



**DISTANCE LEARNING CENTRE  
AHMADU BELLO UNIVERSITY  
ZARIA, NIGERIA**

**COURSE MATERIAL**

**FOR**

**BACHELOR OF NURSING SCIENCES (BNSc)**

**COSC 265; SSC 202: FUNDAMENTALS/INTRODUCTION TO  
COMPUTER SCIENCE**

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## QUOTE

*“Open and Distance Learning has the exceptional ability of meeting the challenges of the three vectors of dilemma in education delivery – Access, Quality and Cost”*

*- Sir John Daniels*

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**Copyright**

**Course Writers/Development Team**

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### **STUDY MODULES**

|   |   |   |   |   |   |           |
|---|---|---|---|---|---|-----------|
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| Study Session 1: Brief History of Computers-      | - | - | - | - | - | 50        |
| <b>3.0 Module 3: Computer Classification-</b>     | - | - | - | - | - | <b>60</b> |
| Study Session 1: Classification of Computers-     | - | - | - | - | - | 60        |

## **i. COURSE INFORMATION**

**Course Code:** COSC 265 ; SSC 202

**Course Title:** Fundamentals/Introduction to Computer Science

**Credit:** 2 Credit Units

**Year:** Two

**Semester:** One

## **ii. COURSE INTRODUCTION AND DESCRIPTION**

You should note that the term computer is derived from the word compute. The word compute means to calculate. A computer makes decisions based on simple comparisons such as one number being larger or smaller than another. Computers are not very intelligent devices, but they handle instructions flawlessly and very fast.

This course is designed for you that have little or no knowledge or experience with computers and the use of computers. It aims to provide you with an understanding of what computers are and the role computers play in solving everyday problems. It also aim to help you, regardless of your field, to feel justifiably confident in your ability to use computers to accomplish useful goals in your field. This course will include:

- Introduction and general overview of what computers are.
- Brief history of computers with reference to the generations of computers.
- Classification of computers.
- Basic components of computers.

### **iii. COURSE PREREQUISITES**

You should note that although this course has no subject pre-requisite, you are expected to have:

1. Satisfactory level of English proficiency
2. Basic Computer Operations proficiency
3. Online interaction proficiency
4. Web 2.0 and Social media interactive skills

### **iv. COURSE LERANING RESOURCES**

The textbooks listed below can be used as additional reference:

1. Adamu Bola et al (2003) Introduction to Computer Operations and Microsoft Word. Ike-lu Printers.
2. Davis, Gordon B. and Olson, Malgrethe H. (1988) Management Information Systems, McGraw Hill Book Company.
3. O' Brien, James A. (1990) Management Information Systems: A managerial end user perspective. New Delhi; Galgotia Publications Private Limited.

You can also visit <http://ocw.mit.edu/index.htm> for additional references option.

### **v. COURSE OUTCOME**

By the end of this course, you should be able to:

1. Explain the concept and use of computers and computing devices.
2. Itemise and explain application areas of computers.
3. Discuss succinctly the differences and similarities among the generations of computer that we have.
4. Itemise and explain the relationship among the basic components of the computer, showing understanding of the interrelationship among these components.

5. Determine how computers can be used in your field of study.

### **U-Tube links to supporting videos**

1. hardware and software  
[https://youtu.be/Zht\\_1\\_DT-0k](https://youtu.be/Zht_1_DT-0k)
2. computer hardware and software Lesson Part 1  
<https://youtu.be/8UyJMiYqvs4>
3. computer hardware and software Lesson Part 2  
<https://www.youtube.com/watch?v=gaN1SKti3ts>
4. data and information definition  
<https://youtu.be/Rs57-PQyqaE>
5. what is the difference between data, information and knowledge?  
<https://youtu.be/mUgEgkV16Bw>
6. distinguishing between data, information and knowledge  
[https://youtu.be/UEm\\_FpTnb1E](https://youtu.be/UEm_FpTnb1E)
7. datavs. information  
<https://youtu.be/vDt3ik2v-Wg>
8. areas of computer applications  
<https://youtu.be/MUkgXSAsg2Q>
9. generations of computers  
<https://youtu.be/kPZDwOjAAEo>
10. 5 generations of computer  
<https://youtu.be/wlRgSbCJ2c4>
11. history of computer 5 generations  
<https://youtu.be/LJ5c3AycRIE>
12. data information and knowledge  
<https://youtu.be/8XN1ORpsHsQ>



## **vi. ACTIVITIES TO MEET COURSE OBJECTIVES**

The Course Material is written in a clear and concise nature that will aid and guide you in understanding the subject matter. Relevant sites and standard references have been provided. There are going to be series of group and individual assignments, you are expected to do and submit them within the defined time limit. Completion and timely submission of assignments will also serve as part of your assessment. You are expected to have a working email address.

Optional tutorial sessions shall be held preceding the semester examination or at any time required.

Specifically, this course shall comprise of the following activities:

- i. Studying courseware
- ii. Listening to course audios
- iii. Watching relevant course videos
- iv. Course assignments (individual and group)
- v. Forum discussion participation
- vi. Tutorials (optional)
- vii. Semester examinations (CBT and essay based).

## **vii. TIME (TO STUDY AND COMPLETE COURSE)**

A minimum of three hours daily for study is recommended for this course.

## **viii. GRADING CRITERIA AND SCALE**

### **Grading Criteria**

#### **A. Formative assessment**

Grades will be based on the following:

|  |    |
|--|----|
| Individual assignments/test (CA 1,2 etc)         | 20 |
| Group assignments (GCA 1, 2 etc)                 | 10 |
| Discussions/Quizzes/Out of class engagements etc | 10 |

#### **B. Summative assessment (Semester examination)**

|              |   |             |
|--------------|---|-------------|
| CBT based    | } | 30          |
| Essay based  |   | 30          |
| <b>TOTAL</b> |   | <b>100%</b> |

#### **C. Grading Scale:**

A = 70-100

B = 60 – 69

C = 50 - 59

D = 45-49

F = 0-44

#### **D. Feedback**

*Courseware based:*

1. In-text questions and answers (answers preceding references)
2. Self-assessment questions and answers (answers preceding references)

*Tutor based:*

1. Discussion Forum tutor input

## 2. Graded Continuous assessments

*Student based:*

1. Online programme assessment (administration, learning resource, deployment, and assessment).

## X. ABU DLC ACADEMIC CALENDAR/PLANNER

|                            | PERIOD     |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |
|----------------------------|------------|--|--|--|-----|--|--|--|-----|--|--|--|-----|--|--|--|------------|--|--|--|-----|--|--|--|-----|--|--|--|-----|--|--|--|------------|--|--|--|-----|--|--|--|-----|--|--|--|-----|--|--|--|
| Semester                   | Semester 1 |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  | Semester 2 |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  | Semester 3 |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |
| Activity                   | JAN        |  |  |  | FEB |  |  |  | MAR |  |  |  | APR |  |  |  | MAY        |  |  |  | JUN |  |  |  | JUL |  |  |  | AUG |  |  |  | SEPT       |  |  |  | OCT |  |  |  | NOV |  |  |  | DEC |  |  |  |
| Registration               |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |
| Resumption                 |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |
| Late Registn.              |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |
| Facilitation               |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |
| Revision/<br>Consolidation |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |
| Semester<br>Examination    |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |
|                            |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |            |  |  |  |     |  |  |  |     |  |  |  |     |  |  |  |

**N.B: - All Sessions commence in January**

- 1 Week break between Semesters and 6 Weeks vacation at end of session.
- Semester 3 is **OPTIONAL** (Fast-tracking, making up carry-overs & deferments)

## XI. COURSE STRUCTURE GUIDE AND OUTLINE

### Course Structure

| WEEK/DAYS | MODULE          | STUDY UNIT  | ACTIVITY   |
|-----------|-----------------|---|--|
| <b>1</b>  | <b>MODULE 1</b> | <b>Study Session 1</b><br>Introduction<br>P.P 16  | 1. Read Courseware for the corresponding Study Session.<br>2. Listen to the Audio on this Study Session<br>3. View any other Video/U-tube<br><a href="https://www.youtube.com/watch?v=z3Kn1fATUek">https://www.youtube.com/watch?v=z3Kn1fATUek</a>   |
| <b>2</b>  |                 | <b>Study Session2</b> Basic Components of a Computer: Hardware, Software and Human ware<br>P.P 22 | 1. Read Courseware for the corresponding Study Session.<br>2. Listen to the Audio on this Study Session<br>3. View any other Video/U-tube<br><a href="https://www.youtube.com/watch?v=QmC0IEwFby4">https://www.youtube.com/watch?v=QmC0IEwFby4</a><br><a href="https://www.youtube.com/watch?v=QmC0IEwFby4">https://www.youtube.com/watch?v=QmC0IEwFby4</a><br><a href="https://www.youtube.com/watch?v=QmC0IEwFby4">https://www.youtube.com/watch?v=QmC0IEwFby4</a> |
| <b>3</b>  |                 | <b>Study Session3:</b> Information and data.<br>P.P 37  | 1. Read Courseware for the corresponding Study Session.<br>2. Listen to the Audio on this Study Session<br>3. View any other Video/U-tube<br><a href="https://www.youtube.com/watch?v=DVNH40YWq2s">https://www.youtube.com/watch?v=DVNH40YWq2s</a>   |
| <b>4</b>  |                 | <b>Study Session4:</b> Computer Application Areas<br>P.P 42                                       | 1. Read Courseware for the corresponding Study Session.<br>2. Listen to the Audio on this Study Session<br>3. View any other Video/U-tube<br><a href="https://www.youtube.com/watch?v=yK-Q1j3Itt4">https://www.youtube.com/watch?v=yK-Q1j3Itt4</a>   |
| <b>5</b>  |                 | <b>Study Session1:</b> Brief History of Computers:<br>P.P 50                                      | 1. Read Courseware for the corresponding Study Session.<br>2. Listen to the Audio on this Study Session<br>3. View any other Video/U-tube<br><a href="https://www.youtube.com/watch?v=VMuQppYtTC0">https://www.youtube.com/watch?v=VMuQppYtTC0</a><br><a href="https://www.youtube.com/watch?v=VMuQppYtTC0">https://www.youtube.com/watch?v=VMuQppYtTC0</a>  |
|           | <b>MODULE 2</b> |   |  |

|                         |                 |  |  |
|-------------------------|-----------------|--|--|
| <b>6</b>                | <b>MODULE 3</b> | <b>Study Session 1:</b><br>Classification of Computers<br>P.P 60 | 1. Read Courseware for the corresponding Study Session.<br>2. Listen to the Audio on this Study Session<br>3. View any other Video/U-tube<br><a href="https://www.youtube.com/watch?v=RQ98_ksHwgY">https://www.youtube.com/watch?v=RQ98_ksHwgY</a><br><a href="https://www.youtube.com/watch?v=RQ98_ksHwgY">https://www.youtube.com/watch?v=RQ98_ksHwgY</a><br><a href="https://www.youtube.com/watch?v=RQ98_ksHwgY">https://www.youtube.com/watch?v=RQ98_ksHwgY</a> |
| <b>Week 13</b>          |                 | <b>TUTORIALS/REVISION</b>  |  |
| <b>Week 14 &amp; 15</b> |                 | <b>SEMESTER EXAMINATION</b>                                      |  |

## **Course Outline**

### **MODULE 1: Introduction and General Overview**

Study Session 1: Introduction

Study Session 2: Basic Components of a Computer

Study Session 3: Data and Information

Study Session 4: Computer Application Areas

### **MODULE 2: History of Computers**

Study Session 1: Brief History of Computers

### **MODULE 3: Computer Classification**

Study Session 1: Classification of Computers

## **12.0 STUDY MODULES**

### **MODULE 1: Introduction and General Overview**

#### **Contents:**

Study Session 1: Introduction

Study Session 2: Basic Components of a Computer

Study Session 3: Data and Information

Study Session 4: Computer Application Areas

### **STUDY SESSION 1**

#### **Introduction**

#### **Section and Subsection Headings:**

Introduction

1.0 Learning Outcomes

2.0 Main Content

2.1- Definition of a Computer:

2.2- Characteristics of Computers

3.0 Tutor Marked Assignment

4.0 Conclusion/Summary

5.0 Self-assessment questions

6.0 Additional Activities (Videos, Animations & out of Class activities)

7.0 References/Further Readings

#### **Introduction**

You are welcome to this study session. In this study session you will be introduced to the basic concept of the meaning of computer, the characteristics of computer.



## 1.0 Learning Outcomes

At the end of this study session you should be able to do the following:

- A. Define what a computer is
- B. Mention some characteristics of computer

## 2.0 Main Content

### 2.1 Definition of a Computer:

When you mention the word "technology", most people think about computers. Almost every facet of our lives has some computerised component. The appliances in our homes have microprocessors built into them, as do our microwave ovens, televisions and our GSM phones. Even our cars and motorcycles have computers in them. The term computer is derived from the word compute.

The word compute means to calculate. A computer makes decisions based on simple comparisons such as one number being larger than another. A computer is a

machine that manipulates data, according to a set of instructions. Computers are not very intelligent devices, but they handle instructions flawlessly and fast. Precisely, computer is a device for performing arithmetic and logical operations, or computer is a device that processes data and converts it into information. Computers are really nothing more than a very powerful calculator with some great accessories. A computer is a general-purpose tool built around a microprocessor. It



**Fig 1.1.1: Computer**

has lots of different parts including memory, a hard disk, a modem, and many more - that work together.

In a nutshell, we can say a computer is a device that is capable of accepting data (or information) as input, process these input based on a set of instructions (programme) to produce information as output and also has the capability to store both data and information for future use or reference.

**ITQ 1**

*What is a computer?*

**ITA 1**

*A computer is a machine that manipulates data, according to a set of instructions.*

## **2.2 Characteristics of Computers**

The increasing popularity of computers has proved that it is a very powerful and useful tool. This popularity is, as a result of the following characteristics:

A. **Automatic:** A machine is said to be automatic if it works by itself without human interventions. Computer is an automatic machine because once on a job, they carry on until the job is finished normally, without any human assistance. However, computers being machines cannot start themselves. They cannot go out and find their own problems and solutions, they have to be instructed. That is, a computer works from a programme of coded instructions, which specify exactly how a particular job is to be done. Some of the other characteristic of computers, such as speed and accuracy are due to the fact they are automatic and work on a problem without any human intervention.

B. **Speed:** A computer is a very fast and accurate device. It can process thousands of instructions within a few seconds, for which a human being can take several hours, days or months. It can perform in a few seconds, the amount of work that a human being can do in an entire year- if he worked day and night and did nothing else.

C. **Accuracy:** Aside the speed you notice in computers, computers are very accurate. The accuracy of computer is always high, and the degree of accuracy of a particular computer depends upon its design. Errors can occur in computerised system also, but most of them occur due to human mistakes rather than technical problems of the computer.

D. **Diligence:** Unlike most human complain about fatigue and stress you here about, computer is free from problems like exhaustion, lack of concentration and confusion. Computer is free from monotony, tiredness and lack of concentration. It can continuously work for hours, without creating much error and without grumbling, hence, computers score over human beings in doing routine type of jobs, which require great accuracy. If ten million calculations have to be performed, a computer will perform the ten million calculations with exactly the same accuracy and speed as the first one.

E. **Versatility:** If you are impressed by an intelligent person's ability to know about a vast amount of varied subject, Versatility is one of the most wonderful things about the computer. We can perform many different tasks on the computer. One moment it might be busy in calculating the statistical data of a business organisation for annual performance evaluation and at the next moment, it is capable of working on inventory control. At another moment, it is preparing the results of examinations, the next moment, it is busy preparing electronic bills, and in between it, may be helping an office secretary to trace an important letter in seconds.

F. **Permanent storage:** As you are aware of, as a human being acquires new knowledge, the brain subconsciously selects what it feels to be important and worth retaining in memory and relegates unimportant details to the background. This is not the case with computers. A computer can store and recall any amount of

information because of its secondary storage (a type of detachable memory) capability. Every piece of information can be retained as long as desired by the user, and can be recalled.

***ITQ 2***

*List any three (3) characteristics of computers:*

***ITA 2***

*Automatic, Speed, Diligence.*

### **3.0 Tutor Marked Assignment**

Itemize three house hold items that have some form of computerized component in them and match them with their appropriate characteristics.

### **4.0 Conclusion/Summary**

In this study session we were able to understand the meaning of computer and some of the characteristics of computer as speed, accuracy automatic.

### **5.0 Self-Assessment Question**

Explain 4 characteristics of a computer

### **6.0 Additional Activities (Videos, Animations & out of Class activities)**

a. Visit U-tube <https://www.youtube.com/watch?v=z3KnlfATUek>.

Watch the video & summarise in 1 paragraph

### **7.0 References/Further Readings**

1. Adamu Bola et al (2003) Introduction to Computer Operations and Microsoft Word. Ike-lu Printers.
2. Davis, Gordon B. and Olson, Malgrethe H. (1988) Management Information Systems, McGraw Hill Book Company.

3. O' Brien, James A. (1990) Management Information Systems: A managerial end user perspective. New Delhi; Galgotia Publications Private Limited.

## STUDY SESSION 2

### Basic Components of a Computer

#### Section and Subsection Headings:

Introduction

1.0 Learning Outcomes

2.0 Main Content

2.1- Hardware Components of Computer

2.2- Software Components of a Computer

3.0 Tutor Marked Assignment

4.0 Summary/Conclusion

5.0 Self-assessment questions

6.0 Additional Activities (Videos, Animations & Out of Class activities)

7.0 References/Further Readings

#### Introduction

You are welcome to this study session. If you use a desktop computer, you might already know that there isn't any single part called the "computer." A computer is really a system of many parts working together. The physical parts, which you can see and touch, are collectively called **Hardware**. **Software** on the other hand, refers to the instructions, or programmes, that tell the hardware what to do and how to do it. Then the people that programme, design and operate or use the computers are referred to as **human ware**. In essence, three components make up the computer system; hardware, software and human ware.

## 1.0 learning Outcomes

At the end of this study session you will be able to do the following :

- A. mention some hardware component of the computer
- B. list some software component of the computer
- C. differentiate between the hardware and the software of a computer.

## 2.0 Main Content

### 2.1 Hardware Components of Computer

We can define the computer hardware (actual machine) that it does whatever the software (computer programmes) tells it to do. There are four (4) basic operations which a computer performs, irrespective of the programme which is running on it. Computer operations associated with some key devices are categorised into input, process, output, and storage devices.

The devices are broadly classified as a collection of four components. They are: (i) Input unit (ii) Output unit (iii) Processing unit (iv) Storage unit.

**A. Input unit:** The input Unit provides an interface between the users and the machine, for inputting data and instruction etc. Some input devices are keyboard, scanners and reading devices, digital cameras, mouse, voice data entry, Joy stick, light pen, etc.

Data can be input in many more forms audio, visual, graphical etc.

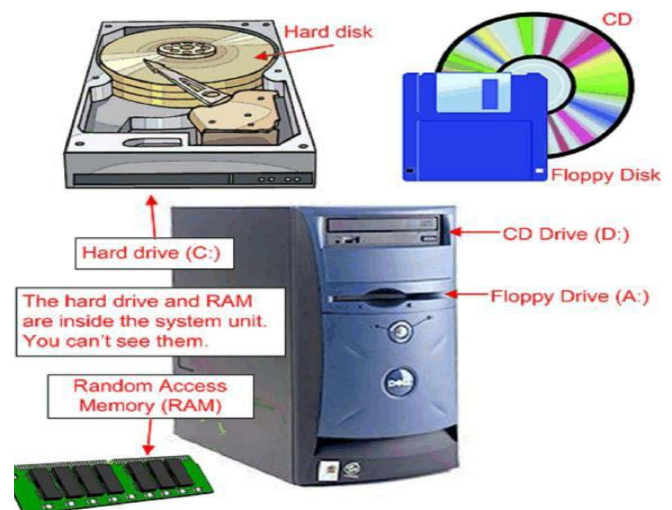
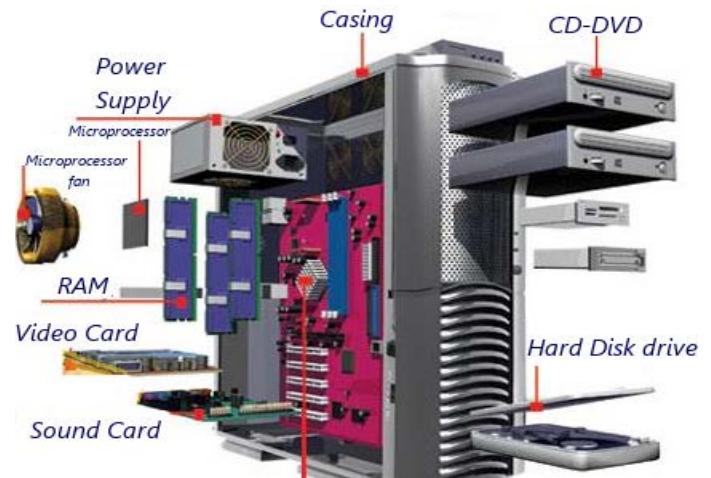


Figure 1.2.1 Hardware of a computer

**B. Output unit:** Like the input unit, you will notice that while observing a computer function, the output unit also provides an interface between the user and the



*Figure 1.2.2 Hardware of computer*

machine. These are devices used to get information out of the computer, either as soft copy (electronic version of the data or information, such as a file that can be transferred by email or USB drives) or hard copy (physical reproduction or reproduction of the data such as a printed page or photograph). An output device is any computer component capable of conveying information to a user.

Commonly used output devices include display devices (monitor or Visual Display Unit {VDU}, TV), printers, speakers, headsets, data projectors, videocassette recorders (VCRs), fax machines, and multifunction devices.

**ITQ 1:** List any three (3) input devices of the computer and any two (2) output devices.  
**ITA 1:** input-Keyboard, Light Pen, Scanner, Web Cam, Thumb Print Sensors, Microphone.  
output- Monitor, Speaker, Projector, Printer.

**C. Processing unit:** if you need to compare a Central Processing Unit (CPU) to what you can easily recall, it is apt to say that the CPU is similar to a calculator, only that it is much more powerful than the latter. The main function of the CPU is to perform arithmetic and logical operations on data taken from memory, or on



information entered through some device, such as a keyboard, scanner, or joystick. Once the CPU has executed the programme instruction, the programme may request that the information be communicated to an output device, such as a video display monitor, printer or a speaker.

**D. Storage unit:** The Storage unit functions like any bag or pouch you know , only that it is a device(s) that retain items such as data, instructions, and information, for retrieval and future use. Both data and programme instructions are stored internally in a computer. Once they are stored in the internal memory, they can be called up quickly or retrieved for further use. They include floppy disks or diskettes, hard disks, compact discs (both read-only and disc-recordable), tapes, PC cards, Smart Cards, microfilm, and microfiche. There are many storage or memory devices in the computer.

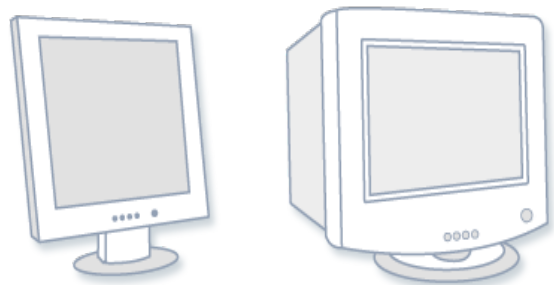
Let's look at the basic computer memory. **Random Access Memory (RAM)** and **Read Only Memory (ROM)**. They are volatile and non-volatile respectively. **Volatile:** This type of memory loses all its data when the PC is turned off. RAM is volatile memory while **Non-volatile** is the type of memory that keeps the data it contains even when the PC is switched off. ROM is a non-volatile memory. **ROM** is a special type of memory which data has been prerecorded. It cannot be changed or overwritten by you, and stays the same even when the PC is switched off. An example of ROM on a PC is the BIOS (Basic Input Output System) software that enables the computer to start up and allows components to communicate with each other.

**RAM** is used in a PC to temporarily store data when you are using applications. RAM is also used to store programme instructions and feed information to the CPU to process. RAM is not permanent, when you switch off the PC (or shut down); the contents of RAM are lost or emptied.

When no electricity flows, the circuit is off. An “on” circuit is represented by the number one (1) and an off circuit is represented by the number zero (0). The two numbers 1 and 0 are called bits. The word bit comes from “binary digit”. Each time a computer reads an instruction, it translates that instruction into a series of bits, 1’s and 0’s. On most computers, every character from the keyboard is translated into eight bits, a combination of eight 1’s and 0’s. Each group of eight bits is called a byte. Therefore, a byte is the amount of space in memory or on a disk needed to store one character. 8 bits = 1 Byte. The units used to measure data are called kilobytes, megabytes and gigabytes. A kilobyte (KB) is 1024 bytes. The size of files stored on your computer is often measured in kilobytes.

A megabyte (MB) is 1,048,576 bytes (1024 kilobytes). MB’s are often used to measure the storage capacity of a disk or the amount of main memory in a computer system. A gigabyte (GB) is 1,024 megabyte’s. Devices such as hard drives are often measured in gigabytes.

**E. Basic Output Devices:** Output devices are hardware we use to get information out of the computer. The output devices are the means by which the computer sends out the symbolic results. They transfer the result of



*Figure 1.2.3 Basic output device*

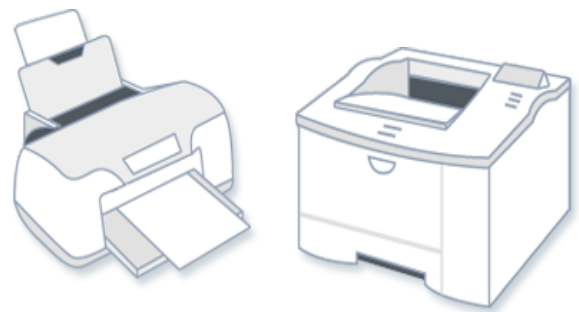
computer operation from the computer to the outside world through the visual display unit. Examples of output devices are printers, monitors, graph plotters, speakers, tape unit, diskette and fixed disk, voice response and microfilm.

**F. Cathode Ray Tube (CRT) Monitor:** The monitor shows the output from your programmes and echoes the actions you take with the keyboard and mouse. Monitor falls into two major categories, depending on whether they are based on an (liquid crystal display (LCD) or CRT. LCD displays are also called flat-panel displays because they are relatively thin. LCD monitor emits little heat and provide a stable, flicker-free display, but are more expensive than CRT-based displays.

### **G. The Printer**

The Printers are one of the most used output devices that you have on computers. They are commonly used to print text, images, and/or photos. A printer is an output device that produces text and graphics on paper. There are many types of computers which are classified base on various criteria. Printers can be broadly categorised into the following two types: Impact and Non-impact printers.

**Impact printers:** Impact printers produce text and images for you when tiny wire pins on print head strike the ink ribbon by physically contacting the paper. They are the older type of printer that uses a ribbon and a print head, like a typewriter. They are very loud and extremely slow. However, they are very more affordable.



*Figure 1.2.4 Printers*

**Dot matrix printer** is an example of impact printer that we can say uses small electromagnetically activated pins in the print head, and an inked ribbon, to produce images by impact. These printers are slow and noisy, high energy consumption, but really affordable to maintain but are not commonly used for personal computers anymore.

**Non-impact printers:** The printers that print the characters without striking against the ribbon and onto the paper are called non-impact printers. Non-impact printer produces text and graphics on paper, without actually striking the paper. Examples are Inkjet and LaserJet printers.

**Inkjet printers:** These are smaller, more affordable printers that use a little cartridge to spray a jet of ink onto the paper. They are fairly quiet and of good quality, but are not as fast or produce such high quality output as a laser printer. These printers are sometimes known as **line printers** because they print each page one line at a time.

**LaserJet printers:** These are large, expensive printers that work like a photocopier. They usually have very high quality printouts and can print very fast.

**Laser printers:** Laser printers are non-impact printers which can print text and images in high speed and high quality resolution, ranging from 600 to 1200 dpi. Unlike inkjet printers, laser printer use toner (black or colored powder) instead of liquid inks.

## H. Some important peripheral devices

**Plotter:** Plotter is an important output device used to print high quality graphics and drawings. Although the graphics can be printed on printers, the resolution of such printing is limited on printers. Plotters are generally used for printing/drawing graphical images such as charts, drawings, maps of engineering and scientific application.

**Touch screen:** Touch screen enables the user to select an option by pressing a specific part of the screen. It has a thin, transparent layer of plastic covering that is touch-sensitive. When you touch a part of the screen, it has the same effect as if you clicked on that area with a mouse.



*Figure 1.2.5*  
*Touch screen*

**Microphone:** A microphone can be attached to a computer to record sound (usually through a sound card input or circuitry built into the mother board). The sound is digitized-tuned into numbers that represent the original analog sound waves and stored in the computer for later processing and play back.



*Figure 1.2.6*  
*Microphone*

**ITQ 2:** Non-Impact printers are the older type of printer that uses a ribbon and a print head, like a typewriter.  
**ITA 2:** True or False: False - these are impact printers.

**Joysticks:** A joystick is a pointing device often used for playing games. The joystick has a gearshift-like lever that is used to move the pointer on the screen. On most joysticks, a button on the top is



*Fig: 1.2.7*  
*Joystick*

used to select options. In industry and manufacturing, joysticks are used to control robots. Flight simulators and other training simulators also use joysticks.

**Light pen:** A special pen that lets you draw directly onto the screen, or click on buttons and menus.



FASTPOINT LIGHT PENS

*Fig:1.2.8  
Light pen*

**ITQ 3:** Where do you find peripheral devices on the computer?

**ITA 3:** Peripheral Devices are attached to provide extra functionality  
Examples include Printers, webcam and scanner.



*Fig 1.2.9: Scanner*

**Scanner:** Scanner is a device used to scan images/documents into a computer. It is a hardware input device that allows a user to take an image and/or text and convert it into a digital file, allowing the computer to read and/or display the scanned object.

**Hard disk:** You will see that this is usually fixed inside the computer and stores large volume of data, which can be accessed and retrieved quickly. The seek time of a hard disk is much lower and the transfer rate much higher than any other type of disk drive.



*Fig 1.2.10:  
Hard disk*

**Floppy disk drive:** A floppy disk drive is like a hard disk, but with removable disks called floppies, floppy disks or diskettes. Floppy disk drive provides long-term transportable storage for programmes and uses data in a compact format, typically storing 1.44 MB of data on a 3



*Fig 1.2.11:  
Floppy disk  
drive*

½” disk. Floppies can be used to transfer small files from one PC to another (up to 1.4MB). Older floppies really were floppy, as they came in soft plastic or card cases.

**CD-ROM/DVD-ROM Drive:** This refers to CD and DVD disc. CD, a compact disc is a flat round storage medium that is read by a laser in a CD-ROM drive.



*Fig 1.2.12: CD ROM*

**Digital Versatile Disc or Digital Video Disc DVD or DVD-ROM** is a type of disc drive that allows for large amounts of data on one disc, the same size of a standard Compact Disc. CD-ROM drives are CD-Players inside computers that has the capability of playing audio CDs and computer data CDs. DVD-

RW Drive is a technology that enables a user to read and write to a DVD+RW or DVD+R disc several times. CD-ROM (Compact Disk – Read Only Memory) drives read data from CD’s that can hold up to 800MB’s of data (standard sizes are 650MB’s and 700MB’s). DVD-ROM (Digital Versatile Disk) drives can store up to 17 gigabytes of data and are designed for video and multimedia applications. Modern PC’s are often fitted with DVD-ROM drives as these drives can also read standard CD’s.

**USB flash drive:** Universal Serial Bus (USB) flash drive (sometimes just called a “flash drive”) looks like a plastic



*Fig 1.2.13: Flash drives*

tube that can be put into a slot in the front of the modern computer. Older computers will require you to insert it in a slot in the back or you may not be able to use the drive at all depending on the age of the computer. These disks hold information and can be used to exchange information between computers.

**Speakers:** Speaker is an electronic or electromagnetic output device connected to the computer to convert electrical energy into sound energy, providing the audible sound to the outer world.



*Fig 1.2.14:  
Speakers*

**Projector:** Projector is another output piece of equipment connected to the computer for projecting text, data or film image from film onto a screen and for playing back recorded sound from tracks on the film.



*Fig 1.2.15: Projector*

**Modem:** Modem is a telecommunication device that converts the digital signals into analog, carry it along the line and at the receiving end again changes it back in to digital signal). It converts the digital signals that your computer uses into analog signals that can be transmitted over the phone lines. It allows a computer to connect to a telephone line (or broadband network) to access the Internet and send/receive emails. Most PCs have a modem built inside them (as an internal PCI card), but external modems are also available.

**Graphics tablet:** A graphics tablet consists of an electronic writing area and a special “pen” that works with it. It allows artists to create graphical images with motions and actions similar to using more traditional drawing tools. The pen of the graphics tablet is pressure sensitive.

**PC/Web Camera:** It is used as Internet camera for interactive picture exchange.





*Fig 1.2.16 Digital Cameras*

**Digital cameras:** This is what you see on a computer working like a normal camera, but it doesn't use film – instead, it lets you transfer the pictures directly into your PC. It allows you to take digital photographs. The images are stored on a memory chip or disk that can be transferred to your computer. Some cameras can also capture sound and video.

**Mobile phone (smart phone):** Smart phones have truly revolutionised mobile computing. Most basic computing functions can now be done on a smart phone, such as email, browsing the internet, and uploading photos and video photographing etc.



*Fig1.2.17: mobile phones (smart phones)*

**UPS (Uninterruptible Power Supply):** UPS is a hardware device that provides a backup power source in case of a power outage (blackout), brownout, or a surge in power. A UPS provides enough power for the computer or computers to shut down properly or to remain up during a temporary power outage.

**Electronic Card Reader:** Before we discuss electronic card reader, let us discuss electronic credit cards. Electronic credit card makes it possible to charge online payments to one's credit card account. The number of input devices is common in association with transactions. The most common are ATMs and POS terminals.

**Bar Code Reader:** Of all the scanning devices, you are probably most familiar with Bar Code Reader. Many retail and grocery stores use some form of bar code reader to determine the item being sold and to retrieve the item price from a

computer system. The code reader may be a handled unit or it may be embedded in a countertop.

## **2.2 Software Component of the Computer System**

Computer needs instructions to tell it what to do, how to do and when to do. These instructions are called programmes. Software is a general term used to refer to all computer instructions or any set of computer instructions. These includes machine codes/language (*the binary codes that the processor understands*), and the source codes (*human understandable instructions that must be converted to machine codes/language by compilers or interpreters before being executed*) of programmes. Software is usually written in High Level Languages that are easier and more efficient for human to use, than the machine codes/languages. Software may also be written in assembly language, essentially as **mnemonic** representation of a machine language using alphabets. The process of software development is called programming.

To perform a particular task, programmer prepares a sequence of instructions known as programme.

### **Classification of Software**

You can classify Software into two main categories. They are systems software and application software.

## **Systems Software:**

The system software serves the application, which in turn serves the user. System software includes device drivers, Operating Systems, firmware, and utilities. An operating system is a system software that provides an interface for a user to communicate with the computer, manages hardware devices (disk drives, a keyboard a monitor and other devices) manages and maintains disk file systems, and support application programmes. Some of the operating systems (OS) are: DOS, Unix, UnixWare, Windows 95, OS/2 Warp, Windows NT, LINUX etc.

## **Application software:**

An application is a computer programme, designed to help people perform an activity. Depending on the activity for which it was designed, an application can manipulate text, numbers, graphics, or a combination of these elements. Application software is any software used for specified applications such as: word processing, spreadsheet, database, presentation graphics, communication, tutorials, entertainment and games. Examples include accounting software, enterprise software, graphics software, media players, and office suites.

**ITQ 4:** *What are the two main classification of the software component of the computer?*

**ITA 4:** *System software and application software*

## **3.0 Tutor Marked Assignment**

1. Distinguish hardware from software with three examples.
2. Write short notes on the relationship between hardware, software and Human ware.

#### **4.0 Summary**

In this study session we were able to discuss the topic computer hardware and software and some examples of computer hardware are speaker, mouse, keyboard, etc

#### **5.0 Self-Assessment Question**

Explain the four (4) components of a computer

#### **6.0 Additional Activities (Videos, Animations & out of Class activities)**

a. Visit U-tube <https://www.youtube.com/watch?v=QmC0IEwFby4>. Watch the video & summarise in 1 paragraph

#### **7.0 References/Further Readings**

1. Adamu Bola et al (2003) Introduction to Computer Operations and Microsoft Word. Ike-lu Printers.

## **STUDY SESSION 3**

### **Data and Information**

#### **Section and Subsection Headings:**

Introduction

1.0 Learning Outcomes

2.0 Main Content

2.1- Definition of data and information

2.2 - Types of Data

3.0 Tutor Marked Assignment

4.0 Summary/Conclusion

5.0 Self-assessment questions and Answers

6.0 Additional Activities (Videos, Animations & out of Class activities)

7.0 References/Further Readings

#### **Introduction**

You are warmly welcome to this study session. In this study session we will be discussing the topic data and information. You will get to understand that data are raw facts while information is processed data.

#### **1.0 Learning Outcomes**

At the end of this session you should be able to do the following:

- i. Define what a data is
- ii. Define what an information is
- iii. Differentiate between data and information.

## 2.0 Main Content

### 2.1 Definition of Data and Information

You can say that the two above mentioned terms are used interchangeably, i.e. data and information. You might wonder what is data and information, and what are their differences, also, you may say how are these things used by the computer? Data are raw facts. These are quantities, characters, or symbols on which operations are performed by a computer. These could be numbers, letters, images or even sound. Data can be defined as a collection of facts and figures relating to an object (or entity) that can be processed to produce meaningful information (or to generate different reports).

On the other hand, information can be defined as data that has been processed or transformed into a meaningful and useful form for specific purpose(s). Data is not useful unless it is subjected to a process through which it is manipulated and organised, its contents analysed and evaluated. Only then data become information.

Let us consider an example in which marks of various subjects are collected for a particular group of students. Now, these marks independently (data) are of no use as such to the class teacher, but once s/he adds the marks of all the students and calculates their respective percentages, this become information and it serves her/him in finding out the answers for the queries like; Who took 1st position in ,the class? Or how many people have got distinctions in the class? What is the overall performance of the class?

**ITQ1:** What is data?

**ITAI:** Data are raw facts. These are quantities, characters, or symbols on which operations are performed by a computer.

## 2.2 Types of Data

Computer works with binary number system that consists of only two digits zero and one. Inside the computer, binary number is represented by an electrical pulse. One means a pulse of electricity and zero means no pulse. All the data entered into the computer are first converted into the binary number system.

Data can be divided into the following types:

(i) Numeric data (ii) Alphabetic data (iii) Alphanumeric data (iv) Image data (v) Audio data (vi) Video data.

**i) Numeric Data:** Numeric data consists of digits 0 to 9, +, and - signs and decimal point. For example: 420, 3.543, -7.2, 302 etc.

**ii) Alphabetic Data:** Alphabetic data consists of all the alphabets, i.e. 'A to Z' and 'a - z'. For example: Layca, Boher, Zaria, Kujama, Donga, Wukari, Asia etc.

**iii) Alphanumeric Data:** Alphanumeric data consists of alphabets, numeric digits (0 - 9) and special characters such as #, \$, etc. For example: 23-March 1940, 28-May 1998, F-16 etc.

**iv) Image Data:** This type of data may consist of charts, graphs, pictures and freehand drawings. For example, rise and fall of temperature during a day can be represented by a chart. Image data is also represented by bit patterns. The data is sent as contiguous bits.

**v) Audio Data:** Sound data is a representation of audio, which may be any music, speech or any other sound stored electronically. It is continuous and not discrete. The audio data is in the form of continuous signal. It is converted into digital form before entering it into the computer. Audio data can be recorded in a computer in

spoken or voice form, using microphone connected to the computer. Such type of data can be processed and later listened to on speaker(s) connected to the computer.

**vi) Video Data:** Video data consists of full-motion images that create actions and movements. It can be produced by a video camera.

***ITQ 1: What are the types of data involved when you watch a cartoon film?***  
***ITA 1: Image and Audio data***

### 3.0 Tutor Marked Assignment

What is the difference between data, information and knowledge?

### 4.0 Summary

In this study session we were able to discuss the topic data and information and we were able to understand that data are raw facts while information are processed facts that gives meaning to the reader or users.

### 5.0 Self-Assessment Question

Outline the 6 types of data

### 6.0 Additional Activities (Videos, Animations & Out of Class activities) e.g.

a. Visit U-tube <https://www.youtube.com/watch?v=DVNH4OYWq2s>. Watch the video & summarise in 1 paragraph

### 7.0 References/Further Readings

Adamu Bola et al (2003) Introduction to Computer Operations and Microsoft Word. Ike-lu Printers,



## **STUDY SESSION 4**

### **Computer Application Areas**

#### **Section and Subsection Headings:**

Introduction

1.0 Learning Outcomes

2.0 Main Content

2.1- Science and Technology:

2.2 – Education

2.3 – Banking and Finance

2.4 – Computer in Communication

2.5 – Computer in Medicine

2.6 – Computer in Recreation

2.7 - Computers in security

2.8 – Computer in Government

2.9 - Computer in traffic control:

2.10 - Computer in industry:

2.11 - Computer in sports

2.12 - Computer in advertising

2.13 - Computer at home:

2.14 - Computers in entertainment:

3.0 Tutor Marked Assignment

4.0 Conclusion/Summary

5.0 Self-assessment questions

6.0 Additional Activities (Videos, Animations & out of Class activities)

7.0 References/Further Readings

## Introduction

You are welcome to this study session. Due to technological development, computers are now used in virtually all spheres of life. Here are a few of the application areas of computers.

### 1.0 Learning Outcomes

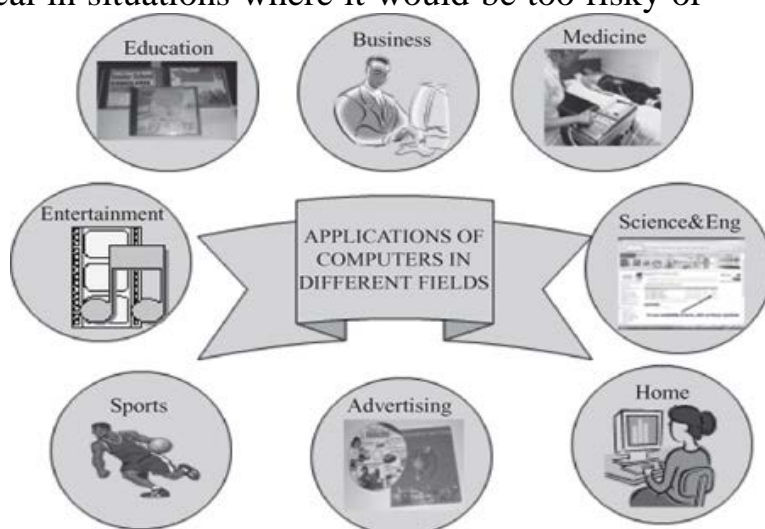
At the end of this study session you will be able to do the following:

- i. explain where computer can be applied
- ii. describe the importance of computer in the banking sector.

### 2.0 Main Content

#### 2.1 Science and Technology:

Computers are used in science and technology to promote advances that could be useful to mankind, i.e. discovering better and more efficient ways of doing things. They are especially useful for humanly intractable calculations and simulation experiments. This is especially critical in situations where it would be too risky or expensive to directly carry out the required operation. For example; it is in space exploration, underwater exploration, testing of new drugs, etc. Computers enable science and technology professionals to carry out their practical procedures using



faster, more accurate and safer methods. Computers are also used

*Fig 1.4.1: Application of computer in different fields*

extensively to aid medical research, not only in monitoring the progress of various scientific experiments but also in processing a large number of statistics

## **2.2 Education:**

Computers are useful for learning about computers and learning about other subjects, i.e. using **computer assisted learning software**. For children, the advent of multimedia has made learning fun. In this regard, they serve as tools for drill and practice, and tutorials. They are also used in school administration and career guidance. The computer can help the head teacher/principal in routine school correspondence circulars to parent-teacher association meetings etc, the list of students, student result etc can also be kept using the computer. The computer can be used for online registration and admission procedures, as well as, the assessment of students' examination scripts and the checking of students' results of a higher institution.

Schools can also exchange information and ideas with another school if they are connected by Internet. Researchers use computers to have easy access to conference and journal details and to get global access to the research material.

## **2.3 Banking and finance:**

Computers are very useful for handling financial transactions, most especially the storage and processing of huge amounts of information kept by financial institutions. In banks now, computers are used to check the balance of the customer before payment, used in transferring of fund from one branch to another. Since the computerisation of bank operations, banking work is now easy both for the customers and bankers. You will see ATM machine allows the account holder of

any bank to operate his/her account from any ATM machine and it eases the congestion in the banks. Computers enhance customer service, through the provision of up to date and timely information for their customers.

**2.4 Computers in Communication:** The computer can be used for communication among business associates, colleagues, family and friends living across different parts of the globe e.g. e-mail communication and social networking interactions. The computer can be used for sharing of information, by different computers across the globe equipped with telecommunication facilities.

**2.5 Computer in medicine:** Medicine, medical researchers and practitioners use computers to access information about the advances in medical research or to seek opinion of doctors globally. The medical history of patients is stored in the computer. Computers are also an integral part of various kinds of sophisticated medical equipment like ultrasound machine, CAT scan machine, MRI scan machine, etc. Computers also provide assistance to the medical surgeons during critical surgery operations like laparoscopic operations, etc.

**2.6 Computers in recreation:** On your average PC, you can play a variety of games. With the games, you could be the sole player, play against the computer or you and a friend could play against each other.

**ITQ 1:** Itemise five fields computers can be used?

**2.7 Computers in security:**

Computers are useful for storing information about crimes, criminals and suspects. This can be very useful in crime detection and prevention. Such systems can be

interfaced with photograph capturing and fingerprint systems (biometric authentication). They can also be linked to mobile radio communication systems over a wide area, to enable in the fast and efficient sharing of information on criminal activities. Such systems would possess enquiry facility for historical and analytic purposes.

**2.8 Computer in government:** You should be aware that Government Ministries and Department and Agencies (MDAs) make use of the power of computing to keep track of the records such as population, tax records, and the voting register for example. The computer can be used for carrying out the various policies of government like; conducting national census or planning for the development of both urban, sub-urban and rural areas of a country.

The government uses computer to manage its own operations and also for e-governance. The websites of the different government departments provide information to the users. Computers are used for the filing of income tax return, paying taxes, online submission of water and electricity bills, for the access of land record details, etc. The police department use computers to search for criminals using fingerprint matching, etc.

**2.9 Computer in traffic control:** The computer can also be used for traffic control and general traffic administration. Computer systems are used to control traffic lights that receive messages from sensors pointing to the road whenever you drive. When sensors do not detect traffic, they signal the control computer to indicate that the way is clear and that it can change to red to allow traffic from other directions to pass. Often, such systems are also controlled by timing and use the sensors to

adjust the timing of the lights according to the amount of traffic (in order to keep the flow of traffic smooth).

### **2.10 Computer in industry:**

Industries use robotics to carry out tasks that would be difficult or dangerous for a human to undertake. This type of jobs are such that you know are impossible to be completed by you or anybody. Most robots have programmed arms to manipulate items (such as when manufacturing a car etc). These devices are controlled by computer systems and instructions.

**2.11 Computer in sports:** A computer can be used to watch a game, view the scores, improve the game, play games (like chess, etc.) and create games. They are also used for the purposes of training players.

**2.12 Computer in advertising:** Computer is a powerful medium of advertising. Advertisement can be displayed on different websites, electronic-mails can be sent and reviews of a product by different customers can be posted. Computers are also used to create an advertisement using the visual and the sound effects. For the advertisers, computer is a medium via which the advertisements can be viewed globally. Web advertising has become a significant factor in the marketing plans of almost all companies.

**2.13 Computer at home:** Computers have now become an integral part of home equipment. At home, people use computers to play games, to maintain the home accounts, for communicating with friends and relatives via Internet, for paying bills, for education and learning, etc. Microprocessors are embedded in house hold

utilities like, washing machines, TVs, food processors, home theatres, security devices, etc.

**2.14 Computers in entertainment:** Computers have had a major impact on the entertainment industry. Whenever you use them, you make a choice to download and view movies, play games, chat, book tickets for cinema halls, use multimedia for making movies, incorporate visual and sound effects using computers, etc. The user can also listen to music, download and share music, create music using computers, etc.

The uses of computer listed above are by no means exhaustive - since the computer is general purpose digital device and there are limitless uses that the computer's efficiency can be effectively employed.

### **3.0 Tutor Marked Assignment**

1. Discuss the importance of computer in the banking sector.

### **4.0 Summary**

In this study session we discussed the application of computer in different fields

### **5.0 Self-Assessment Questions**

#### **Self-Assessment Questions**

- i. Explain what is a computing device and list three characteristics of computing devices.
- ii. Briefly explain the relationship between the basic components of a computer.
- iii. Data and information are used interchangeably; is there any difference between them?

- iv. As a student of Local Government and Developmental Studies (LGDS) Department, how do you think you can apply the knowledge of computers to your field of study?

#### **6.0 Additional Activities (Videos, Animations & out of Class activities)**

- a. Visit U-tube <https://www.youtube.com/watch?v=yK-Q1j3Itt4>. Watch the video & summarise in 1 paragraph.

#### **7.0 References/Further Readings**

1. Adamu Bola et al (2003) Introduction to Computer Operations and Microsoft Word. Ike-lu Printers,



## **MODULE 2**

### **History of Computers**

#### **Content:**

Study Session 1: Brief History of Computers

### **STUDY SESSION 1**

#### **Brief History of Computers**

#### **Section and Subsection Headings:**

Introduction

1.0 Learning Outcomes

2.0 Main Content

2.1 - First Generation (1945-1956) Vacuum Tubes,

2.2- Second Generation Computers (1956-1963) Transistors,

2.3- Third Generation of Computer (1964-1975) Integrated Circuit,

2.4- Fourth Generation (1975 -1989) Microprocessors and,

2.5- Fifth Generation Computers (1989 – Present) Artificial Intelligence.

3.0 Tutor Marked Assignments (Individual or Group)

4.0 Summary/Conclusion

5.0 Self-assessment questions and Answers

6.0 Additional Activities (Videos, Animations & out of Class activities)

7.0 References/Further Readings

## Introduction

You are welcome to this study session. in this study session we are going to discuss the topic the history of computers from the first generation to the fifth generation.

### 1.0 Learning Outcomes

At the end of this study session, you should be able to:

- i. Understand the history of computers
- ii. Identify the distinctive devices used in each generation of computers.

### 2.0 Main Content

#### 2.1 First Generation (1945-1956) Vacuum Tubes:

**With the onset of the Second World War, governments sought to develop computers to exploit their potential strategic importance. By 1941 German engineer Konrad Zeus had developed a computer, the Z3, to design airplanes and missiles. In 1943, the British completed a secret code-breaking computer called Colossus to decode German messages.**



*Fig 2.1.1: First generation computer*

We can say that the Colossus's impact on the development of the computer industry was rather limited for two important reasons. First, Colossus was not a general-purpose computer; it was only designed to decode secret messages. Second, the existence of the machine was kept secret until decades after the war.

Another computer development spurred by the war was the Electronic Numerical Integrator and Computer (ENIAC), produced by a partnership between the US government and the University of Pennsylvania. Consisting of 18,000 vacuum tubes, 70,000 resistors and 5 million soldered joints, the computer was such a massive piece of machinery that it consumed 160 kilowatts of electrical power, enough energy to dim the lights in an entire section of Philadelphia. Developed by John Presper Eckert (1919-1995) and John W. Mauchly (1907-1980), ENIAC, unlike the Colossus and Mark I, was a general-purpose computer that computed at speeds 1,000 times faster than Mark I.

You should be aware that in the mid-1940's John Von Neumann (1903-1957) joined the University of Pennsylvania team, initiating concepts in computer design that remained central to computer engineering for the next 40 years. Von Neumann designed the Electronic Discrete Variable Automatic Computer (EDVAC) in 1945 with a memory to hold both a stored programme as well as data. This "stored memory" technique as well as the "conditional control transfer," that allowed the computer to be stopped at any point and then resumed, allowed for greater versatility in computer programming.

The key element to the Von Neumann architecture was the central processing unit, which allowed all computer functions to be coordinated through a single source. In 1951, the UNIVAC I (Universal Automatic Computer), built by Remington Rand,

became one of the first commercially available computers to take advantage of these advances. Both the US Census Bureau and General Electric owned UNIVACs. Computer belonging to this generation had the following characteristics:

- i. Each computer had a different binary-coded programme, called a machine language that told it how to operate.
- ii. Operating instructions were made-to-order for the specific task for which the computer was to be used. This made the computer difficult to programme and limited its versatility and speed.
- iii. Large in size as compare to present day computers.
- iv. Uses vacuum tubes (responsible for their breathtaking size).
- v. Generated lot of heat, they were not consistent and reliable as the valves tended to fall frequently.
- vi. Low capacity internal storage (using magnetic drums).
- vii. Processors operated in the milliseconds speed range.
- viii. Internal storage consisted of magnetic drum and delay lines.

## **2.2 Second Generation Computers (1956-1963)**

### **Transistors:**

By 1948, we have arrived the second generation computer Transistors. The invention of the transistor greatly changed computer development. The transistor replaced the large, cumbersome vacuum tube in televisions, radios and computers. As a result, the size of electronic machinery has been shrinking ever since. Transistorized circuits were



*Fig 2.1.2: second generation computers*

smaller, faster, generated little heat, less expensive and consumed less power (energy-efficient) than vacuum tube circuits and were much greater in processing capacity.

In this type of component, you will notice the use of magnetic cores as the primary internal storage medium and the introduction of removable magnetic disc pack, were other major developments of the second generation. These computers had built in error detecting devices and more efficient means were developed to input and retrieve data/information from the computer. The transistor was at work in the computer by 1956. They also contained all the components we associate with the modern day computer: printers, tape storage, disk storage, memory, operating systems, and stored programmes.

Second generation computers replaced machine language with assembly language, allowing abbreviated programming codes to replace long, difficult binary codes. It was the stored programme and programming language that gave computers the flexibility to finally be cost effective and productive for business use. The stored programme concept meant that instructions to run a computer for a specific function (known as a programme) were held inside the computer's memory, and could quickly be replaced by a different set of instructions for a different function.

A computer could print customer invoices and minutes later design products or calculate paychecks. More sophisticated high-level languages such as COBOL (Common Business-Oriented Language) and FORTRAN (Formula Translator)



*Fig 2.1.3: third generation of computer*

came into common use during this time, and have expanded to the current day. These languages replaced cryptic binary machine code with words, sentences, and mathematical formulas, making it much easier to programme a computer. New types of careers (programmer, analyst, and computer systems expert) and the entire software industry began with second generation computers.

**2.3 Third Generation of Computer (1964-1975) Integrated Circuit:** Though transistors, as we knew them, were clearly an improvement over the vacuum tube, they still generated a great deal of heat, which damaged the computer's sensitive internal parts.

A revolution in the computer development took place with the development of Integrated Circuits (IC) on a single silicon chip. In 1958, Jack St Clair Kebly and Robert Noyce invented the first IC. IC incorporated number of transistors and electronic circuits on a single wafer or chip of silicon. IC is called chip because of the way they are made.

We can also call them semiconductors as combining layers of materials that have varying capacity to conduct electricity from them are developed. This ushered in the third generation of computer systems in 1964. The integrated circuits enhanced considerably the processing capability of placing 12 or more logic gates on a single chip was developed into a well-defined technology and was redefined to a point where hundreds or more gates could be placed on a chip of silicon and incorporated as functional logic block in an overall system.

Computers of this generation have the following characteristics:

- i. Smaller in size as compared to second generation computers because more components were squeezed onto the chip.
- ii. Higher capacity of internal storage.
- iii. Remote communication facilities.
- iv. Multiprogramming facilities.
- v. The use of an operating system that allowed machines to run many different programmes at once with a central programme that monitored and coordinated the computer's memory.
- vi. Reduced cost of access storage.
- vii. Processors operate in nanosecond speed range.
- viii. Use of high level languages such as COBOL.
- ix. Wide range of optional peripherals.

**2.4 Fourth Generation (1975 -1989) Microprocessors:** After the integrated circuits, the only place to go was down - in size, which is; Large Scale Integration (LSI) could fit hundreds of components onto one chip. By the 1980's, Very Large Scale Integration (VLSI) squeezed hundreds of thousands of components onto a chip.

Ultra-Large Scale Integration (ULSI) increased that number into the millions. The development of microprocessor chip, which contains an entire CPU on a single silicon chip, led to the mushroom growth of inexpensive computers. The microprocessor can perform all the functions of arithmetic logic unit and control units of the CPU.

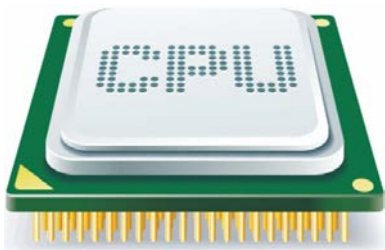


Fig 2.1.4: CPU

This generation increased the power, efficiency, reliability and increased input-output capability and longer components life of its computers. The Intel 4004 chip, developed in 1971, took the integrated circuit one step further by locating all the components of a computer (Central Processing Unit, memory, and input and output controls) on a minuscule chip. Whereas, previously, we have noticed that the Integrated Circuit had to be manufactured to fit a special purpose, now one microprocessor could be manufactured and then programmed to meet any number of demands. Soon everyday household items such as; microwave ovens, television sets and automobiles with electronic fuel injection incorporated microprocessors.

New powerful languages were developed to broaden the use of multiprogramming and multiprocessing. Following the previous development closely, we will agree that this is a major shift from batch processing to online and remote interactive processing. Some computers belonging to the fourth generation are DEC-10, STAR-1000, PDP-11 and APPLE Series Personal computers.

## **2.5 Fifth Generation Computers (1989 – Present) Artificial Intelligence:**

Using recent engineering advances, computers may be able to accept spoken word instructions and imitate human reasoning. They try to simulate the human way of thinking and reasoning. Artificial Intelligence includes areas like Expert System (ES), Natural Language Processing (NLP), speech recognition, voice recognition, robotics, etc.



The ability to translate a foreign language is also a major goal of fifth generation computers. This feat seemed a simple objective at first, but appeared much more difficult when programmers realised that human understanding relies as much on context and meaning as it does on the simple translation of words. For example, expert systems assist doctors in making diagnoses by applying the problem-solving steps a doctor might use in assessing a patient's needs.

Till we got to the fourth generation of computers, the major stress was on improving the hardware from valves to transistors and then to integrated circuits, which resulted in miniaturisation and fast speed of computers. Automatic programming, computational logic, pattern recognition and control of robots, the processes which need skill and intelligence are examples of Artificial Intelligence. Computers of this generation are characterised by reliable and efficient software development by new languages, newer computer architectures and systems software and are generally smaller, faster, greater in capacity, more flexible and more reliable.

### **3.0 Tutor Marked Assignment**

1. List the distinctive device used in first, second and third generation computers.
2. Discuss on the historical development of computers, from the first to fifth generation of computers.

### **4.0 Conclusion/Summary**

In this study session, we have been acquainted with the brief history was discussed from the early counting devices to the modern computers. The modern computer was discussed in the light of their generations, with each generation having some distinct device that aided computing, based on the technological intelligence

available at the time. Each succeeding generation had a more sophisticated device that aided computing that stretched through five generations till today. For each preceding generation, specific flaws were taken care of in the succeeding generations.

### **5.0 Self-Assessment Question**

List the distinctive device used in all the generations of computers as well as their advantages over their preceding generation.

### **6.0 References/Further Readings**

1. Adamu Bola et'al (2003)Introduction to Computer Operations and Microsoft Word. Ike-lu Printers.

## **MODULE 3**

### **Computer Classification**

#### **Content:**

Study Session 1: Classification of Computers

### **STUDY SESSION 1**

#### **Classification of Computers**

#### **Section and Subsection Headings:**

Introduction

1.0 Learning Outcomes

2.0 Main Content

2.1 - Classification of Computers by Signal

2.2 - Classification of Computers by Size

2.3 - Classification of Computers by Purpose

2.4 - Classification of computers by processors

3.0 Tutor Marked Assignment

4.0 Summary/ Conclusion

5.0 Self-assessment questions and Answers

6.0 Additional Activities (Videos, Animations & Out of Class activities)

7.0 References/Further Readings

## Introduction

You are warmly welcome to this study session. In this study session you will be introduced to the topic classification of computers. You will get to understand that computers are classified based on signal, by size, by purpose.

### 1.0 Learning Outcomes

At the end of this module you should be able to do the following:

1. Identify the basic classifications of computers
2. Itemise different computing devices that fall within a specific classification of computers

### 2.0 Main Content

#### 2.1 Classification of Computers by Signal

We can classify computers in this group as three types, based on the electronic signal they transmit. We can identify three different classes if we look upon how a computer works or what they are applied for. They are into 3 categories: (i) Analog (ii) Digital (iii) Hybrid.

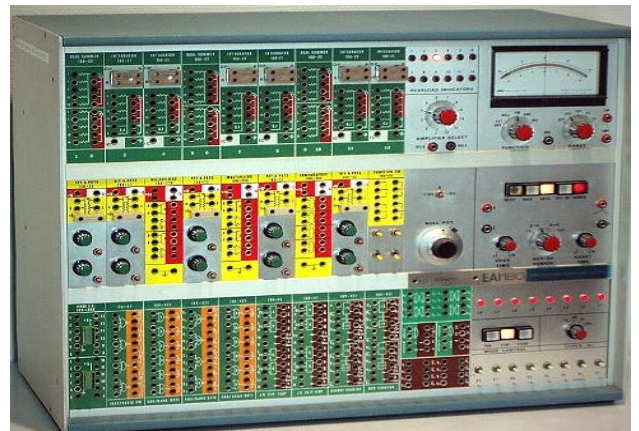
**ITQ 1:** List all types of computers that fall under the classification according to size.  
**ITA 1:** (i) Microcomputers (ii) Minicomputers (iii) Mainframe computers and (iv) Supercomputers.

- Analog computer:** An analog computer is a form of computer that uses the continuously changeable aspects of physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved. Analog computers represent variables by physical quantities. Thus, any computer which solve problem by translating physical conditions such as flow, temperature, pressure, angular position or voltage into related mechanical or electrical related circuits as an analog

for the physical phenomenon being investigated in general, is a computer which uses an analog quantity and produces analog values as output.

These computers are used in hospitals, air-crafts and so on. An example of the use of an electronic analog computer is that of controlling a flight simulator for training pilots. The computer responds to the cockpit simulator control movements made by the pilot and makes physical changes in the environment, so that the pilot feels as if he is controlling an actual airplane. Each one has to be constructed to do a specific job and will respond very quickly to changes in the measurement of inputs. A more recent and common mechanical analog computer is the slide rule, speedometer, fuel gauge, thermometer, etc.

**Digital computers:** These are the most common class of computers that we know because we are using them every day. Digital computers that perform calculations and logical operations with quantities represented as digits, usually in the binary number system. In digital computers, mathematical expressions are represented as binary digits (0 and 1) and all operations are done using these digits at a very high rate. It means that the computer operates on electrical inputs that have only two states, **ON** and **OFF**. These computers are widely used in commercial and control systems.



*Fig 3.1.1: Analog computers*

**iii) Hybrid computers:** We use Analog computers in purely working out measuring the physical quantities, whereas digital computers counted and manipulated the numbers to produce results. Hybrid computers are computers with combined features of both digital and analog types. This type of computer operates by counting as well as by measuring. In other words, the output can be either in the form of numbers or required units of measurement, e.g., an analog device measures patient's heart beat. These measures will be converted into digital form and a digital device checks for any abnormality. Modem is another hybrid computer which converts the digital signals into analog, carry it along the line and at the receiving end again changes it back in to digital signal).

## 2.2 Classification of Computers by Size

The digital computers we have in existence nowadays vary in their sizes. The computers are broadly classified into four categories based on their size (i) Microcomputers (ii) Minicomputers (iii) Mainframe computers and (iv) Supercomputers. They are briefly explained below:

**i) Supercomputers:** Supercomputers are the most powerful computers. They are used for problems requiring complex calculations. Supercomputers are used for highly calculation-intensive tasks, such as,

weather forecasting, climate research (global warming), molecular research,

biological research, nuclear research and aircraft design. They are also used in major universities, military agencies and scientific research laboratories.



*Fig 3.1.2: Supercomputers*

Due to their size and expense, supercomputers are relatively rare, thus we will hardly come across them. Supercomputers are the fastest and the most expensive machines. They have high processing speed compared to other computers.

Some of the faster supercomputers can perform trillions of calculations per second because they are built by interconnecting thousands of processors that can work in parallel. Some examples of supercomputers are IBM Roadrunner, IBM Blue gene and Intel ASCI red. PARAM is a series of supercomputer assembled in India by C-DAC (Centre for Development of Advanced Computing), in Pune. PARAM Padma, it is the latest machine in this series.

**ii) Mainframe Computers:** They are usually slower, less powerful and less expensive than supercomputers. A technique that allow many people at terminals, to access the same computer at one time is called time sharing. Mainframe computers can support hundreds or thousands of users, handling massive amounts of input, output, and storage. Mainframe computers are used in large organisations where many users need access to shared data and programmes. Mainframes are also used as e-Commerce servers, handling



*Fig 3.1.3: Mainframe computers*

transactions over the Internet. Mainframes are used by banks and many businesses to update inventory etc.

**iii) Minicomputers:** These are digital computers, generally used in multi-user systems. They have high processing speed and high storage capacity than the microcomputers. Minicomputers can support 4–200 users simultaneously. The users can access the minicomputer through their PCs or terminal. They are used for real-time applications in industries, research centres, etc. PDP 11, IBM (8000 series) are some of the widely used minicomputers.

Minicomputers: are smaller than mainframe, general purpose computers, and give computing power without adding the prohibitive expenses associated with larger systems. It is generally easier to use. Minicomputers usually have multiple terminals. Minicomputers may be used as network servers and Internet servers.

**Microcomputers:** Microcomputers are small, low-cost and single-user digital computer. They consist of CPU, input unit, output unit, storage unit and the software. Although microcomputers are stand-alone machines, they can be connected together to create

a network of computers that can serve more than one user.

IBM PC based on Pentium microprocessor and Apple Macintosh are some examples of microcomputers.

Microcomputers include



PC



Laptop



Netbook



Tablet



PDA



Smart Phone

*Fig 3.1.4: Mini computers*



desktop computers, notebook computers or laptop, tablet computer, handheld computer, smart phones and notebook.

### 2.3 Classification of Computers by Purpose

Computers of this category are general purpose and special purpose.

**i) General purpose:** General purpose computers are capable of carrying out some general data processing under programme control. Different programmes can be used to solve many problems. Most digital computers are general purpose computers and used in business and commercial data processing.

**ii) Special purpose computers:** This is when you see that a computer designed for machine control or process control would be different than a general purpose computer. The special purpose computers are designed to solve specific problems. The computer programme for solving a specific problem is built right into the computer. Most analog computers are special purpose computers. These special purpose computers are widely used in industrial robotics.

### 2.4 Classification of Computers By Processors

| Name  | Date | Transistor |
|-------|------|------------|
| 8080  | 1974 | 6,000      |
| 8088  | 1979 | 29,000     |
| 80286 | 1982 | 134,000    |
| 80386 | 1985 | 275,000    |

|                      |      |             |
|----------------------|------|-------------|
| 80486                | 1989 | 1,200,000   |
| Pentium              | 1993 | 3,100,000   |
| Pentium II           | 1997 | 7,500,000   |
| Pentium III          | 1999 | 9,500,000   |
| Pentium 4            | 2000 | 42,000,000  |
| Pentium 4 "Prescott" | 2004 | 125,000,000 |

The central processing unit is one of the two most important components of your microcomputer. It's the electronic brain of your computer. In addition to processing data, it controls the function of all the other component

*Table 3.1.1: Classification of computers by processors*

The most popular microprocessors in IBM compatible computers are made by Intel. The Intel 4004 microprocessor is regarded as the world's first 8 bit microprocessor. Computers operate at very high speeds. Current CPU's operate at speeds of 400 million cycles per second or more. What this means is that, every 2.5 nanoseconds, the computer can execute a complete processing loop. On modern computers, this usually means executing one or two instructions.

Today we have computers with two processing cores on one processor chip called dual cores and also others with four processing cores on one processing chip called quad cores. Other variants are the core i3, i5 and i7 that do not mean that they have three, five or seven processors but rather these numbers are a rating or grading of their processing power.

### **3.0 Tutor Marked Assignment**

1. Discuss where you can find and use analogue, digital and hybrid computers.
2. Evaluate the differences among categories of sizes used in this classification
3. List three computing devices you can classify as general purpose and special purpose.

4. List five computing device and match them to their appropriate category of classification.

#### **4.0 Summary**

In this study session, basic criteria for the classifications of computers were discussed. With a myriad of computing devices, there is a need to further classify them using some distinct criteria. Four criteria were used: Type of signals processed, size, purpose and types of processors used. Some computing devices will be seen to fall among two or more criteria, this is basically for identification. Presently, most Personal Computers (PC) are purchased based on processing capability as the amount of items the processor can handle at a specific time increases based on the speed of the processor.

#### **5.0 Self-Assessment Questions**

##### **Self-Assessment Questions**

1. What are the basic criteria used in the classification of computers?
2. Why are processors used as a criterion for the purchase of a computer?

#### **6.0 References/Further Readings**

1. Adamu Bola et al (2003) Introduction to Computer Operations and Microsoft Word. Ike-lu Printers.