UNIT 3 CLASSIFICATION OF COMPUTERS

CONTENTS

1.0 INTRODUCTION

The computer has passed through many stages of evolution from the days of the mainframe computers to the era of microcomputers. Computers have been classified based on different criteria. In this unit, we shall classify computers based on three popular methods.

2.0 OBJECTIVES

At the end of this unit you should be able to:

- classify computers based on size, type of signal and purpose
- identify the features that differentiate one class of computers from the others.

3.0 MAIN CONTENT

3.1 Categories of Computers

Although there are no industry standards, computers are generally classified in the following ways:

3.2 Classification Based on Signal Type

There are basically three types of electronic computers. These are the Digital, Analog and Hybrid computers.

The Digital Computer

This represents its variables in the form of digits. The data it deals with, whether representing numbers, letters or other symbols, are converted into binary form on input to the computer. The data undergoes a processing after which the binary digits are converted back to alpha numeric form for output for human use. Because of the fact that business applications like inventory control, invoicing and payroll deal with discrete values (separate, disunited, discontinuous), they are best processed with digital computers. As a result of this, digital computers are mostly used in commercial and business places today.

The Analog Computer

It measures rather than counts. This type of computer sets up a model of a system. The common type represents its variables in terms of electrical voltage and sets up circuit analog to the equation connecting the variables. The answer can be either by using a voltmeter to read the value of the variable required, or by feeding the voltage into a plotting device. Analog computers hold data in the form of physical variables rather than numerical quantities. In theory, analog computers give an exact answer because the answer has not been approximated to the nearest digit. Whereas, when we try to obtain the answers using a digital voltmeter, we often find that the accuracy is less than that which could have been obtained from an analog computer.

It is almost never used in business systems. It is used by scientists and engineers to solve systems of partial differential equations. It is also used in controlling and monitoring of systems in such areas as hydrodynamics and rocketry in production. There are two useful properties of this computer once it is programmed:

- It is simple to change the value of a constant or coefficient and study the effect of such changes.
- It is possible to link certain variables to a time pulse to study changes with time as a variable, and chart the result on an X-Y plotter.

The Hybrid Computer

In some cases, the computer user may wish to obtain the output from an analog computer as processed by a digital computer or vice versa. To achieve this, he set up a hybrid machine where the two are connected and the analog computer may be regarded as a peripheral of the digital computer. In such a situation, a hybrid system attempts to gain the advantage of both the digital and the analog elements in the same machine. This kind of machine is usually a special-purpose device which is built for a specific task. It needs a conversion element which accepts analog inputs, and outputs digital values. Such converters are called digitisers. There is a need for a converter from analog to

digital also. It has the advantage of giving real-time response on a continuous basis. Complex calculations can be dealt with by the digital elements, thereby requiring a large memory, and giving accurate results after programming. They are mainly used in aerospace and process control applications.

3.3 Classification by Purpose

Depending on their flexibility in operation, computers are classified as either special purpose or general purpose.

Special-Purpose Computers

A special purpose computer is one that is designed to solve a restricted class of problems. Such computers may even be designed and built to handle only one job. In such machines, the steps or operations that the computer follows may be built into the hardware. Most of the computers used for military purposes fall into this class. Other examples of special purpose computers include:

- Computers designed specifically to solve navigational problems.
- Computers designed for tracking airplanes or missiles
- Computers used for process control applications in industries such as oil refinery, chemical manufacture, steel processing and power generation
- Computers used as robots in factories like vehicle assembly plants and glass industries.

General Attributes of Special-Purpose Computers

Special-purpose computers are usually very efficient for the tasks for which they are specially designed.

They are very much less complex than the general-purpose computers. The simplicity of the circuiting stems from the fact that provision is made only for limited facilities.

They are very much cheaper than the general-purpose type since they involve fewer components and are less complex.

General-Purpose Computers

General-purpose computers are computers designed to handle a wide range of problems. Theoretically, a general-purpose computer can be adequate by means of some easily alterable instructions to handle any problems that can be solved by computation. In

practice, however, there are limitations imposed by memory size, speed and the type of input/output devices. Examples of areas where general purpose computers are employed include the following:

- Payroll
- Banking
- Billing
- Sales analysis
- Cost accounting
- Manufacturing scheduling
- Inventory control

General Attributes of General-Purpose Computers

- General-purpose computers are more flexible than special purpose computers. Thus, the former can handle a wide spectrum of problems.
- They are less efficient than the special-purpose computers due to such problems as the following:

- They have inadequate storage
- They have low operating speed
- Coordination of the various tasks and subsections may take time
- General-purpose computers are more complex than special purpose computers.

3.4 Classification of Computers According to Capacity

In the past, the capacity of computers was measured in terms of physical size. Today, however, physical size is not a good measure of capacity because modern technology has made it possible to achieve compactness.

A better measure of capacity today is the volume of work that a computer can handle. The volume of work that a given computer handles is closely tied to the cost and to the memory size of the computer. Therefore, most authorities today accept rental price as the standard for ranking computers. Here, both memory size and cost shall be used to rank (classify) computers into three main categories as follows:

 Microcomputers Medium/mini/small computers Large computer/mainframes.

Microcomputers

Microcomputers, also known as single board computers, are the cheapest class of computers. In the microcomputer, we do not have a Central Processing Unit (CPU) as we have in the larger computers.
Rather we have a microprocessor chip as the main data processing unit. They are the cheapest and smallest, and can operate under normal office conditions. Examples are IBM, APPLE, COMPAQ, Hewlett Packard (HP), Dell and Toshiba, etc.

Different Types of Personal Computers (Microcomputers)

Normally, personal computers are placed on the desk; hence they are referred to as desktop personal computers. Still other types are available under the categories of personal computers. They are:

- **Laptop Computers:** These are small size types that are batteryoperated. The screen is used to cover the system while the keyboard is installed flat on the system unit. They could be carried about like a box when closed after operation and can be operated in vehicles while on a journey.

- **Notebook Computers:** These are like laptop computers but smaller in size. Though small, the notebook computer comprises all the components of a full system.

- **Palmtop Computers:** The palmtop computer is far smaller in size. All the components are complete as in any of the above, but it is made smaller so that it can be held on the palm.

Uses of the Personal Computer

A personal computer can perform the following functions:

- It can be used to produce documents like memos, reports, letters and briefs.
- It can be used to calculate budgets and accounting tasks
- It can analyse numeric functions
- It can create illustrations
- It can be used for electronic mails
- It an help in making schedules and planning projects
- It can assist in searching for specific information from lists or from reports.

Advantages of the Personal Computer

- The personal computer is versatile: it can be used in any establishment
- It has faster speed for processing data
- It can deal with several data at a time

- It can attend to several users at the same time, thereby being able to process several jobs at a time
- It is capable of storing several data
- Operating the personal computer gives less fatigue
- It is possible to network personal computers, that is, linking of two or more computers.

Disadvantages of the Personal Computer

- The personal computer is costly to maintain
- It is very fragile and complex to handle
- It requires special skill to operate
- With inventions and innovations everyday, the personal computer is at the risk of becoming obsolete
- It can lead to unemployment, especially in less developed countries
- Some computers cannot function properly without the aid of a cooling system, e.g. air conditioners or fans in some locations.

Mini Computers

Mini computers have memory capacity in the range '128- 256 Kbytes' and are also not expensive but reliable and smaller in size compare to mainframe. They were first introduced in 1965; when DEC (Digital Equipment Corporation) built the PDP – 8.Other mini computers are WANG VS.

Mainframe Computers

The mainframe computers, often called number crunchers have memory capacity of the order of '4 Kbytes', and are very expensive. They can execute up to 100 MIPS (Meanwhile Instructions per Second). They have large systems and are used by many people for a variety of purposes.

4.0 CONCLUSION

Computers are classified based on three major criteria namely size, type of signal being processed, and purpose. The classification adopted at any point in time depends on the issues involved. For instance, if our goal is to process different kinds of signals or to accept one type of signal and convert to another form of signal, we should look in the

realm of analog or digital or even the hybrid computers. This, of course, calls for a converter such as analog to digital converter or digital to analog converter as the case may be.

5.0 SUMMARY

In this unit we have been able to study the following:

- Computers can be classified based on three major criteria: size, type of signal being processed, and purpose.
- Based on size, computers are classified as mainframe, mini computer and microcomputer.
- Based on the type of signal being processed, computers are classified as analog, digital and hybrid.
- Based on purpose, computers are classified as general-purpose or special-purpose computers.
- Microcomputers now come in different forms due to the continued reduction in size as a result of advances in electronic technology. Microcomputers could be desktop, laptop or palmtop.

6.0 TUTOR-MARKED ASSIGNMENT

1. Classify computers based on type of signal.
2. Based on the signal being processed, to what category each of these computing equipment belongs: petrol pump, thermometer, cellphone, anti-aircraft radar control in the military, and weather forecasting equipment at the meteorological station.

7.0 REFERENCES/FURTHER READING

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