



# Chapter One

## Information technology

### 1.1 Introduction

#### Information Technology (IT)

This is a general term which relates to the use of computers as an aid to creating and maintaining data, i.e. information. IT is related to all aspects of managing and processing information, especially within a large organization.

OR is a broad term which covers all aspects of the use of computer technology. It includes not only hardware and software, but also communication technology applied to linking computer systems, software engineering, and the administration and use of computer systems.

Information technology plays a major role in reengineering business processes, the speed, information processing power, and ease-of-use of modern computer hardware, software, and networks can dramatically increase the efficiency of business processes, and communications among its people.

Information technologies and business systems that use IT allow us to work more intelligently, they also often change how we structure and manage our organization and processes-that is, how we work and how interact. IT is a facilitator of organization activities and processes. Therefore it is very important for every manager and professional staff member to learn about IT from the stand point of his or her specialized field. Every manager and staff member should know how to build, use, and Manage successful systems based on IT.

#### **In sales and Marketing, managers use IT to:**

- 1- Develops new goods and services (product analysis) -determine the best
- 2- Location for production and distribution facilities (site analysis).



3- Determine the best advertising and sales total revenues promotion analysis.

4- Set product prices to get the highest total revenues (price analysis).

Marketing managers also use IT to manage customer relationship.

**IT:** are the individuals components that are typically organized into computer –based information systems (IS) The two terms IT & IS are not precisely synonymous, but are used interchangeably in common practice.

**A computer** is programmable, multiuse that accepts data- raw facts and figures and processes, or manipulates, it into information that can use, such as summaries or totals. Its purpose is to speed up problem solving and increase productivity.

**Communications or telecommunications, technology** consists of electromagnetic devices and systems for communicating over long distances.

Computers may seem like incredibly complicated devices, but their underlying principle is simple. When you open up a personal computer, what you see is mainly electronic circuitry. And what is the most basic statement that can be made about electricity. It can be either turned on or turned off, or switched between high voltage and low voltage. Because computers are based on /off or other two state conditions, they use binary system, which consists of two digits 0 and 1.

## Information System

Information systems (IS) collects, processes, stores, analyzes, and disseminates information for a specific purposes, like any other system ,an information system include inputs (data, instructions) and outputs (reports, calculations).

It processes the inputs and produces outputs that are sent to the user or other system. Feedback mechanism that controls the operation may be included. Like any other system, an information system operates within an environment.





It is important to note the differences between data, information, and knowledge.

**Data:** are raw facts or elementary descriptions of things, events, activities, and transactions that are captured, recorded, stored, and classified but not organized to convey any specific meaning.

Examples of data would include grade point averages, bank balances, or the number of hours employees worked in a pay period.

**Information:** is collection of facts (data) organized in some manner so that they are meaningful to a recipient, for example, if we include student name with grade point averages, customer names with bank balances, and employees' wages with hours worked, we would have useful information.

In figure 1-1 shown the computer goes through four operations when it process data into information.

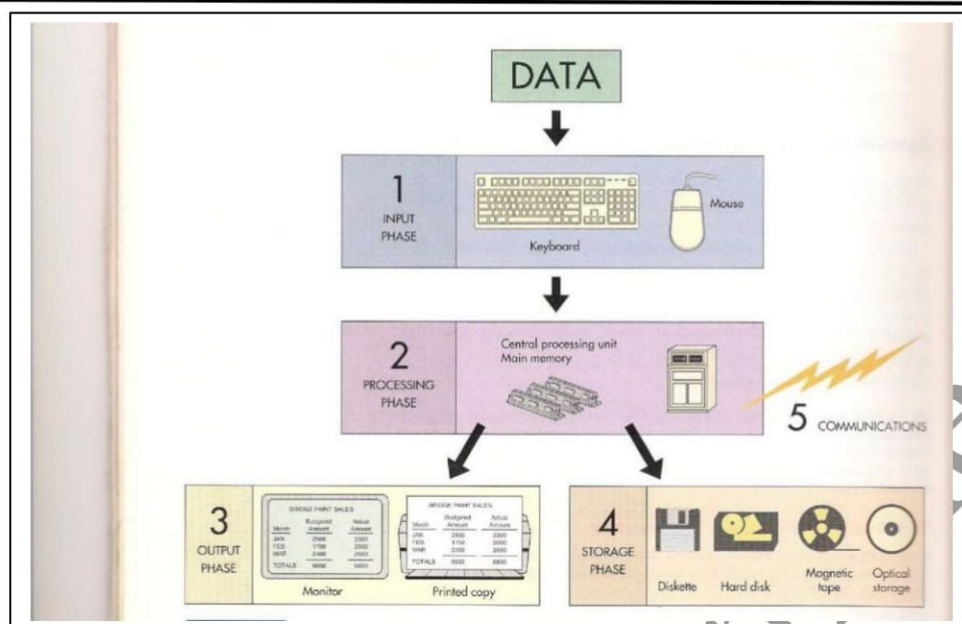
- 1- Input
- 2- Processing
- 3- Output
- 4- Storage

**Input operation:** data is entered or otherwise captured electronically and is converted to a form that can be processed by the computer. The means for capturing data (raw, unsorted facts) is input hardware, such as keyboard.

**Processing operation:** the data is manipulated to process or transform it into information for example numbers may be added or subtracted.

**Output operation:** the information which has been processed from the data is produced in form usable by people. Examples of output are printed text, sound, and charts and graphs displayed on computer screen.

**Secondary storage operation:** the information and programs are stored in computer -process able form.



**Fig: 1-1 A computer goes through four operations**

To be useful to managers and the organization, information should exhibit a variety of characters; it should be accurate, complete, flexible, reliable, information that is not of high quality can led to poor decision ,costing the organization a great deal of money

## 1.2 system Architecture

Most computers have similar architectures that combine software and hardware.

### Hardware

**Hardware** refers to the physical components of a computer. These are the parts that you can see, feel and hear. Examples are the CPU, the keyboard, the monitor, memory, cables, mouse, printer and power supply.

### Software

**Software** refers to the programs that control the computer and make it function.

A program is a set of instructions that the computer obeys. Computer programs can be extremely long and complex sets of instructions. It is quite common for computer programs to be tens of thousands of lines long. The application programs that you use on your PC for word processing and spreadsheets are in fact even longer.



Software includes the operating system which controls the computer hardware and application software, such as word processing, spreadsheets etc...

### **Input devices**

Input devices allow you to input information to the computer and include things such as the keyboard and mouse.

### **Output devices**

Output devices allow you to output information from the computer and include the printer and the monitor.

### **Peripheral device**

A peripheral device is any device which you can attach to your computer. Thus, you could attach a scanner or modem to the back of your system unit.

### **System hardware**

Computer based information system (CBIS) are composed of hardware, software, databases, people, telecommunications, and procedures. The components are organized to input, processing, output data and information. Physical equipment used for the input, processing, output and storage activities of computer system.

It consists of the following:

1. Central processing unit (CPU)
2. Memory (primary and secondary storage)
3. Input technology
4. Output technology
5. Communication technology





## **Central Processing Unit (CPU)**

The central processing unit (CPU) perform the actual computation inside any computer, the CPU is a microprocessor for example, Pentium III) made up of millions of microscopic transistors embedded in a circuit on a silicon wafer or chip. Examples of specific microprocessor .

The microprocessor has different portions which perform different functions:

- 1-**Control Unit:** this controls the flow of information.
- 2-**Arithmetic Logic Unit (ALU)** performs arithmetic calculations.
- 3-**Registers:** which store very small amount of data and instructions for short period of time .

### **Control unit**

-Direct and coordinates all units of the computer to execute program steps.

-Direct and coordinate all operation of the computer systems.

These operations include;

- 1- Control to the input and output devices.
- 2- Entry and retrieval of information from memory.
- 3- Routing of information between the memory, arithmetic and logic unit.

Control unit automatically coordinates the operation of the entire computer system, although the control unit does not performed any actual processing on the data, it acts as a central nervous system uses to sent control signal to other units.

### **Arithmetic and Logic Unit**

Perform the processing of data including arithmetic operation such as addition, subtraction, multiplication, division and logic operation including comparison (ex:  $A < B$ ) and sorting.



## Register

Registers are devices capable of storing information, receiving data from other areas within the computer and transferring information as directed by the control unit, it is used for temporary storage of data or instruction and the most important registers are :

- 1- Program counter (PC): it contains the address of the next instruction to be executed.
- 2- Instruction register (IR): it contains the instruction being executed.
- 3- Address register (AR): holds the address of memory location.

## Memory

There are two general categories of memory: primary and secondary.

**Primary memory:** is the memory that is intimately associated with the actual working of the computer. This includes memory that holds the start-up routines as well as the current program and data it is working with. There are various forms of primary memory: RAM, ROM and Cache memory.

**RAM or Random Access Memory** holds the current running program and its associated data.

**ROM or Read Only Memory** contains certain key routines (small programs). One example: is the set of start-up routines. These take control of the computer when you switch on and ensure that the computer **boots-up**. Booting-up is the process of starting the computer up so that it is able to load and run computer programs.

**Cache memory** is very high speed memory that is used by the CPU in executing the individual instructions of the program. It is used to hold items such as instructions that are next in line to be executed and data that is likely to be needed by the CPU.

**Secondary memory:** consists of the various devices that are able to store data and programs even when the power is off. This includes devices such as hard drives, floppy drives, tape drives, CD drives and DVD drives.

## **Input technology**

### **a) Keyboards Input**

Is the most common input device the keyboard is designed like a typewriter but with additional function keys.

### **b) Mice and track balls:**

A mouse shown in figure 1-2 is hand held device used to point a cursor at a desired place on screen, such as an icon, cell in a table. A variant of the mouse is the trackball, which is often used in graphic design, the user holds an object much like a mouse but rather than moving the entire device to move the cursor.



**Fig: 1-2 A mouse .**

### **c) Touch screen**

Is a technology that divides the computer screen into different areas? Users simply touch the desired area (often buttons or squares) to trigger an action.

### **d) a stylus**

Is a pen style device that allows the user either to touch parts of predetermined menu of options?

### **e) Joysticks**

Is used primarily at workstations that can display dynamic graphics, they can also used to play video games.

Many games require a joystick for the proper playing of the game. There are many different types, the more sophisticated respond to movement in 3 axis directions, as well as having a number of configurable buttons. Like most things in life you get what you pay for with joysticks and it is worth investing in a good, strongly constructed



model, especially bearing in mind that children will hammer these devices whilst playing games. We can see Joysticks in figure 1-3



**Fig: 1-3 Joysticks.**

**f) Voice input for PCs (microphones)**

Early voice recognition systems offered very poor results, due to the limitations of the software combined with hardware limitations. It takes an awful lot of CPU processing power to convert the spoken word into text which appears on the screen. Things are changing rapidly however and recent systems allow you to talk to a PC and see text appear on the screen. Most of these systems require an initial training period, where you train the software to respond to your particular voice. Whilst still not perfect this is a key technology of the future.

**g) Web Cams**

Ever since it was invented, the Web has become increasingly interactive. You can now use a small digital movie camera (a Web cam) mounted on the PC monitor to allow two-way communication involving not just text Communication but sound and video communication as well. The figure 1-4 shown a Web cam



**Fig: 1-4 A Web cams.**

## **h) Scanners**

A scanner allows you to scan printed material and convert it into a file format which may be used within the PC. You can scan pictures and then manipulate these inside the PC using a graphics application of your choice. In addition, you can scan printed text and convert this not just to a picture of the text but also to, actual text which can be manipulated and edited as text within your word-processor. There are a number of specialist programs, generically called OCR (Optical Character Recognition) programs which are specifically designed for converting printed text into editable text within your applications.

## **i) Light Pens**

A light pen is used to allow users to point to areas on a screen and is often used to select menu choices. Figure 1-5 shown light pen.



**Fig: 1-5 A Light Pens.**

## **j) Digital Cameras**

A digital camera can be used in the same way a traditional camera can, but instead of storing images on rolls of film which require developing, the images are stored digitally in memory housed within the camera. These pictures can easily be transferred to your computer and then manipulated within any graphics programs which you have installed on your computer. Currently they are limited by the quality of the image recorded and the number of pictures which you may store within the camera.

## **Output Technologies**

### **a) Monitors**

Are the video screens used with most computers that display input as well as output like television sets, monitors come in a variety of sizes and color/resolution quality .and like television sets, the common desktop monitor uses cathode ray tube (CRT) technology to shoot



beams of electrons to the screen. The points on the screen known as pixels, the more pixels on the screen, the better resolution, here are some other useful facts about monitors:

1-portable computers use a flat screen that uses liquid crystal display (LCD) technology not (CRT)

2-LCDs use less power than CRT monitors but cost six to eight times what an equivalent CRT

## b) Printers

**There are two types of printers:**

### 1-impact printers:

Work like typewriters, using some kind of striking action, raised metal character strikes an inked ribbon that makes a printed impression of the character on the paper, these devices cannot produce high-resolution graphics, and they are relatively slow, noisy and subject to mechanical failure, although inexpensive, they are becoming less popular.

### 2- Non-Impact Printers

Come in two styles

**Laser printers:** Are higher speed, high \_quality devices that uses laser beams to write information on photosensitive drums, laser printers produce very high quality resolution text and graphics.

**Inject printers:** work differently, by shooting fine streams of colored ink onto the paper. These are less expensive than laser printers, but offer less resolution quality.

## c) Plotters

Are printing devices that use computer-directed pens for creating maps and architectural drawings?

## d) Voice output

A voice output system constructs the sonic equivalent to textual words, which can then be played through speakers.





## Computer Software

There are two major types of software: **system software & application software.**

### System Software:

Is a set of instructions that serves primarily as an intermediary between computer hardware and application programs. System software provides important self regulatory functions for computer system, such as loading itself when the computer is first turned on, managing hardware resources such as secondary storage for all applications, and providing commonly used sets of instructions for all applications to use.

### Application software

Is a set of computer instructions that provide more functionality to a user such as word processing and payroll programs. System software can be grouped into two major functional categories: System control programs and system support programs.

## 1.3 Types of system

In the early days of computer technology, it was easy to categorise computers. Today, even the basic desktop machines are extremely powerful by the standards of a few years ago and rival the early mainframes in computing power.

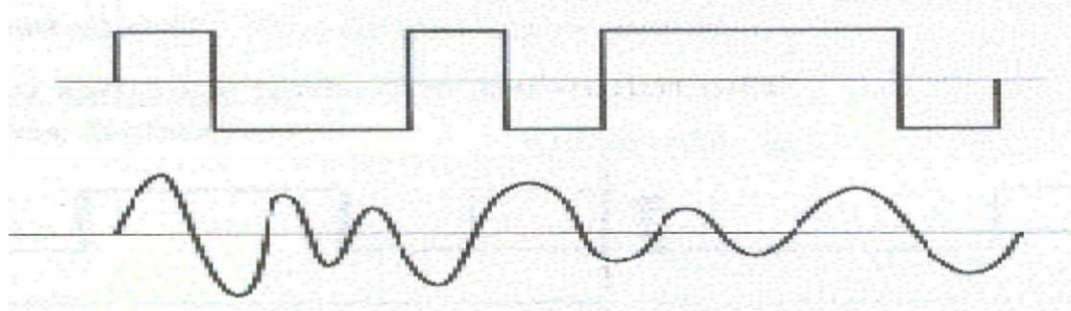
### Mainframes

These are the largest and most powerful of computers. The biggest of these are sometimes called **Supercomputers**. Mainframes are usually only found in large corporate institutions, research organizations, government ministries and tertiary academic institutions.

They provide centralized processing and storage of data. They are usually used for large database systems such as the accounts of a municipality, patient information at a large hospital or student records at a university.

Because desktop (personal computers) and laptops are relatively cheap, many activities such as word processing, creation of spreadsheets and general office tasks are carried out using these types of computers. This frees the mainframe for processing large databases.

**Networking**, in which computers are connected together and are able to communicate, allows data to be **downloaded** from the mainframe to the personal computer or be **uploaded** from the personal computer to the mainframe. In effect, networking creates one large system comprising all the different computers linked together.



**Fig: 1-6 Data transfer.**

**Capacity and speed:** Mainframes have the largest capacity in terms of data storage and processing speed. The capacity of a modern mainframe can be hundreds or even thousands of times that of a modern personal computer.

**Cost:** Mainframes are also the most expensive machines in terms of both initial cost and maintenance. A mainframe can cost millions of Rends.

**Typical users:** Because the mainframe provides services to all sectors of a large corporation or institution, users can include systems analysts, programmers, database administrators, data capturers, accountants, accounts administrators

### **Network computer**

**Network computers** are also sometimes known as **thin clients** or **dumb terminals**. They provide access to a mainframe via a network and have little, if any, computing capacity of their own. Network computers provide remote access to a mainframe. They allow the user to input data or commands and receive output. The actual processing would be done on the mainframe.

**Capacity and speed:** Network computers do not have any processing capacity of their own. Their speed will depend on

- i: the speed and capacity of the mainframe;
- ii: the speed of the network to which they are attached;





iii: the number of users accessing the mainframe. Thus in periods of low demand, they will appear to function very quickly but would appear to slow down when the demand on the system is high.

**Cost:** Network computers are relatively simple devices, hence they are fairly cheap.

**Typical users:** These would generally be the end-users of the system such as managers, accountants, receptionists, and accounts clerks and data capturers.

### Personal computers

**Personal computers** or **PCs** for short are the type of computer that most users are familiar with. Because they are usually found on users desks, they are also sometimes called **desktop computers**. **Operating systems** such as **Linux** and **Windows** were designed specifically for personal computers. The same applies to the thousands of application packages that are available including **OpenOffice.org** and Microsoft **Office**. A typical PC consists of a main unit housing the CPU and disk drives, a VDU (Video Display Unit), a keyboard and a mouse. PCs are self contained computing systems that can be used for thousands of different tasks from creating a simple document to controlling a large industrial machine.

**Capacity and speed:** Because of the rapid advances in technology, the PC of today is more powerful than many mainframes of a few years ago. There is little sign that the rate of development is slowing down. Typically, a modern PC can store the equivalent of a few million pages of printed text and carry out millions of instructions in a second. What complicates the issue of speed in talking about PCs is the use of graphics. Most applications make intensive use of graphics. This demands enormous computing power. Computers, which would otherwise appear to be very fast, can appear to be quite slow because of the demands placed on them by the graphics used in an application. Other components, such as the graphics card, also play a role in the speed of a PC.

**Cost:** There has been a steady decline in the cost of computing power. Although the cost of PCs has been fairly steady, the computing power that has been supplied has increased drastically. The cost of a personal computer is greater than that of a network computer or PDA but less than that of a laptop and a very small fraction of the price of a mainframe.





**Typical users:** Everyone is a potential user of a personal computer since there is virtually no sphere of human activity that does not make use of information technology. The list could include scientists, researchers, mathematicians, statisticians, technologists, engineers, students, teachers, accountants, actuaries, managers, doctors, librarians, receptionists, book-keepers, writers, and journalists. These are just a very few.

### Laptop

Laptops are similar to personal computers except that they comprise an integrated unit. Instead of a separate monitor, the lid contains a screen. The keyboard is built into the base. Usually they make use of a touchpad instead of a mouse. The term **notebook computer** is often used instead of laptop computer.

The main feature of a laptop is its portability. This is possible, not only because of the reduced size and weight, but also through the use of a built-in battery which is able to power the computer for a few hours without being connected to a mains power supply. Laptops are also designed around low power and smaller devices. For example, laptops use small 2½" hard drives as opposed to the 3½" drives of desktops. In addition, these drives have special components built-in to protect them against movement.

**Capacity and speed:** These are the same as for personal computers.

**Cost:** Because of the more expensive components and the smaller market for laptops, these are usually quite a bit more expensive than personal computers. Increased volumes and improvements in manufacturing techniques will bring the price of laptops down in the future.

**Typical users:** Although the users could be any of those mentioned under personal computers, cost tends to limit the users to those who need portability or who can afford the cost. You would find them most commonly used by people such as managers and journalists. It is quite common to see a laptop and the desk of senior members of staff and personal computers on the desk of staff. This is not always a matter of status but often due to the fact that managers tend to take work home with them.