

CHAPTER ONE

INTRODUCTION TO COMPUTER

1.1 INTRODUCTION

Basic Terms

Data Vs Information

Data is the plural form of "Datum" which means fact; it is a collection of raw figures that represent features or details about people, objects places clans or events. Data are the raw material for information. Data comes in many forms - numbers, words, symbols. Data relates to transactions, events and facts. On its own - it is not very useful.

Information is the collection of meaningful facts and figures that can be used as a base for guidance and decision making. Information is data that has been rearranged, processed organized, into a form perceived as useful by the recipient. Information is data that has been processed in such a way as to be meaningful to the person who receives it. Information can be used for Planning, Recording, Controlling, Measuring and Decision-making in an organization.

Hence we must combine, add to or process data in some way to make it meaningful or to change it to information.

Data (input) → Data Processing → Output (Information)



Merging etc.)

(Calculating, Sorting, Summarizing,

Data processing is therefore the manipulation and transformation of data in to more meaningful form (information). Think of data as a "raw material" - it needs to be processed before it can be turned into something useful hence the need for "data processing".

Think of the data that is created when you buy a product from a retailer. This includes:

- Time and date of transaction (e.g. 10:05 Tuesday 23 December 2003)
Transaction value (e.g. £55.00)
- Facts about what was bought (e.g. hairdryer, cosmetics pack, shaving foam) and how much was bought (quantities)
- How payment was made (e.g. credit card, credit card number and code)
Which employee recorded the sale
- Whether any promotional discount applied

At its simplest, this data needs processing at the point of sale in order for the customer to receive a valid receipt. So the data about the transaction is processed

to create "information" - in this case a receipt. You can imagine that the same data would also be useful to the manager of the retail store. For example, a report showing totals sales in the day, or which are the best-selling products. So the data concerning all shop transactions in the day needs to be captured, and then processed into a management report.

So that, Data are the raw material for information whereas Information is data that has been processed in such a way as to be meaningful to the person who receives it. Note the two words underlined - "processed" and "meaningful". It is not enough for data simply to be processed. It has to be of use to someone - otherwise why bother?! The information produced by the data processing must be accurate, timely and full.

Information Technology

Information technology is technology that merges computing with high-speed communications links carrying data, sound, and video. This merging of computers with communication technology is produced through a phenomenon called **technological convergence**. This **technological convergence** brings several industries using devices that can exchange information in electronic format used or understood by computer. The current century that we are living is termed as Information Age. Its parents are computer technology and communication technology.

N.B: The most important consequence of information technology is that it is producing a gradual fusion of several important industries in a phenomenon that has been called **technological convergence**.

Technological convergence (or Digital Convergence) technological merger of several "industries" through various devices that exchange information in the electronic or digital format used or (understood) by computer.

Example: Web TV technology: is one of the technological mergers that allow adding set-top boxes to your TV, so that they can access and view the WWW, internet over the TV screen.

Effects of IT

- Change conventional meaning of time, distance and space.
- Physical location those are associated with work, leisure become meaningless.
- Nature of work is changing and changing fast.
- Entire industries are redefined using Internet and WWW (world wide web)

Technological convergence: is derived from a combination of two recent technologies: *computers and communications*.

1.1 Definition of Computer?

In the beginning of the civilization, people used their fingers and pebbles for computing purpose. In fact, the word '**digitus**' in Latin actually means '**finger**' and '**calculus**' means '**pebble**'. This gives a clue into the origin of early computing concepts. With the growth in civilization, the computing need also

grew. The need for a mechanism to perform lengthy calculations led to the invention of first calculator and then to computers.

The term '**computer**' is derived from the word '**compute**', which means to calculate. A **computer** can be defined as a machine (composed of electronic and electric circuits), which can perform arithmetic operations and logical decisions with defined pattern of instructions called software.

A **computer** can also be defined as an **electronic device** which **accepts an input, process the input** according the instruction provide and **produce the desired output**. Although, the application domain of a computer depends totally on the human creativity and imagination, it covers a huge area of applications including education, industries, government, medicine, scientific research, law, social sciences, and even music and arts. Computers are widely seen as instruments for future progress and as tools to achieve sustainability via improved access to information, and dematerialization via video conferencing and E-mail.

1.2 CHARACTERISTICS OF COMPUTERS

Man developed computers so that he could perform intricate operations such as calculation and data processing or simply for entertainment. Let us discuss some of **the characteristics of a computer**, which make them an essential part of every emerging technology and such a desirable tool in human development.

- ◆ **Speed:** The computers process data at an extremely fast rate, that is, to the tune of millions of instructions per second, even more. In a few seconds, computers can perform such a huge task that a normal human being may take days or even years to complete.
- ◆ **Accuracy:** Besides the efficiency, the computers are also very accurate. The level of accuracy depends on the instructions and the type of machines being used. Since we know that the computer is capable of doing only what it is instructed to do, faulty instructions for processing the data automatically lead to faulty results. This is known as GIGO, that is, Garbage In Garbage Out.

◆ **Reliability:** Generally, reliability or dependability is the **measurement of the performance of a computer**, which is measured against some predetermined standard for operation without any failure. The major reason behind the reliability of the computers is that, at hardware level, they do not require any human intervention between its processing operations. Moreover, computers have the built-in diagnostic capabilities, which help in continuous monitoring of the system.

- It refers to a computer is a trustfulness (acceptance) machine.

❖ **Storage Capability:** Computers can store large amounts of data and it can recall the required information almost instantaneously. Anyone can store data in a computer for several years and you will find it the same whenever you come back to your data. Different computers have different memory and storage capacity. It is also possible to store data on secondary storage devices like CD-ROMS, DVDs, external hard disks, flash disks, and many more. For example, a single CD-ROM can store 700 MB of data.

- Storage capacity of a computer is measured in bits, bytes, kilobytes, megabytes, gigabytes and terabytes.
- A bit: is the smallest measurement unit of data either 0 or 1 (off or on).
- Gigabytes and Terabytes: are the larger measurement units of data. A group of bits is called **byte**.
- **8 bits = 1 bytes = 1 character, 1KB = 1024 byte, 1MB = 1024 KB, 1GB = 1024 MB, 1TB = 1024 GB**

◆ **Versatility:** Computers are quite versatile in nature. They can perform multiple tasks simultaneously with equal ease. For example, at one moment it can be used to prepare a letter, play music and in between you can print a document as well. All this work is possible by changing the program (sequence of instructions for computers).

◆ **Diligence:** Computer, being a machine, does not suffer from the human traits of tiredness and lack of concentration. If four million calculations have

to be performed, then the computer will perform the last four-millionth calculation with the same accuracy and speed as the first calculation.

- ◆ **Automatic:** A computer can work without human involvement after starting the program.

In general terms computers can use for the following purposes: -

- To make the work easy.
- To do the work efficiently (Efficiency).
- To improve the quality of the result of work (Quality).
- To assist the work (Assistance).
- To finish the task faster (Speed).

Limitation of computers

- Computers can perform tasks that are only programmed to do.
- Computers operate on data that are provided by users.
- Computers cannot give any conclusion without going through immediate instructions.
- Computers have limited use in qualitative conditions
- Computers require regular checking.

1.3 GENERATION OF COMPUTERS (ASSIGNMENTS)

1.4 CLASSIFICATION OF COMPUTERS

These days, computers are available in many sizes and types. You can have a computer that can fit in the palm of your hand to those that can occupy the entire room; single user computers can be used by hundreds of users simultaneously. Computers also differ based on their data processing abilities. Hence, computers can be classified according to purpose, data handling, and functionality.

There are different types of Computers. Their difference is depending on different categories of characteristics.

Classification by the method of operation (processing)

They are classified into three:

1. Analog

Analog computers operate by measuring. They deal with continuous variables; they don't compute directly with numbers, rather, they operate by measuring physical magnitude such as pressure, temperature, voltage, current etc.

Examples

- Thermometer
- Voltmeter
- Speedometer
- Gasoline pump – Contains an analog Computer that converts the flow of pumped fuel into two measurements the price of the delivered gas and the quantity of pumped fuel.

They are special purpose computers.

Analog computers have limited accuracy

2. Digital Computers

Digital computers deal with discrete variables; they operate by counting rather than measuring. They operate directly up on numbers (or digits) that represent numbers, letters, or other special symbols.

Examples:

- Abacus
- Desk & pocket computers
- The general purpose computers

Digital computers have higher accuracy and speed than the analog ones.

3. Hybrid computers

The best features of analog and digital computers can be combined into a single device to form a hybrid computer. A hybrid computer processes the information by collecting input data with analog method, convert it into digital quantities, processes the digital values and convert the output from digital to analog form.

Example: In hospital insensitive-care unit analog devices may measure a patient's heart function, temperature and other vital signs. These measurements may then be converted into numbers and supplied to a digital component in the system. This component is used to monitor the patient's vital signs and to send an immediate signal to the nurse's station if any abnormal readings are detected.

Classification by purpose of application

Computers can be applied or used for different purposes. Based upon their application, they are classified as **special purpose** or **general-purpose** computers

1. Special purpose computers

They are designed to solve a single type of problem, that is their components and function are uniquely adapted to a specific situation involving specific application.

Example:

- The public telephone box
- Traffic control system
- Ticket machines (used in grocery, super market etc.)
- Pocket calculators etc.
- Counters

Most analog computers are special purpose computers.

2. General-purpose computers

They are designed to solve variety of problems through the use of “store program concept”. A program or set of instructions designed to solve a problem is read and stored into the memory and then executed by the computer one by one. The same computer can be applied to solve another set of problem using different program. General purpose computers are more flexible and versatile.

Examples

- Micro computers
- Mini computers
- Super computers etc.

Classification by physical size, price, capacity and performance

At this stage, by a computer, we mean a general-purpose digital computer. There is a wide variety of general purpose digital computers on the market place today,

in terms of physical size, price, capacity, and performance. They are then classified as follows by their capacity and size:

Super computers: - are the fastest, largest and most potential types of computer. They have speed of hundreds of millions of operation per second, a primary memory capacity of about 80 million characters, a secondary memory of capacity of about 20 times its primary memory.

They are multi-user systems in intercontinental range. They can carry out enormously complex scientific calculations. They are used to process huge amount of data and are commonly used in space technology centers, meteorology stations, astronomical observatories, intercontinental communications, and airline organizations.

Mainframe computers: - Smaller than in size and capacity, lower in speed & memory capacity than the super computers. However, they are multi-user systems and handle hundreds of users, usually used in large organizations.

Mini computers (workstations): - have relatively lower speed, can handle multi-users, are smaller in size than the mainframe computers. They use terminals for inputs and output. Mini computers are used in small organizations.

Microcomputers: -Microcomputer (personal or desktop computer) is a computer whose CPU is microprocessor. Microprocessor is a processor all of whose components are on a single integrated-circuit chip. Since its CPU is integrated in a single circuit, it can serve only a single user at a time. Most of home and personal office computers are microcomputers. The relative performance and usage of personal computer is relatively increased with a very high rate.

1.5. APPLICATIONS OF COMPUTERS

Why we use Computers?

For the last few decades, computer technology has revolutionized the businesses and other aspects of human life all over the world. Practically, every company, large or small, is now directly or indirectly dependent on computers for information processing. Computer systems also help in the efficient operations of

railway and airway reservation, hospital records, accounts, electronic banking, and so on computers not only save paper work.

The following are some of the capability of Computers, which are reasons to use Computers.

- Store and process large amount of information with high speed and accuracy;
- Transmit information across continents via communication channels;
- Simulate events;
- Perform complex mathematical computations and make comparisons;
- Monitor ongoing industrial operations;
- Perform repetitive processes with great ease, speed, and reliability;

Therefore, computers are applicable for any functions or process that requires these abilities. Some of the areas where computers are being used are listed below.

Education:

Computers have also revolutionized the whole process of education currently, the classrooms, libraries, and museums are efficiently utilizing computers to make the education much more interesting. Unlike recorded television shows, computer-aided education (CAE) and Computer Based Training (CBT) packages are making learning much more interactive.

Medicine and Health Care:

There has been an increasing use of computers in the field of medicine. Now, doctors are using computers right from diagnosing the illness to monitoring patient's status during complex surgery. By using automated imaging techniques, doctors are able to look inside a person's body and can study each organ in detail (such as CAT scans or MRI scans), which was not possible few years ago. There are several examples of special purpose computers that can operate within the human body such as a cochlear implant, a special kind of hearing aid that makes it possible for deaf people to hear.

Entertainment:

Computers are finding greater use in entertainment industry. Computers are used to control the images and sounds. The special effects, which mesmerize the audience, would not have been possible without the computers. In addition, computerized animation and colorful graphics have modernized the film industry.

Communication:

E-Mail or Electronic Mail is one of the communication media in which computer is used. Through e-mail the messages and reports are passed from one person to one or more persons by the aid of computer and the telephone line. The advantage of this service is that while transferring the messages it saves time, avoids wastage of paper, and so on. Moreover, the person who is receiving the messages can read the messages whenever he is free and can save it, reply it, forward it or delete it from the computer.

Commercial or business applications

Computers are needed to perform business operations that require handling large amounts of data. Several computer applications are available to assist business in working with large volumes of data.

Examples: Text processing, Accounting and Finance management, Inventory control, Database management, and Statistical analysis

Scientific-engineering and research application

- Computers are using for scientific research, complex mathematical calculations, design work, and analysis and control of physical system. Examples are: Space technology, Meteorological observatory system, Astronomical investigations, Design of machines and Control of manufacturing process

Weather and Environment

- Computer equipment may show temperature ranges, precipitation levels and wind flow and can used in weather forecasting. Computer can also help in overcoming environmental hazards.

Transportation

- Computers have affected almost every kind of transportation. Many aircraft can fly under the control of the computer; in this situation, the captain simply serves as a manager by telling the computer what to do. In Cars, computers have provided functional controls such as spark and fuel control.

Household Control

- A growing number of the newer houses hold devices are computers controlled. For example: Security systems, refrigerators, microwave ovens, washers, stereos, and televisions. This computer controlled home security system monitors movements, broken glass, unlawful entry without a security code, and so on, and alerts the local police department.

Banking:

- In the field of banking and finance, computers are extensively used. People can use the ATM (Automated Teller Machine) services 24 hours of the day in order to deposit and withdraw cash. When the different branches of the bank are connected through the computer networks, then the inter branch transaction such as draft can be done by the computers without any delay.