

# Chapter 1: Computer System

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## What is Information Technology

- Information Technology is the direct use of technology to process data.
- A more formal definition of IT would be:
  - ◆ The acquisition, processing, storage and dissemination of vocal, pictorial, textual, and numeric information by a micro-electronics based combination of computing and telecommunications.
- The technology itself can be divided into **Computer and Communications Hardware** and **Software**.

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## Why use Information Technology?

- Computer and communication technology available today offer an efficient way of management information
  - ◆ Cheaper
  - ◆ Faster
  - ◆ More Accurate

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## What is Data?

- Organizations come in contact with large amount of Data
- Data is process to provide useful information
- Relevant information assist managers to plan, control and make decision
- Data is
  - ◆ Collected
  - ◆ Process (treated to get useful information)
  - ◆ Store (Keep, File)
  - ◆ Disseminate (Information distribute)

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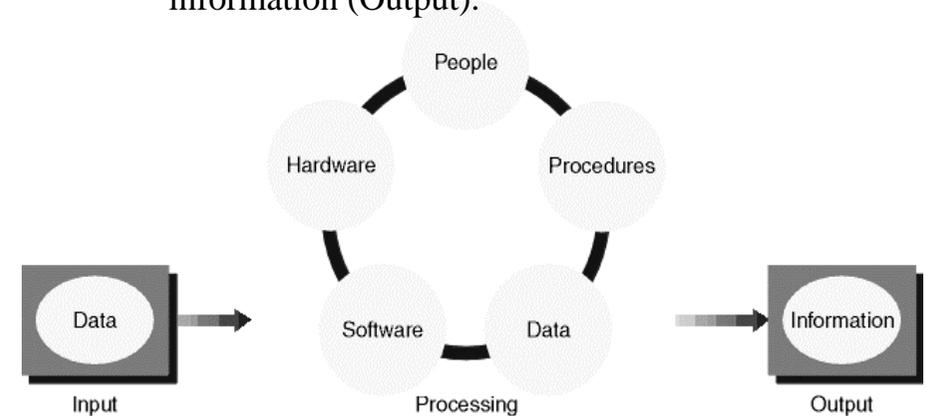
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## Data Processing

- We can make the following initial points about computers.
  - ◆ The machines themselves, that is the physical components of a computer system (such as processor, screen, keyboard and printer) are referred to as the computer hardware.
  - ◆ A computer process data.
  - ◆ A computer's operations are performed under the control of a program.
  - ◆ Almost all business computers (and most scientific computers) are digital computers.

## Data Processing

- Data processing is the use of automation (System) to process raw data (Input) to create meaningful information (Output).



## Information System Components

- Hardware
  - ◆ Hardware refers to the physical layer of the information system.
- Software
  - ◆ Software consists of system software and application software.
- Data
  - ◆ An information system transforms data into useful information.

## Information System Components

- Processes
  - ◆ Describe the tasks that users, managers, and IT staff members perform.
- People
  - ◆ Users, sometimes called end users, include employees, customers, vendors, and others who interact with an information system.

## How Information Differ from Data?

- One of the simplest definitions says that information is data with a structure and a meaning derived from the context in which it is used.
- For example, the numbers 8, 17 and 5 might be items of data. In themselves, they mean nothing. But a gambler could regard these three numbers as information if they happened to be the numbers of the horses that came first, second and third in a particular horse race.
- In this example, the structure is in fact that the sequence of numbers agrees with the sequence of horses in the race. The meaning for the gambler lies in the significance of these numbers for either winning or losing a bet. The context refers to many aspects of the activity of gambling on horse races.

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## Knowledge

- In an information economy, knowledge & core competencies are key organizational assets.
- Knowing how to do things effectively and efficiently in ways that other organizations cannot duplicate is a primary source of profit.



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## How Knowledge Differs from Information

- Knowledge is a complex structure of information that has meaning within a specific context.
- For example, a successful gambler's may rely on some very complex knowledge structures to determine which horse is a good bet in a given race.
- This might involve knowing about probability mathematics, about the form (i.e. historical performance) of the various horses, and about the interaction between a horse's form and the current conditions of the track.

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## Components of a Computer

- Software is the program that run on the computer
  - ◆ E.g. Operating system, Word Processor
- Hardware is the physical component of the computer
  - ◆ E.g. Hard disk, CPU,

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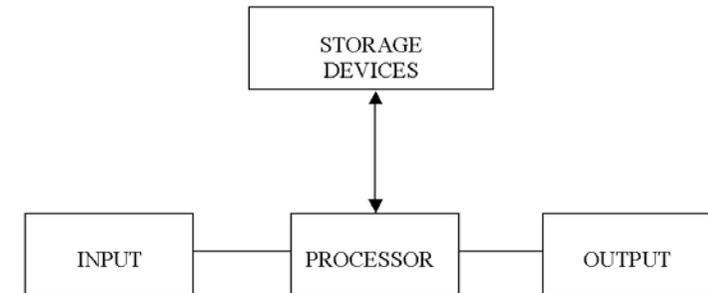
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## Components of a Computer - Software

- Software is the intangible part of the system, which comprises the instructions to perform given tasks, i.e. the programs.
- Hardware is the physical part of the system; the computer, peripheral devices, etc.

## Components of a Computer - Hardware

- The basic components of a computer's hardware consist the following.



## Different Types of Computer

- Computers are classified according to size, although the differences between these categories can be quite vague.
  - ◆ Supercomputers
  - ◆ Mainframes
  - ◆ Minicomputers
  - ◆ Microcomputers
  - ◆ Workstations
  - ◆ Personal Computers
  - ◆ File Servers
  - ◆ Portables



## Supercomputers

- Ultra-fast computers designed to process huge amount of scientific data and then display the underlying pattern that have been discovered.
- They are particularly useful for occasions when many calculations need to be performed, for example in weather forecasting.
- Manufacturers of supercomputers include Cray and Fujitsu.



## Mainframes

- Mainframe computers are large computers in terms of price, power and speed.
- Typically, they cost over £1 million and support several hundred users.
- Well-known manufacturers include IBM AND ICL.
- Mainframes are the largest of the computers. Their name comes from the first of the computers, which were very large.
- The circuits, which employed large number of valves, were mounted on large metal frames, hence the name.
- These days, a mainframe computer would occupy the space of one, or more cabinets, the size of small wardrobes.



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## Mainframes (cont')

- Mainframe computers have very large processors with several hundred Megabytes of RAM.
- This allows them to be used by many users at the same time, maybe 200 or more.
- This type of computer would usually be used with very large and fast peripheral devices and with many hard disks units.
- Since the number of users can be so high. There is quite a large processing task to control the flow of data between the computer and all the terminals.
- For this reason, most mainframe computers use a minicomputer to handle this activity, thereby leaving the mainframe free to process the data. In these circumstances, the minicomputer is referred to as a Front End Processor (FEP).

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## Minicomputers

- Originally used to describe computers, which were cheaper and less well equipped than mainframes, this term is becoming obsolete.
- These days, the larger microcomputers are similar in characteristics to the smaller minicomputers.
- Essentially, the minicomputers are a small version of the large mainframe computers.
- In minicomputers, the processor is much larger than the microcomputers and consists of more than one silicon chip. Similarly, the size of the RAM is significantly larger.
- The increased size of the CPU enables the minicomputers to be used by a number of users at the same time, perhaps up to fifty. As technology improves, this number will increase.
- Along the larger processor, the minicomputer will employ hard disks with even larger storage capacity as backing storage and will often be used with faster printers.



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## Microcomputers

- This term microcomputer, originally used for a independent 'freestanding' computer, has become largely out-dated and replaced by the term personal computer (PC).
- Microcomputers (also called Personal Computers) are the most recent type of computer to be developed. They are the smallest type of computer.
- They come in a variety of sizes, from the desktop model, to the now outdated laptop, the A4 sized notebook, and even the sub notebook size.
- Unlike the larger computers, the processor is contained on one silicon chip, instead of a combination of chips. This processor in a PC is called a microprocessor.



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## Microcomputers (cont')

- The common microprocessors today are the 80486 and the Pentium chips manufactured by Intel.
- Today, PC users would store data and programs on their hard disk or diskettes.
- The PC would have 1 or more floppy disk drives.
- Hard disks allow storage of greater volumes of data and increased retrieval speeds. In addition, PCs today may also incorporate a CD-ROM drive.
- Each PC will also include a color VDU or monitor, a keyboard and a mouse. Printing can be done to an attached dot-matrix or laser printer. At any 1 time, only one user can use the PC.

## Workstations

- Originally, a workstation was a computer used by one person, particularly for graphics and design applications (such as computer aided design) and was used primarily in engineering.
- It has a fast and powerful central processor, a high-resolution monitor, a large memory, and would, almost certainly, run on UNIX.
- This enabled complex designs to be easily manipulated. Such characteristics, however, are no longer unique to workstations as high performance personal computers can offer very similar services.
- The distinction, therefore, is a historical one based on the very noticeable difference between early 8-bit personal computers and powerful workstations. More powerful PCs mean that the distinction is eroding.



## PCs

- Companies like Apple Computers first developed the personal computer market.
- Then, in August 1981, the IBM PC was launched. In the early years of the development of the PC, the Apple Macintosh (technically not a PC) became the standard for graphics-based applications and the IBM PC and a host of IBM-compatibles, or clones, was chosen for text-based (business) applications.
- However, as chips have become more powerful, the difference in emphasis has become less important.



## File Servers

- A file server is a PC or minicomputer which provides additional services for users of networked PC.



## Portables

- As the name implies, portables are small enough to be carried from place to place and can be powered from batteries or from the mains. Increased efficiency of design means that they can support as much memory as stand-alone PCs.
- Portables are described as laptops, notebooks and handheld (or pocket) computers.
- These pocket computers may or may not be compatible with PCs, and range from machines that are little more than electronic organizers to relatively powerful processors with compatibility and full communications features.
- It is estimated that portable computers now represent over 50% in volume of all types of personal computer sold. They offer considerable space saving.



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## The Power of Computer

- The factors that determine the power of a computer (how much it can do, and how fast) are as follows.
  - ◆ The speed of handling program instructions, which for a mainframe is measured in millions of instructions per second (MIPS).
  - ◆ Smaller mainframes only manage 11 MIPS, whereas the largest IBM mainframe can handle 80 MIPS. Alternatively, speed and power can be measured in megaflops (millions of floating point instructions per second).
  - ◆ The MHz (Megahertz) rates of the internal clock (the rate at which timing pulses are emitted from the control unit). The higher the rate, the faster the computer can work.
  - ◆ The efficiency of the instruction set. Some computers combine a fairly small set of instructions in clever ways to increase efficiency.
  - ◆ The size of the processor's memory.
  - ◆ The number of tracks on the computer's buses.

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## Computer Software

- Hardware only becomes useful when it is instructed to perform activities. Software comprises the set of instructions which tell the hardware what to do.
- The purpose of software is to cause the computer to provide the user with the data processing facilities required. These instructions are usually combined in a sequence.
- A set of such instructions is called a program. Software program are divided into:
  - ◆ System Software
  - ◆ Application Software

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## System and Application Software

- System Software
  - ◆ System software includes all programs that help computer function properly
    - ◆ Example: Operating System
- Application Software
  - ◆ Application software consists of all the programs you can use to perform a task
    - ◆ Example: Internet Browser, Word Processor

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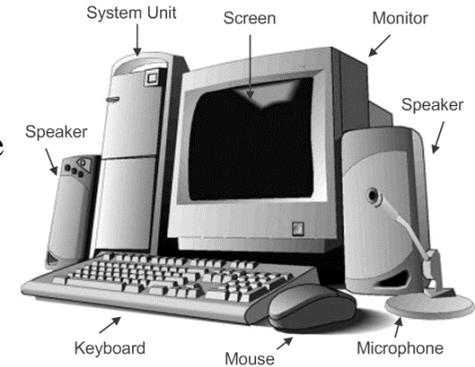
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# Communications

- Today, telecommunications is intimately bound with information technology.
- Essentially, for maximum performance, computers must be linked to each other to exchange information.
- This can be done by cabling (if the computers are located close to each other), or more commonly, by using the telephone network to transmit data.

# System Components

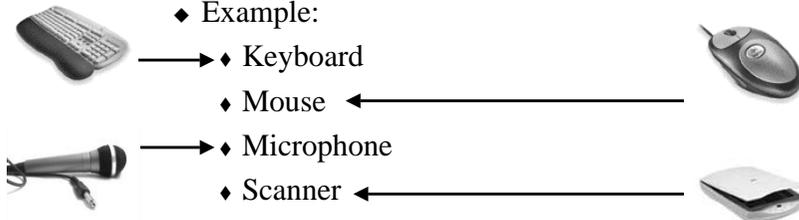
- A computer system is made up of 4 components:
  - ◆ Input Device
  - ◆ Processor
  - ◆ Output Device
  - ◆ Storage Device



# System Components – Input Device

- A device which transfers data and programs to the internal memory. Accepting data that has been represented in a way that the computer can use.

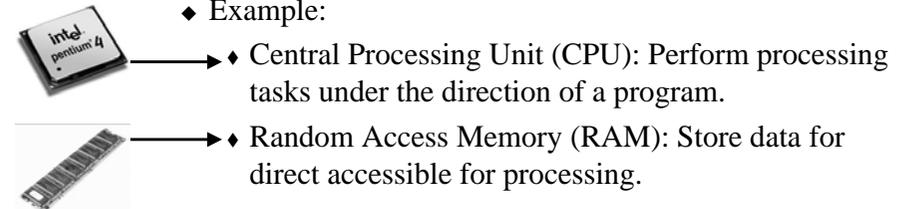
◆ Example:



# System Components – Processor

- The main unit of a computer system. It accepts data from an input device, executes instructions and performs operations on data as specified by the internally stored program and outputs the results to an output device.

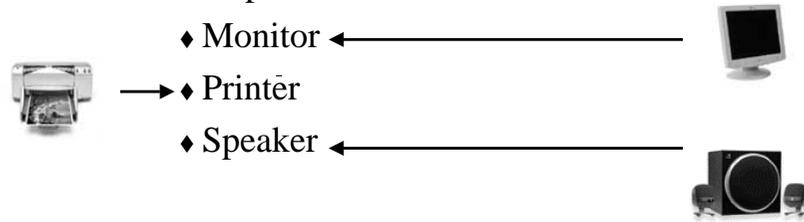
◆ Example:



## System Components – Output Device

- A device which receives the results of processing from the processor, and then display or output the results to users

◆ Example:



## System Components – Storage Device

- A computer's auxiliary bulk storage device providing for the storage of records and programs until required for processing activities.

◆ Example:

