



INTRODUCTION TO COMPUTER

In the previous lesson you have learnt about work-life balance. In this lesson you will learn basics of computer. In the past few decades, you have noticed that computers have greatly influenced the life styles of a common man; in the office, home, shopping center, library, theatre etc. It enables you to access bank accounts from home, shop online, and quickly communicate with people around the world by e-mail and Internet, Now-a-days, it has become an indispensable tool in everybody's life. In this lesson we shall be discussing about key components of a computer system, basics of computer.



OBJECTIVES

After reading this lesson, you will be able to:

- identify key components of a computer system;
- describe how computer works;
- explain the concepts of various computing environments;
- classify softwares;

9.1 WHAT IS A COMPUTER?

A computer is an **electronic device** that accepts **data as input**, performs a specified sequence of operations (**Process**) as per the set of instructions (known as **program**) to generate desired **output as information**.

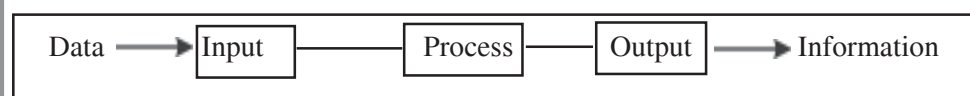


Fig. 9.1

Data can be anything like marks obtained by you in various subjects, your name, age, sex, height etc. Processed data is called as information such as finding out result, generation of merit list, etc. The characteristics of computers that have made them so powerful and universally useful are Speed, Accuracy, Reliability, Versatility, Storage and Retrieval ability.



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9.2 TYPES OF COMPUTER

Depending upon the size and power, computers are classified in various types. Following are the description of several different types of computer:

9.2.1 Supercomputers

Supercomputers are large, powerful computers that help you perform specialized tasks. Supercomputers are the fastest and most expensive computers and they process huge amounts of information very quickly. Super computers are being used to perform sophisticated mathematical calculations, track weather patterns, monitor satellites, and perform other complex, dedicated tasks.

9.2.2 Mainframe Computers

The largest type of computer in common use is the mainframe. They are designed to handle tremendous amounts of input, output, and storage. For example, consider the airlines reservation system. One can get his/her air ticket booked at one of the various reservation counters, each of which has many employees working at computer terminals. A terminal is a special kind of computer that does not have its own CPU or storage. It is just an Input/ Output (I/O) device that acts as a window into another computer located somewhere else. The terminals are connected to a database residing in and are controlled by a mainframe computer that can handle the input and output needs of all the terminals connected to it.

A typical mainframe computer is characterised by vast amounts of memory with many hard disks in several gigabytes range, one or more tape drives, etc. Early mainframe computers were very large and required separate rooms to house them. Today's mainframe computers are significantly smaller.

9.2.3 Mini Computers

The best way to describe a minicomputer is that its capabilities lie somewhere between those of mainframes and those of microcomputers. Like mainframes. Minicomputers can handle a greater amount of input and output than microcomputers can. Minicomputers are relatively inexpensive and ideal for academic institutions and small business houses.

9.2.4 Micro Computers

Microcomputers are classified as small, inexpensive computers designed for personal use and are the computers that most people typically use. Some of the most common types of microcomputers include the following:



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Desktop Computers are computers that sit on the desk, floor, table, or another flat surface and have a detachable keyboard, mouse, monitor, and possibly other pieces of equipment. Desktop computers generally fall into two main categories: PCs or Macs. The PC, or personal computer—originally referred to as the IBM personal computer—is now manufactured by a variety of companies including Hewlett-Packard, Dell, Intel etc. The Apple Macintosh computer, now known as Mac, can perform the same functions as the PC.

Notebook Computers give you the ability to take their computers with them, making their information portable or mobile. Originally referred to as “laptops,” this term is slowly being phased out in favor of the more accurate notebook designation. Although smaller than a desktop computer, notebook computers are not meant to be used on your lap, due to the amount of heat they generate..

Tablet Computers might seem similar to notebooks; however, they have some special features that set them apart. When used in the tablet configuration, you can actually write directly on the screen using a special pen known as a stylus. Tablets use advanced handwriting-recognition technology to convert handwriting to digital text. Many also use speech-recognition technology, which enables the user to record discussions or lectures.

Personal Digital Assistants (PDAs) are the smallest of portable computers. PDAs are also called palmtops. They are much less powerful than notebook or desktop models and are generally used for displaying important telephone numbers and addresses or keeping track of dates and agendas. Many can be connected to larger computers to exchange data.

Note: With the fast changing technology, present day PCs are having the capabilities of mainframes or minicomputers. Thus, the line of distinction between different types of computers is getting, blurred day by day and his rendering the above classification meaningless.

**INTEXT QUESTION 9.1**

- I. Write **True** or **False** for the following:
- (a) Processed data is called as information.
 - (b) PDA stands for Personal Data Assistants.
 - (c) Supercomputer’s are the most powerful computers.
 - (d) Desktop Computers are also called as Personal Computers.
 - (e) Notebook computers are originally referred as laptops.

9.3 OVERVIEW OF A COMPUTER SYSTEM

Every computer system has two main units:

- (i) Hardware
- (ii) Software

All physical parts of the computer (or everything that we can touch) are known as



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Hardware. Software gives intelligence to the computer. Software is used to develop applications that we use in our daily life like : Banking, shopping, games etc. So Hardware and Software together make computer a perfect device to perform task. Without Hardware, Software is waste and without Software there is no meaning of Hardware. So to run an application both are required at the same time. For example in a television the wires, switches etc. are the hardware while the programs, watched on TV, is the software.

Although the hardware of a computer is capable of performing marvelous tasks, it cannot actually accomplish any of them without the vital instructions that software provides. In this section, we will look at the physical components of the machine, the hardware and then turn to the software that brings life to the physical components.

9.4 HARDWARE

Hardware refers to the physical units of a computer, which includes electronic and electrical circuitry, components and devices. Regardless of its shape, size or capabilities, every computer that people use directly has same general design.

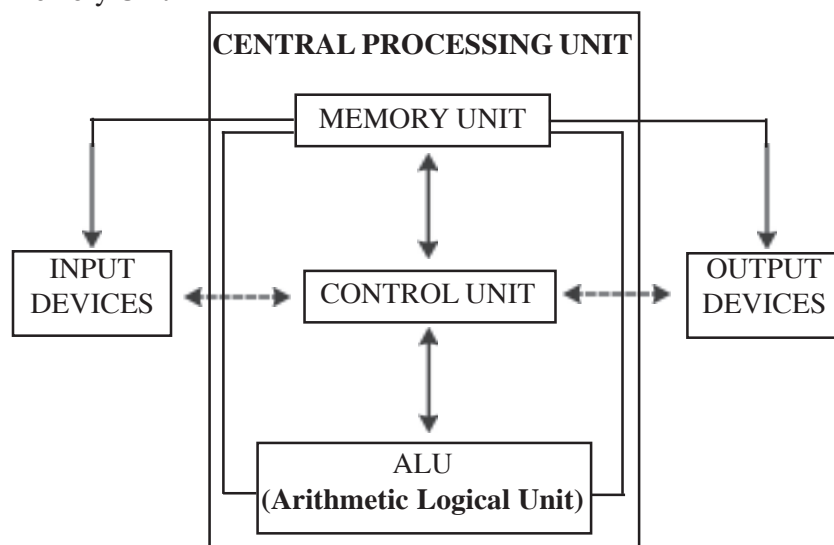
Computer Hardware = Processing Unit + Secondary Storage Devices + Peripheral Devices

9.4.1 Central Processing Unit (CPU)

The complex procedure that transforms raw input data into useful information for output is called **processing**. To perform this transformation, the computer uses **central processing unit**. The processor is the “**brain**” of the computer, the part that interprets and carries out instructions.

Every CPU has three basic parts (The relationship between different hardware components is shown in Figure 2):

- (a) Control Unit (CU)
- (b) Arithmetic Logic Unit (ALU)
- (c) Memory Unit



(.....Control of events _____Flow of data and instruction)

Fig. 9.2: Block diagram of different components of a computer



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Mostly available brands of CPU are Intel – Core Duo, Pentium, Celeron, Centrino, Core i5, Core i7; AMD (Advanced Micro Devices) – Athlon, Sempron, Turion; Motorola

Control Unit (CU)

The Control Unit (CU) is a component of CPU that control all the operation of the processor. The control unit manages all the computer resources and coordinates all the computer’s activities. It contains the basic instructions (called **firmware**) for execution of programs. The instruction set, built into the circuitry of the control unit, is a list of all the operations that the CPU can perform. In fact, the control unit can be thought of as a traffic cop, directing the flow of data around the CPU and around the computer.

Arithmetic Logic Unit (ALU)

When the control unit encounters an instruction that involves mathematical calculation or decision/logic, it passes the control to the second component, i.e., the arithmetic logic unit (ALU). ALU carries out arithmetic & logic operations. The ALU includes a group of registers - memory locations built directly into the CPU - that are used to hold data that are being processed by the current instruction. For example, the control unit might add two numbers (an arithmetic operation), or compare two numbers (a logical operation). In addition, CPU has a number of registers for storing data and instructions that are currently being processed.

Memory Unit

Computer memory unit is used to store data or information and instructions to execute a program. There are two kinds of computer memory such as:

1. Primary Memory
2. Secondary Memory

Primary memory is an integral part of the computer system and is accessible directly by the processing unit. It helps you to store program instructions or part of data for immediate needs. These are much faster and expensive than Secondary memory.

Secondary memory such as Hard disk, Optical disks, Flash Drive etc. is located external to the computer. These are less expensive and slower than the primary, but it is quite useful to store huge volume of data on permanent basis and transferred to the primary storage as and when required.

Let us discuss about primary and secondary memory in detail.

Primary Memory

Primary memory consists of mainly two types of memories:

- (a) Random Access Memory (**RAM**)
 - (b) Read Only Memory (**ROM**)
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**Notes****(a) Random Access Memory (RAM)**

The CPU, does not have sufficient storage space for the entire program as well as for the data being manipulated by those programs. Therefore, the control unit stores the data and instructions received from input devices into primary memory called Random Access Memory (**RAM**). Unlike human memory, which can store information indefinitely, RAM holds information only while the computer is ON. When the computer is turned off or reset, the information disappears unless it has been saved on a storage device. Hence RAM is often referred to as volatile or temporary memory. RAM is usually measured in megabytes (**MB**) or gigabytes (**GB**)

(b) Read Only Memory (ROM)

Some of the data and instructions remain permanently stored into memory, which cannot be changed. This memory is called Read-Only Memory (**ROM**). A computer needs ROM, mainly, so that it knows what to do when the power is first turned on. Among other things, ROM contains a set of start-up instructions that check to see whether the rest of memory is functioning properly, look for hardware devices, and look for an operating system. Since this memory never gets lost, it is sometimes referred to as permanent or non-volatile memory.

Secondary Memory (External Storage Devices)

Hard disk, tapes and optical disks come under most popular category of **external storage devices** or **ancillary storage devices**. These devices are very sensitive to environmental conditions (humidity and temperature) as well as to external magnetic fields and need to be stored carefully.

Types of external storage devices are as follows:

1. Hard Disk
2. Magnetic Tape
3. Optical Disk
4. Flash Drive

1. Hard Disk

It is a non-removable magnetic disk enclosed in most PCs. It contains a stack of metal platters, each coated with iron oxide, that spin on a spindle and the entire unit is encased in a sealed chamber. The physical size and storage capabilities of a hard disk vary. For PCs, the storage capacities vary from **20 GB** to **hundreds of GB**.

2. Magnetic Tape

The best use of tape storage is for data that you do not use very often. A tape is a long strip of magnetic material; therefore the tape drive has to write data to it sequentially - one byte after another.



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Magnetic Tapes are **sequential access media**, which means to get to a particular point on the tape; the tape must go through all the preceding points. In contrast, disks are random access media because a disk drive can access any point at random without passing through intervening points. Therefore, tapes cannot be practically used for data that you need often. They are mainly used for taking **backup of hard disk**. The tape capacity varies from few **hundred kilobytes** to several **gigabytes**.

3. Optical Disks

The need for ever greater storage capacities has driven hardware manufacturers to use optical storage technology as the main alternative to magnetic storage.

In optical disks, a laser beam is used to read/write data on to the disk. Optical disks can store video, text, music, and graphics.

Types of popular optical disks are as follows:

1. CDROM
2. CD-RW
3. DVD

CDROM

The most-popular optical storage medium is **compact disk, read - only memory**.

CD-ROM uses the same technology that is used in music CDs. One cannot write data to a CD-ROM but can always read it. The huge amounts of data, such as dictionaries, encyclopedias, medical, legal or other professional reference libraries etc., that normally would not change, is available on CDs nowadays. A single CD can hold up to 650 MB of data. Larger CDs can store up to 20GB.

CD-RW (CD-Read and Write) - Erasable Optical Disk

These are optical disks where data can be written, erased and re-written. This makes use of a laser beam to write and re-write the data. These disks may be used as an alternative to traditional disks.

Digital Versatile Disc (DVD)

Digital Versatile Disk or Digital Video Disc, a type of CD-ROM that holds a minimum of 4.7 GB, enough for a full length movie. The DVD specification supports disks with capacities from **4.7 GB to 20 GB** (Approx).

4. Flash Drive

Flash drives are removable storage devices that use flash memory and connect to the computer by a USB port. Available in several storage sizes ranging from 16 MB to 1 TB (Terra Byte), a flash drive is a quick and easy way for you to save and transport files.



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9.4.2 Peripheral Devices

These are the devices used to enter data/information into and out of a computer system. Input/output (IO) devices are treated as peripheral devices.

Input Devices

The most commonly used input devices on a computer are the **keyboard** and **mouse**. However, there are dozens of other devices that can also be used to input data into the computer. Below is a list of computer input devices that can be utilized with a computer or a computing device.

List of Input Devices

- Keyboard
- Barcode reader
- Biometrics (eg. Fingerprint scanner)
- Mouse, touchpad, or other pointing device
- Pen or Stylus
- Scanner
- Touch Screen, etc.

Output Devices

An output device is any peripheral that receives data from a computer, usually for display, projection, or physical reproduction. An output device that can make a hard copy of any information shown on your monitor. Another example of an output device is a computer monitor, which displays an image that is received from the computer. Monitors and printers are two of the most common output devices used with a computer.

List of Output Devices

- Monitor
- Printer
- Plotter
- Projector
- Speaker
- Headphone, etc.



INTEXT QUESTIONS 9.2

- I. Write True or False for the following:
 - (a) CPU stands for Central Power Unit
 - (b) ALU is part of CPU
 - (c) All physical parts of the computer (or everything that we can touch) are known as software.



Notes

- (d) Primary memory is an integral part of the computer system and is accessible directly by the processing unit.
- (e) Secondary memory is more expensive and faster than the primary memory.

9.5 SOFTWARE

Computer hardware consists of the physical components of the system. However, without software, computers would be useless as it would just be a collection of mechanical parts. Software provides the instructions that tell the computer what to do. It is a collection of instructions, called programs that enable you to interact with a computer. There are two categories of computer software: *System Software* and *Application Software*.

9.5.1 System Software

System software is a type of a computer program that is designed to run a computer's **hardware and application program**. System software provides the instructions that the computer needs to run. It contains the directions needed to start up the computer (known as the **boot process**), checks to ensure everything is in good working order, and enables you to interface with the computer and its peripheral devices so that you can use them. System software consists of two main types of programs: the *operating system* and *utility programs*.

Operating Systems

The operating system (OS) is a special computer program that is present on every desktop or notebook computer, in addition to others ranging from mainframes to PDAs. The operating system controls the way the computer works from the time it is turned on until it is shut down. Operating system manages the various hardware components, including the CPU, memory, storage devices, and peripheral devices. It also coordinates with the various software applications that might be running. There are several popular operating systems available for home computers. They include **Microsoft Windows**, **Mac OS**, and **Linux**.

Utility Programs

Operating system software is the most critical software on the computer, because nothing can run without it. However, utility programs are another important component of system software. These small applications handle many important tasks involved with the management and maintenance of your system.

Utility programs can be used to help back up important files, remove unwanted files or programs from your system, and schedule various tasks to keep your system running smoothly. Some of these utilities are included with the operating system viz. File Management (Add/Remove Program, Windows Explorer), Task manager, Disk Cleanup etc).

9.5.2 Application software

Software that can perform a specific task for the user, such as word processing, accounting, budgeting or payroll, fall under the category of application software.

Word processors, spreadsheets, database management systems are all examples of general purpose application software.

Types of application software are:

Word processing software: The main purpose of this software is to produce documents. **MS-Word, OpenOffice.org Writer** and **Word Pad** are some of the examples of word processing software.

Database software: Database is a collection of related records. The purpose of this software is to organize and manage data. The advantage of this software is that you can change the way data is stored and displayed. **MS SQL Server, Oracle, PostgreSQL** are some of the examples of database software.

Spreadsheet software: The spreadsheet software is used to maintain budget, financial statements, grade sheets, and sales records. **MS-Excel, OpenOffice.org Calc** are the example of spreadsheet software.

Presentation software: This software is used to display the information in the form of slide show. The best examples for this type of application software are **Microsoft PowerPoint** and **OpenOffice.org Impress**.

Multimedia software: **Media players** and **Real players** are the examples of multimedia software. This software will allow the user to create edit and view audio and videos.

9.5.3 Open Source Software

Gone are the days when you paid a heavy price to purchase software as it was locked to a particular vendor. But with an ever-increasing global internet community, with a desire to contribute to the ongoing technological revolution, people started sharing their knowledge and formed groups with similar technological interests and there by developed a software called **Open Source Software**. It is made available **freely** to everyone on the internet.

Open Source is a software whose **source code** is published and made available to the public, enabling everyone to **copy, modify** and **redistribute** the source code without paying royalties or fees. **OpenOffice.org**, informally referred to as **OpenOffice** is the leading open-source office software suite for word processing, spreadsheets, presentations, graphics, databases and more.

9.6 VIRUS

Viruses are **malicious codes** or **programs** that get installed on your computer without your knowledge and against your wishes. The severity of a virus can vary. Some viruses merely seem to be nuisances or might not even be obvious to the user; some cause files to be corrupted or erased; and others are capable of shutting down a computer and erasing the entire hard drive. Viruses infect a system and then attach themselves to a program or file to spread to other users.

Viruses can be distributed in several ways. In the early days of computers, viruses were spread by sharing infected floppy disks. Now, due to the ease in which files can be shared over the Internet, viruses are able to spread much more quickly. One



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of the most common ways to send a virus is through *e-mail attachments*. Security experts recommend that you never open an e-mail attachment unless you have first scanned it with antivirus software to determine that it is virus-free. Experts also recommend that unless you know the sender and have been expecting the e-mail attachment, it is best to delete the attachment without even opening it.

9.6.1 How to protect your computer from a virus

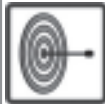
You can protect your computer from viruses by installing an antivirus protection program. Once installed on a computer an antivirus software monitors, detects, and cleans any computer viruses.

Most popular antivirus softwares are: **Windows Defender**, **Norton antivirus** and **McAfee**, and popular **free** antivirus programs include **Avast** and **AVG**.



INTEXT QUESTION 9.3

3. Write **True** or **False** for the following:
- RAM stands for Read Access Memory.
 - RAM is usually measured in kilo byte (KB).
 - The unit of memory “MB” stands for Microbyte.
 - Microsoft Windows is an Application Software.
 - Software’s that are available free of cost are called as Open Source Software.



WHAT YOU HAVE LEARNT

In this lesson you have learnt the different types of computer i.e., supercomputers, mainframe computers, mini computers, micro computers. You have learnt about types of memory (primary memory and secondary memory). Also you have learnt about input devices (keyboard, mouse, scanner etc.), output devices and types of software.



TERMINAL EXERCISE

- Define Computer and its types.
- Draw block diagram showing different components of a computer. Explain the various parts of Central Processing Unit (CPU).
- Explain the various memory units of a computer system.
- Write short notes on:

- (a) Desktop Computers
- (b) Arithmetic Logical Unit
- (c) Peripheral Devices of Computer System
- (d) Open Source Software

5. Differentiate between

- (a) Hardware and Software
- (b) Primary and Secondary Memory
- (c) RAM and ROM
- (d) System and Application Software



Notes



ANSWERS TO INTEXT QUESTIONS

9.1

- I. (a) True
(b) False
(c) True
(d) True
(e) True

9.2

- I. (a) False
(b) True
(c) False
(d) True
(e) False
(f) False
(g) False
(h) False

9.3

- I. (a) False
(b) True