Computers and computerized devices assist doctors, nurses, and technicians with medical tests.
- Surgeons implant computerized devices, such as pacemakers, that allow patients to live longer.

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# Computer Applications in Society

- **Travel**

- Many vehicles manufactured today include some type of onboard navigation system. Some mobile users prefer to carry specialized handheld navigation devices. In preparing for a trip, you may need to reserve a car, hotel, or flight. Many Web sites offer these services to the public.

- **Manufacturing**

- **Computer-aided manufacturing (CAM)** refers to the use of computers to assist with manufacturing processes such as fabrication and assembly. Often, robots carry out processes in a CAM environment. CAM is used by a variety of industries, including oil drilling, power generation, food production, and automobile manufacturing.

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# THE END