Al-Hikmah University, Ilorin

COS 101

INTRODUCTION TO COMPUTER SCIENCES





DISTANCE LEARNING CENTRE
[HUI-DLC]

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COS 101:
INTRODUCTION TO COMPUTER SCIENCES 3UNIT (C)

DISTANCE LEARNING CENTRE
AL-HIKMAH UNIVERSITY, ILORIN

HUI-DLC

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Published by the Distance Learning Centre,
Al-Hikmah University, Ilorin, Nigeria


Email: hui-dlc@alhikmah.edu.ng


Website: https://dlc.alhikmah.edu.ng

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Vice-Chancellor's Remark

This publication is a manual of the courseware primarily designed by the Centre for Distance Learning (HUI-DLC) of Al-Hikmah University, Ilorin, Nigeria. In particular, this volume is a symbol of the University's commitment to e-learning and unrelenting efforts in making its instructional packages learner-friendly. The courseware is intended to give students of the University an unrestricted access to learning by breaking the barriers of physical distance. According to Marcus Specht, a Professor of Advanced Learning technology, "... students of the future will demand the learning support that is appropriate for their situation or context. Nothing more, nothing less". Those students have arrived here in Al-Hikmah University and the digital learning support is ready on their demand as this courseware is hosted on the HUI-DLC cloud space use at their convenience, even in the comfort of their homes and offices.

In appreciation of the strict limitation of space, this learning material equips the learners with learning support devices and guides that are well domesticated within the learning plan as dictated by the course design and set student's learning objectives (SLOs) of the course in particular and envisioned goals of the programme in general. The language is simple, lucid and accessible. The pictures and illustrative figures (including display of screens) in full colours are added assets that endear the text to readership of all categories. The complementary textual explanations have been done in a coherent manner such that the unintended ambiguities which may result from arbitrariness in the use of images and wordings are avoided.

The University's Management warmly appreciates this giant stride made by HUI-DLC team, while also expressing sturdy optimism that other arms of the University will follow suit in the noble direction of putting the University in the global fold of IT-compliant institutions of the 21st century.



Professor Lateef Folorunsho Oladimeji
Vice-Chancellor, AL Hikmah University, Ilorin

Foreword

To further attain the vision and mission of Al-Hikmah University in promoting academic and moral excellence, through appropriate learning for wisdom and morality. The Distance Learning Centre (HUI-DLC) has designed courseware to capture, not only the different ages and time, but also a wide range of Information that will reposition Nigeria, Africa and the world at large for the better.

The Centre operates under the leadership of the Vice Chancellor; Professor Lateef Folorunsho Oladimeji. It was established having realized the need to have capable hands to serve humanity as scholars and practitioners in all fields in line with international standards. The courseware have been carefully designed and structured to reflect new developments at the local and global levels, to enable the learners fit in anywhere in the world and be practitioners capable of shaping a better and safer world. The Distance Learning Centre (HUI-DLC) is made up of competent, reliable and selfless scholars of national and international repute.

The Centre wishes you a blessed and rewarding academic journey in your field of study. This courseware contains course content, course information, course requirement, learning support devices, learning objectives and learning sections for your reading pleasure and assimilation.



Dr. Abdulrauf U. Tosho
Director, HUI-DLC

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COURSE PLAN



Learning Guide

Learning Section 1

Introduction to **Computer** System

Unit 1: The Definition of **Computer** System

Unit 2: Classification of **Computer** Software System

Unit 3: Characteristics of a **Computer** System

Unit 4: Components of a **Computer** System

Learning Section 2

Computer Data and Information

Unit 1: **Data** and Information

Unit 2: **Data** Processing

Unit 3: Roles of **Data** Processing in the society

Learning Section 3

Parts of a **Computer** System

Unit 1: **Computer** Hardware

Unit 2: **Computer**

Learning Section 4

Computer Application

Unit 1: Application Areas of Computers

Unit 2: Internet Technology

Unit 3: Electronic Mail

Learning Section 5

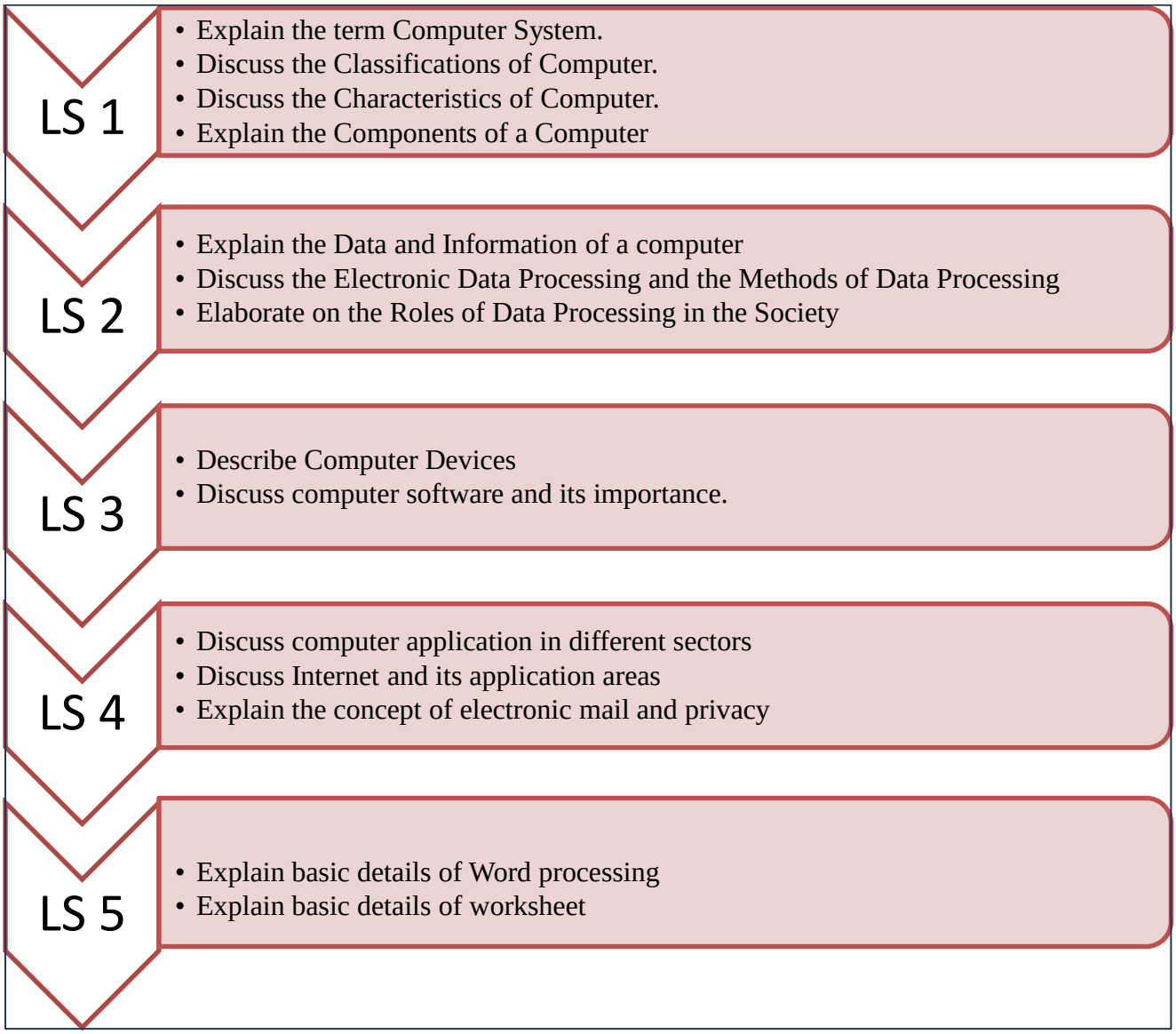
Office Productivity Tools

Unit 1: Word processing

Unit 2: Worksheet

Student Learning Objectives (SLOs)

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



Course Information

This course is expected to introduce you to the overview processes involve in Database design and the allied terminologies that will guide the concrete understanding of Data modeling. The Learning Sections will explore the various components of Database management for a well-grounded knowledge and expertise is this aspect of computing. It will introduce you to concepts such as entity relationship model, construction and notation of E-R model, requirement analysis of Database, Data integrity and redundancy among other related concepts of Database management system

Pre-requisites: NIL

Course Requirements: Attaining learning success

All learning relating to open distance learning approach is designed to cater for learners that are separated by space and time for the lecturer. Hence, learners are expected to gain access to learning content through electronic means which makes it imperative to download the instructional content for self-study at own pace with minimal interference from the course tutor.

This courseware is available on the Al-Hikmah University website at www.dlc.alahikmah.edu.ng and it is in printable format for instant access. It is important to note that this material is also packaged on removable storage devices to simplify and provide choice of accessibility and mobility of instruction.

Learners can as well visit the HUI-DLC Virtual Classroom at http://dlclms.alhikmah.edu.ng by logging in with their parameters, navigating the course of study and eventually clicking on the course code CMP404 for download or read online.

Learners are expected to stick to the schedules of interaction periods and durations with tutors and as well take all the form of assessment as lined in the course outline. It is pertinent to note the concept of ‘open’ in distance learning that learners have the free will of learning time and period and could at the same time determines the examination period of their choice.

The major requirement for open and distance learning is the possession of electronic gadgets/devices for ease of access to all the forms of learning material for this course.

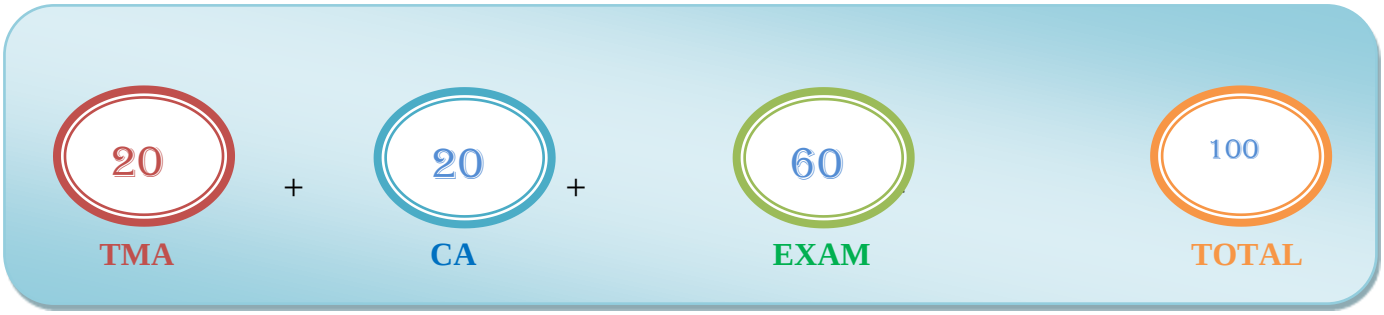
Learning Support Devices

In the attempt to interact with the learning content in the Al-Hikmah University HUI-DLC Learning Management System and the physical material, easy to identify icons have been put together to guide your learning through the courseware. Learners are required to familiarize themselves with each of these icons because it is going to provide fruitful assistance to achieving success in knowledge acquisition and achievement.

The icons are displayed along with their meaning as follows:

 **Introduction**	 **Learning Objectives**	 **Main Content**	 Summary
 Tutor Marked Assignment	 **Self-Assessment**	 **Open Education Resources**	 **Downloadable Material**
 Interaction Medium	 **References**	 **Further Readings**	 **Self-Advancement**
 In-Text Question	 **In-Text Answer**	 **Youtube**	 **Podcast**

Grading Trend and Assessment



Learning Section 1:

Introduction to **Computer System**

Units

Unit 1: The Computer System

Unit 2: Classification of Computer System

Unit 3: Characteristics of a Computer System

Unit 4: Components of a Computer System



Unit 1: The Computer System



Introduction

Our society and daily activities have undergone a tremendous change as a result of advancement in technology and this advancement makes life easy and simple especially with the use of computers. Today, we have seen how **Computer** forms an integral part of our lifestyles mostly in our homes, offices, schools, hotels and places of worship. In this study session, you will learn about **Computer System** and history of **Computer System** .

Student Learning Objectives

I

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

1. Define a **Computer System**
2. Discuss the application of **Computer** in education
3. Explain the following terms as it relates to a **Computer System** :
    i. Hardware
    ii. Software



Main Content

Introduction to Computer

The **Computer** involves the technologically advanced hardware combine together to work at great speed. To execute its various activities, the **Computer** consists of different parts, every single part serve a specific purpose in conjunction with other parts. Therefore, a **Computer** can be defined as an electronic device that can accept **Data** as input, process **Data** in order to generate the desired output using instructions (Program). A **Computer System** is basically made up of the Central Processing Unit (normally known as the computer), the monitor, the keyboard and the mouse.

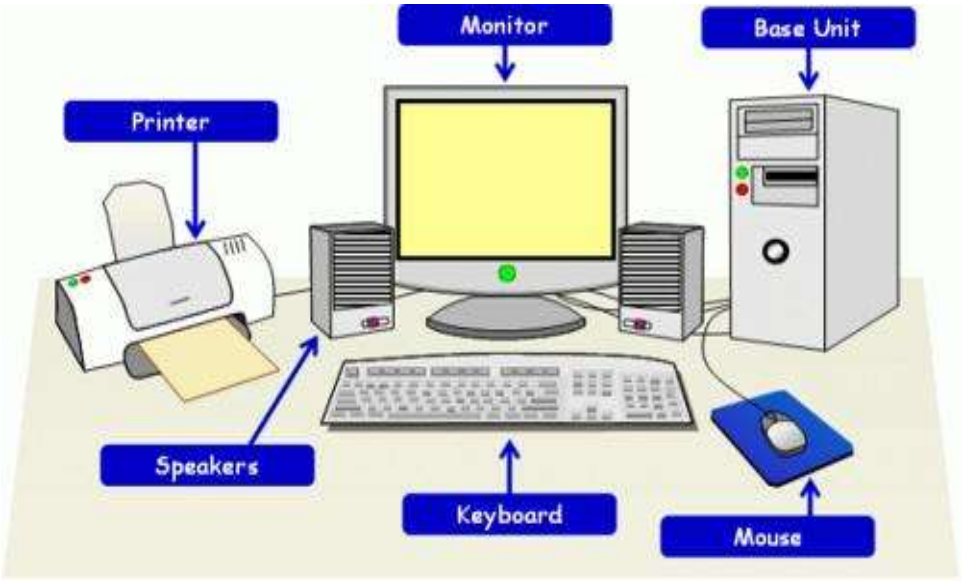


Figure 1: Diagram of a **Computer System**
Source: www.qsstudy.com

Furthermore a **Computer** is basically defined as a tool or machine used for processing **Data** to give required information. It is capable of:

i. taking input **Data** through the keyboard (input unit)
ii. storing the input **Data** in a diskette, hard disk or other medium
iii. processing it at the central processing unit (CPU) and
iv. Giving out the result (output) on the screen or the Visual Display Unit (VDU).

A **Computer System** is a combination of physical tangible things like keyboards, mouse, monitors, internal circuits and communication media known as hardware while the intangible things like stored programs known as software. The two are related and interconnect with each other. Furthermore A **Computer** is a device or set of devices that works under the control of a stored program that spontaneously accepts and processes **Data** to supply information.
In educational institutions such as Computers can perform a task through these media:

i. Automatic: it performs instructions with least human intervention
ii. Re-programmable: it stores instruction (the program)
iii. A **Data** processor: it performs operations on **Data** (numbers or words) made up of a group of digits to generate information.

One of the key functions of **Computer** is the execution of routine and administrative tasks such as the keeping of academic and administrative records on admissions, examinations, staffing and other routine functions.
In computer, **Data** is the name given to raw facts. **Information** is the significant **Data** that is relevant, accurate, and up to date and can be used to make decisions in a computer.

A **Computer** accepts and then processes input **Data** according to the instructions given. The element of any sort of processing is input, processing, storage, and output. This can be shown in the figure below:

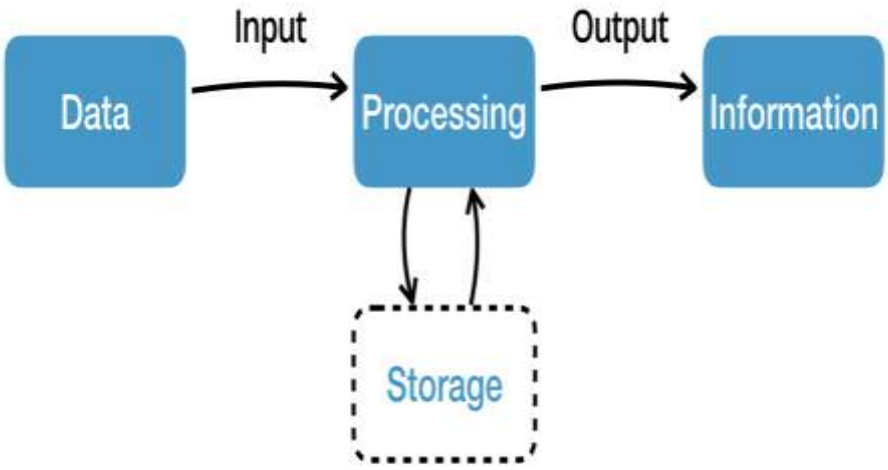


Figure 2: **Data** Processing Unit
Source: www.cseandeeehelp.blogspot.com

A **Computer** operation is executed base on the programmed logical and arithmetical rules.

The arithmetical element might be as easier as x + y = z.

The logic will be something along the lines of if x + y does not equal z then add 3 to x and try again.

A Program can be defined as a set of coded instructions, which informs the **Computer** of what to perform. For as much as the instructions are being carried out, they are normally held in the computer's internal storage or memory.

Application of Computers in Education

Computer has become a universal tool of any modern man (or woman). Literacy today is not defined only in terms of the ability to read and/or write but in addition, it includes the ability to use and communicate with the aid of computer. In the education sector, computers are being used to promote teaching and learning. The field of education provides the most fascinating application of computing system. This has consequently attracted considerable attention from educationist and policy makers since the late 1960s, when computers were introduced into the classroom. The entry of the **Computer** into the classroom has now offered opportunities and possibilities for students to develop their potentials with computer-aided instructions packages.

Box 1.0

What is a Computer?

A **Computer** can be defined as an electronic device that can accept **Data** as input, process **Data** in order to generate the desired output using instructions (Program).

History of Computers

The history of the **Computer** goes back several decades however; the word 'computer' is an ancient word that has transformed its meaning several times in the last few centuries. Originated from the Latin, by the mid-17th century it means to compute which indicates to calculate'. From the earliest times the need to carry out calculations has been developing. The initial step entails the development of counting and calculation aids such as the counting board and the abacus.

Blaise Pascal (1623-1662) was the son of a tax collector and a mathematical intellect. He developed the earlier mechanical calculator (Pascaline) based on gears. It executed addition and subtraction.



Figure 3: Blaise Pascal and his Mechanical Calculator
Source: www. interestingengineering.com

Gottfried Wilhelm Leibniz (1646-1716) was a German mathematician and developed the earlier calculator to do multiplication and division. It was not dependable as a result of accuracy of modern parts.



Figure 4: Gottfried Wilhelm Leibniz and his Calculator
Source: www.hnf.de

Charles Babbage (1792-1872) was a British originator who planned an 'analytical engine' integrating the designs of a memory and card input/output for **Data** and instructions. Again, the present-day technology did not allow the whole construction of the machine. Babbage is mainly recalled because of the work of Augusta Ada (Countess of Lovelace) who was perhaps the major **Computer** programmer.

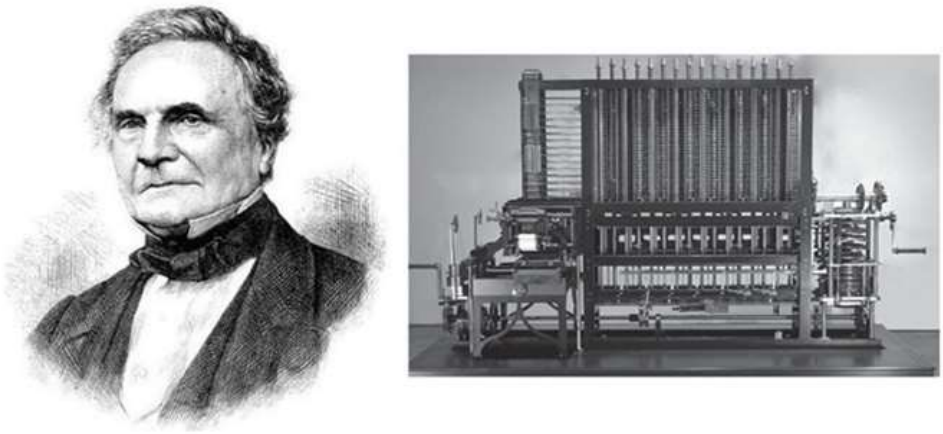


Figure 5: Charles Babbage and his Analytical Engine
Source: www.world-today-news.com

William Seward Burroughs (1855-1898) introduced the first commercially successful mechanical adding machine of which a million were sold by 1926.

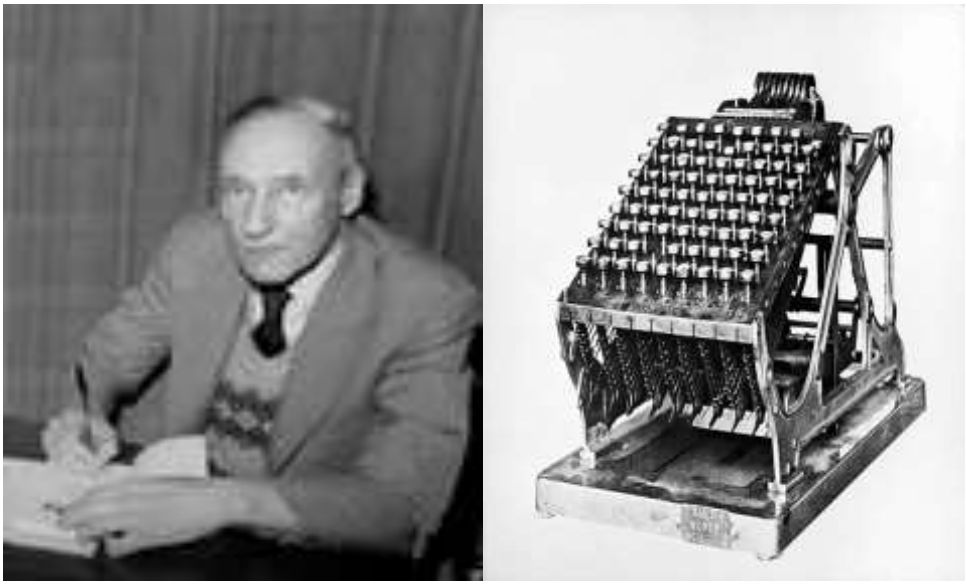


Figure 6: William Seward Burroughs and his Mechanical adding machine
Source: www.geni.com, www.gettyimages.com

Herman Hollerith (1860-1929) established an electromechanical punched-card tabulator to formulate the **Data** for 1890 U.S. Census. **Data** was entered on punched cards and could be sorted according to the census requirements. The machine was powered by electricity. He designed the Tabulating Machine Company which became International Business Machines (IBM). IBM is remains one of the leading **Computer** companies in the world.



Figure 7: Herman Hollerith and his tabulating machine
Source: www.columbia.edu

Howard Hathaway Aiken (1900-1973) was a Harvard professor. With the support of IBM, he assembled the Harvard Mark **Computer** (51ft long) in 1944. It was based on relays (operate in milliseconds) as different to the use of gears. It required 3 seconds for a multiplication.



Figure 8: Howard Hathaway Aiken and his computer
Source: www.quotesgram.com

Eckert and Mauchly designed and assembled the Electronic Numerical Integrator and **Computer** (ENIAC) in 1946 for military computations. It used vacuum tubes (valves) which were totally electronic (operated in microseconds) as different to the relay which was electromechanical. It weighed 30 tons, used 18000 valves, and needed 140 watts of power. It was 1000 times quicker than the Mark I multiplying in 3 milliseconds. ENIAC was a decimal machine and could not be programmed without modifying its setup by hand.

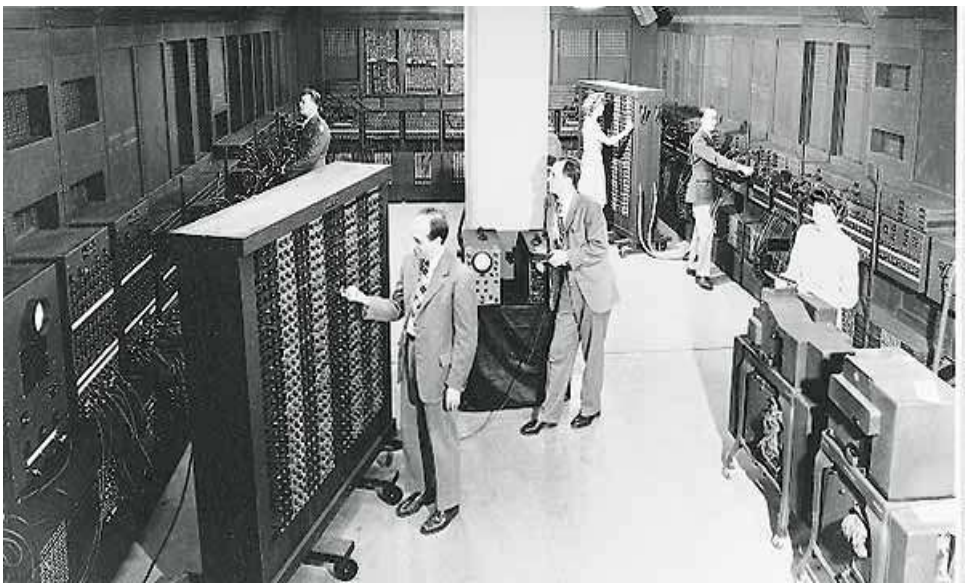


Figure 9: The Electronic Numerical Integrator and **Computer** (ENIAC)
Source: www.hnf.de

John Vincent Atanasoff (1903-1995) had made a specific **Computer** in 1941 and was visited by Mauchly before the construction of the ENIAC.

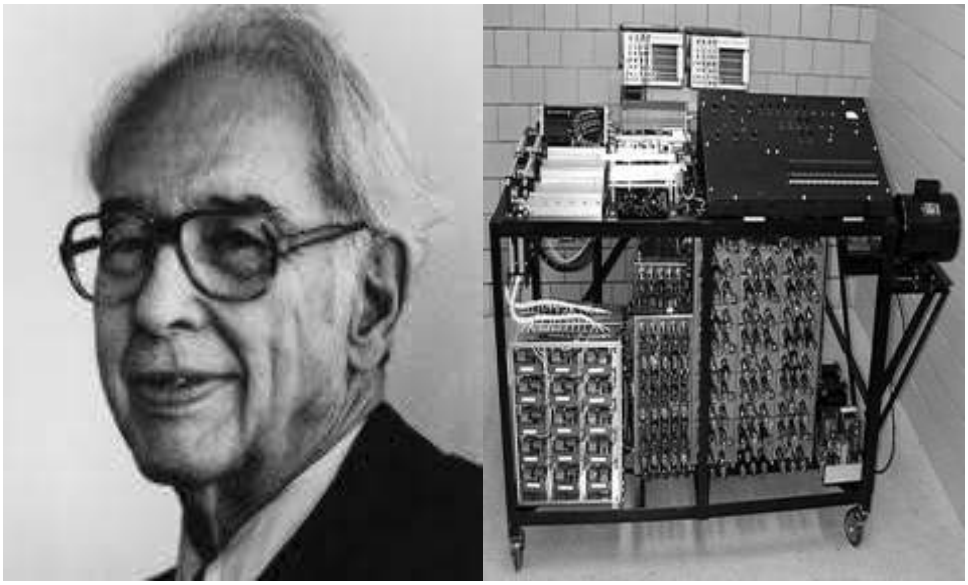


Figure 10: John Vincent Atanasoff and his computer
Source: www.history.computer.org, www.jameco.com

John Von Neumann (1903-1957) was a scientific genius and was a consultant on the ENIAC project. He formulated plans with Mauchly and Eckert for a new **Computer** (EDVAC) which was to store programs as well as **Data**. This is known the stored program concept and Von Neumann is credited with it. Virtually all current computers are based on this idea and are denoted to as Von Neumann machines. He also concluded that the binary system was more appropriate for computers since switches have only two values. He went on to plan his own **Computer** at Princeton which was a general purpose machine.

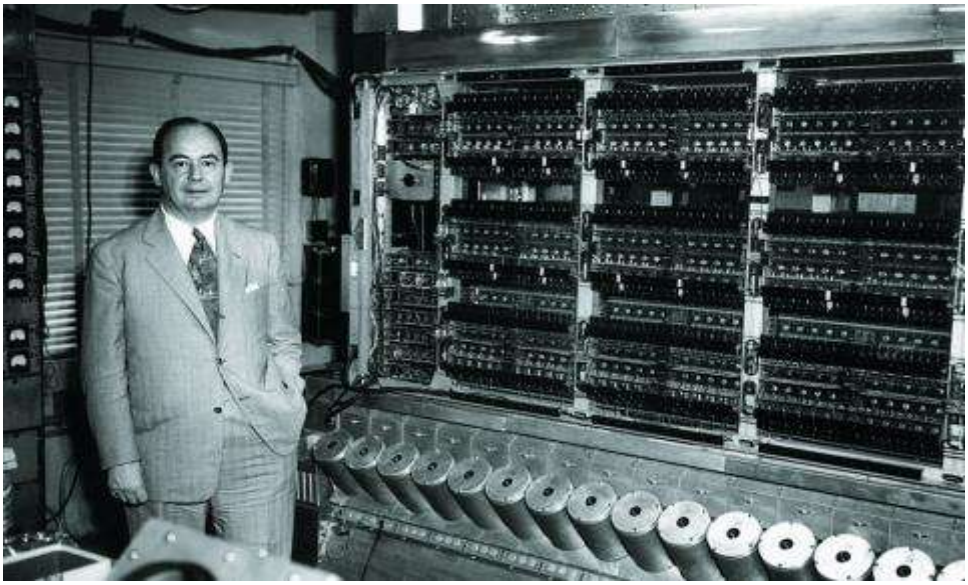


Figure 11: John Von Neumann and the EDVAC
Source: www.peeweepc.com

Box 1.1

What is the meaning of ENIAC?

ENIAC means Electronic Numerical Integrator and **Computer**

Summary

In this Unit, you have learnt that:

The **Computer** involves the technologically advanced hardware combine together to work at great speed. To execute its various activities, the **Computer** consists of different parts; every single part serves a specific purpose in conjunction with other parts. A **Computer** operation is executed base on the programmed logical and arithmetical rules. The word 'computer' is an ancient word that has transformed its meaning several times in the last few centuries. Originated from the Latin, by the mid-17th century it means to compute which indicates to calculate'. The initial development of **Computer** entails the development of counting and calculation aids such as the counting board and the abacus.

Self-Study Assessment

Now that you have completed this unit, you can assess how well you have achieved its Learning Outcomes by answering these questions.

I. Explain the term "**Computer System** ".
II. Who developed earlier mechanical calculator?
III. Who was the British originator that planned analytical engine?
IV. Hardware can be referred to as ……
V. …… is defined as a set of coded instruction, which direct **Computer** on tasks to perform.

Tutor Marked Assignment

i. Discuss in what ways are **Computer** being used to improve our quality of life?
ii. Write short notes on
    a) Keyboard
    b) Mouse
    c) Monitor
iii. List four key features of computer.
iv. State three purposes of a computer.
v. What is a **Computer System** capable of doing?



Further Readings

1. "Computer System Architecture" by MIT OpenCourseWare (online course, 2022)
2. "Computer System Design" by Harvard University (online course, 2022)
3. "Classification of Computer System s" by Tutorials Point (online tutorial, 2022)



References

1. **Computer System** Classification" by GeeksforGeeks (online tutorial, 2022)
2. "**Computer System** Types" by Microsoft Support (online tutorial, 2022)
3. "Classification of **Computer System** s" by **Computer** Hope (online article, 2022)
4. "**Computer System** Classification" by iFixit (online guide, 2022)



Unit 2: Classification of Computer System

Introduction

In this unit, you will be introduced to the Classification of **Computer System** and how they can be grouped into classes.

Student Learning Objectives

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

1. Identify the classes of computers
2. Describe the following in term of their classifications
    i. Digital Computer
    ii. Analog Computer
    iii. Hybrid Computer
    iv. Mini Computer
    v. Personal Computer

Main Content

Classifications of Computers

The computers can be grouped into four which are

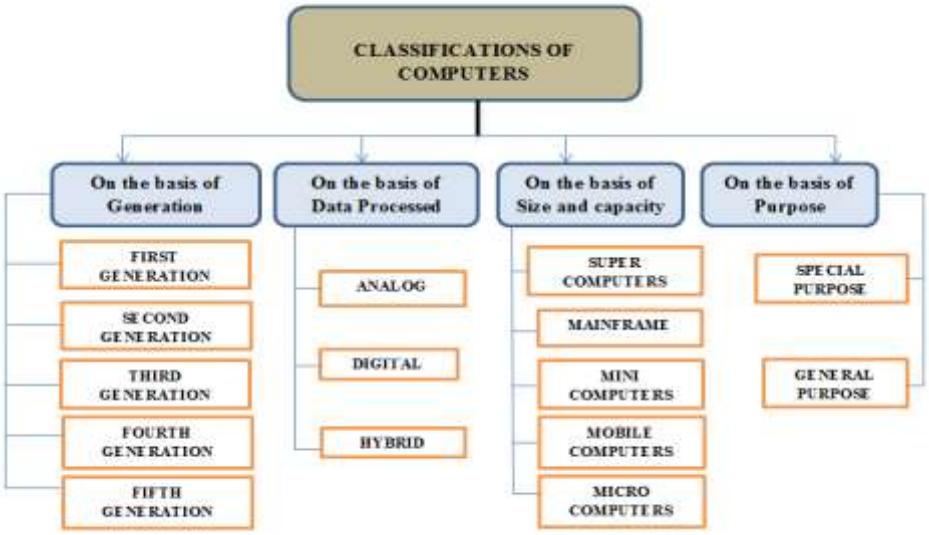


Figure 12: Classifications of computer
Source: www.steemit.com

Classification based on the Data Processing

There are mainly three types of electronic computers. These are:

i. Digital Computer
ii. Analog Computer
iii. Hybrid Computer

Digital Computer

Digital **Computer** Represent its variable in the form of digits. It counts 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 beset processed with digital computers. As a result of this, digital computers are mostly used in commercial and business places today.



Figure 13: Example of Digital Computer
Source: www.camillaathie.files.wordpress.com

Analog Computer

The aspect of analog **Computer** deals with quantities that are continuously varied, it measures rather than counts. This type of **Computer** sets up a model of a system. Common type signifies it variables in terms of electrical voltage and sets up circuit analog to the equation linking the variables. This can be done either by using a voltmeter to read the value of the variable needed, or by feeding the voltage into a plotting device. They hold **Data** in the method of physical variables rather than numerical quantities. In theory, analog computers provide a precise answer because the answer has not been approximated to the nearest digit. Whereas, when you try to acquire the answers using a digital voltmeter, you often find that the accuracy is less than that which could have been acquired from an analog computer. It is almost never used in business systems. The analog **Computer** is used by the scientist and engineer to resolve 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 namely;

i. It is easier to change the value of a constant or coefficient and study the effect of such changes.
ii. It is likely 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.



Figure 14: Example of Analog Computer

Source: www.blog.analogmachine.org

Hybrid Computer

A hybrid **Computer** is a type of **Computer** that is planned to provide the types and functions that are seen by both the digital and the analog computers. Features of Hybrid Computer

i. This **Computer** combines the features of both analog and digital computers.
ii. It handles **Data** in both quantities and variable.
iii. In some cases, the operator may wish to acquire the output from an analog **Computer** as processed by a digital **Computer** or vice versa. To accomplish this, the operator will set up a hybrid machine where the two are linked and the analog **Computer** could be known as a peripheral of the digital computer. In such a situation, a hybrid system tries to gain the advantage of both the digital and the analog elements in the same machine.
iv. This type of machine is normally a special-purpose device which is created for a particular task.
v. It requires conversion elements which permit analog inputs, and output digital value. Such converters are called digitizers. There is need for a converter from analog to digital also.
vi. It has the advantage of giving real-time response on a continuous basis.
vii. Complex calculations can be dealt with by the digital elements, thereby requiring a large memory, and giving accurate results after programming.
viii. It is mainly used in aerospace and process control applications.



Figure 14: Example of Hybrid Computer
Source: www.tipsmake.com

Box 2.0

What are the three types of electronic computers?

Answer
i. Digital Computer
ii. Analog Computer
iii. Hybrid Computer

Classification by Purpose

There are two major types of purpose of computers are as given below:

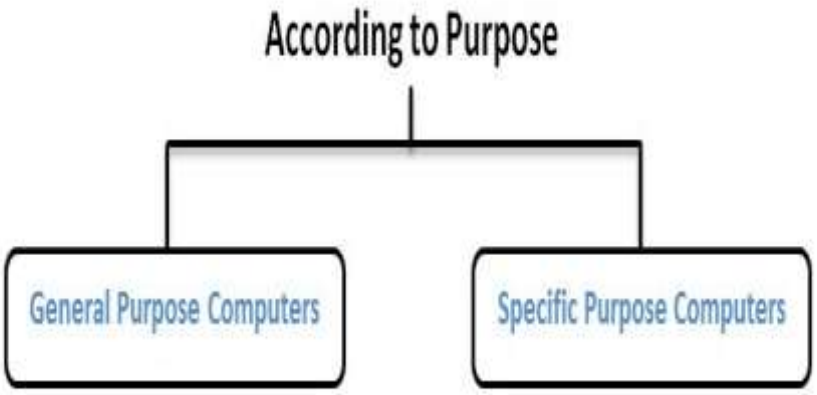


Figure 14: Example of Hybrid Computer
Source: www.tipsmake.com

Special Purpose Computers

A special purpose **Computer** is the one that is made to resolve a constrained class of problems. However, such computers may even be planned and make to handle only one job. In such machines, the stages that the **Computer** follows may be created into the hardware. These sets of computers are design for military purposes are grouped into this class. Other examples of special purpose computers include:

i. Computers created specially to resolve navigational problems.
ii. Computers designed for tracing airplane or missiles.
iii. Computers served as a method for processing the control applications in industries such as oil refinery, chemical manufacture, steel processing and power generation.
iv. Computers served as robots in factories like vehicles assembly plants and aluminum industries.

Attributes of Special Purpose Computers

Special purpose computers are normally very effective for the activities for which they are personally designed.

i. They are very much less difficult than the General-Purpose Computers.
ii. They are inexpensive than the General-Purpose type since they require less components and are less difficult.

General-Purpose Computers

General-Purpose computers are computers designed to handle an extensive range of problems. Ideally, a general-purpose **Computer** can be suitable by means of some easily changing instructions to handle problems that can be resolved by computation. In practice however, there are restrictions forced by memory size, speed and the type of input/output devices. The examples of seven areas where the general purpose computers are:

i. Banking
ii. Inventory Control
iii. Manufacturing Scheduling
iv. Payroll
v. Billing
vi. Sales Analysis
vii. Cost Accounting

Attributes of General-Purpose Computers

i. General-Purpose computers are more flexible than special purpose computers
ii. They can handle a wide spectrum of problems.
iii. They are less effective than the special-purpose computers as a result of problems which includes;
    - Inadequate storage.

- Low operating speed.
- Coordination of the numerous activities and subgroup may take time.
- General Purpose Computers are more difficult than the special purpose ones.

Box 2.1

What are the Computer classifications based on purpose?

Answer
i. General-Purpose Computers
ii. Special-Purpose Computers

Classification by Size/Capacity

The capacity of a **Computer** can easily be defined as the volume of work that **Computer** can handle. The volume of work that a given **Computer** handles is strictly tied to the cost and to the memory size of computer. The memory size and cost shall be used to rank (classify) computer

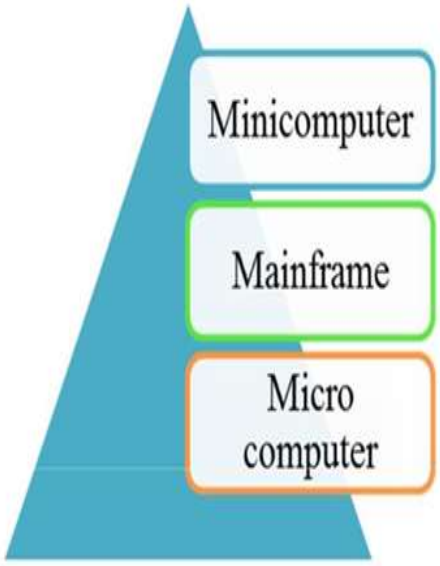


Figure 15: Classification of **Computer** by Capacity

*The Mainframe and Mini**Computer*** can be explained in the table below

Table 1.1: Explain the attributes of Mainframes and Minicomputer

S/N	Mainframes	Minicomputers
1.	It is a system that has central **Computer** connected by cable or telecommunications to thousands of terminals and capable of accepting immediate input from all.	It was early introduced in 1965
2.	The Main Frame Computers often called number crunches have memory capacity of the order of 4 Kbytes.	It is a **Computer** whose size, speed and capabilities lie between those of a mainframe and personal computer.
3.	Mainframe has many times more processing power than a PC and offers very extensive **Data** storage facilities.	The mini computers have memory capacity ranging from 128k bytes to 2Gbytes.
4.	They are very costly.	The mini computers are inexpensive, reliable and smaller in size compare to mainframe.
5.	They can perform up to 100MIPS (Meanwhile Instructions Per Second).	The introduction of more powerful chips indicates that some 'Super Minis' and even PCs connected in a network can run faster than small mainframe
6.	They have large systems and are used by many people for a variety of purpose.	

These are the pictures of Mainframes **Computer** and Minicomputer



Figure 16: Mainframes **Computer** and Minicomputer.
Source: www.glogster.com

Microcomputer

Micro**Computer** market was mainly established by companies like APPLE COMPUTERS, but a crucial event was the launch of the IBM PC in August 1981. Microcomputers, also referred to as single board computers, are the inexpensive class of computers. In micro**Computer** the central processing unit is absence compare to the larger computers where we have a microprocessor chip as the key **Data** processing unit. Micro**Computer** is the cheapest smallest and can perform under normal office condition. Examples are IBM, APPLE, COMPAQ, Hewlett Packard (HP), Dell Toshiba, etc.



Figure 17: Example of a Microcomputer.
Source: www.ecomputernotes.com

Today microcomputers are Personal **Computer System** and they are well-known from other **Computer System** s because of possessing a single microprocessor.

Types of Personal Computers (Micro Computers)

A personal **Computer** is sited on table desk therefore they are known to as desktop personal computers. The personal computers can be classified into different parts namely: Notebook, Laptop and Palmtop Computers

Laptop Computers

These are small size kinds that are battery-operated. The screen is used to cover the system while the keyboard is installed completely on the system unit. They could be taken around everywhere and can perform tasks anywhere while at the market.

Notebook Computer

It is in form of a laptop **Computer** but smaller in size. However, it is small and it involves all the components of a full system.

Palmtop Computer

It is designed in such a way that it can be held on the palm, and is far smaller in size. All the features are complete as any of the above mentioned. Example includes Tablet, Mobile Phone etc.

The pictures BELOW indicate the various types of Personal System



Figure 18: Type of microcomputers.
Source: www.mytechlogy.com

The usefulness of Personal **Computer** can be seen as listed below:

i. It can be used to keep a document.
ii. Personal **Computer** can be used for budgeting purpose.
iii. It can examine numeric function.
iv. It can generate diagrams.
v. It can be used to send mails.
vi. It can help in programs and plan projects.
vii. It can assist in looking for particular **Information** on web.

The table below differentiates and explains the features of Advantages and Disadvantages of Personal Computer. Table 1.2: Merits and Demerits of Personal Computers

S/N	Merits	Demerits
1.	**Computer** is multipurpose; it can be used in any institution.	**Computer** is expensive to keep.
2.	It is quicker for processing **Data**.	It is very delicate and difficult to handle
3.	It performs numerous tasks at a time	It needs special skill to operate
4.	It has the ability of storing many **Data**.	It can lead to unemployment when used mostly in less developed countries.
5.	Operating of **Computer** is less weakness.	

Box 2.2

What are the Computer classifications based on capacity?

i. Mini Computers
ii. Micro Computers
iii. Mainframe Computers

Classification by Generation

First Generation (1940-1956) Vacuum Tubes

The first computers used vacuum tubes for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms. They were very expensive to operate and in addition to using a great deal of electricity, they generated a lot of heat, which was often the cause of malfunctions. First generation computers relied on machine language, the lowest-level programming language understood by computers, to perform operations, and they could only solve one problem at a time. Input was based on punched cards and

paper tape, and output was displayed on printouts. The UNIVAC and ENIAC computers are examples of first-generation computing devices. The UNIVAC was the first commercial **Computer** delivered to a business client, the U.S. Census Bureau in 1951.



Figure 19: First Generation of Computer
Source: www. informationq.com

Second Generation (1956-1963) Transistors

Transistors replaced vacuum tubes and ushered in the second generation of computers. The transistor was invented in 1947 but did not see widespread use in computers until the late 1950s. The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors. Though the transistor still generated a great deal of heat that subjected the **Computer** to damage, it was a vast improvement over the vacuum tube. Second-generation computers still relied on punched cards for input and printouts for output. Second-generation computers moved from cryptic binary machine language to symbolic, or assembly, languages, which allowed programmers to specify instructions in words. High-level programming languages were also being developed at this time, such as early versions of COBOL and FORTRAN. These were also the first computers that stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology. The first computers of this generation were developed for the atomic energy industry.



Figure 20: Second Generation of Computer
Source: www. informationq.com

Third Generation (1964-1971) Integrated Circuits

The development of the integrated circuit was the hallmark of the third generation of computers. Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers. Instead of punched cards and printouts, users interacted with third generation computers through keyboards and monitors and interfaced with an operating system, which allowed the device to run many different applications at one time with a central program that monitored the memory. Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.



Figure 21: Third Generation of Computer
Source: www. informationq.com

Fourth Generation (1971-Present) Microprocessors

The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. What in the first generation filled an entire room could now fit in the palm of the hand. The Intel 4004 chip, developed in 1971, located all the components of the computer—from the central processing unit and memory to input/output controls—on a single chip. In 1981 IBM introduced its first **Computer** for the home user, and in 1984 Apple introduced the Macintosh. Microprocessors also moved out of the realm of desktop computers and into many areas of life as more and more everyday products began to use microprocessors. As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet. Fourth generation computers also saw the development of GUIs, the mouse and handheld devices.



Figure 22: Fourth Generation of Computer
Source: www. informationq.com

Fifth Generation (Present and Beyond) Artificial Intelligence

Fifth generation computing devices, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today. The use of parallel processing and superconductors is helping to make artificial intelligence a reality. Quantum computation and molecular and nanotechnology will radically change the face of computers in years to come. The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization.



Figure 23: Fifth Generation of Computer
Source: www.informationq.com

Box 2.3

What are the Computer classifications based on generations?

i. First Generation Computers
ii. Second Generation Computers
iii. Third Generation Computers
iv. Fourth Generation Computers
v. Fifth Generation Computers

Summary

In this Unit, you have learnt that:

The types of computers based on different classifications which are;

i. Classifications based on the **Data** Processing
ii. Classification by Purpose
iii. Classifications by Size/Capacity
iv. classifications based on generations

Laptop Computers: They are small size kinds that are battery-operated? The screen is used to cover the system while the keyboard is installed completely on the system unit. They could be taken around everywhere and can perform tasks anywhere while at the market.

Self-Study Assessment

Now that you have completed this unit, you can assess how well you have achieved its Learning Outcomes by answering these questions.

i. The combination of two electronic computers is …….
ii. Notebook **Computer** is an example of …….
iii. What are the forms of electronic computer

Tutor Marked Assignment

i. Explain the following terms;
- Digital Computer
- Radio Computer
- Analog Computer
- Hybrid Computer

ii. Distinguish between the attributes of Mainframes and Minicomputer
iii. Micro**Computer** is the cheapest smallest and can perform under normal office condition, Discuss.

Further Readings

1. "Classification of **Computer System** s" by Coursera (online course, 2022)
2. "**Computer System** Classification" by edX (online course, 2022)
3. "**Computer System** Types" by Udemy (online course, 2022)



References

1. "Computer Organization and Design" by David A. Patterson and John L. Hennessy (6th edition, 2020)
2. "Computer System s: A Programmer's Perspective" by Randal E. Bryant and David R. O'Hallaron (3rd edition, 2020)
3. "Computer Architecture: A Quantitative Approach" by John L. Hennessy and David A. Patterson (6th edition, 2020)
4. "The Elements of Computing Systems" by Noam Nisan and Shimon Schocken (2nd edition, 2020)
5. "Computer Hardware and Software" by Peter Norton (2020)



Unit 3: Characteristics of a Computer System

Introduction

In this unit, you will learn about characteristics and basic elements of a **Computer System** .

Student Learning Objectives

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

i. List major characteristics of a **Computer System**
ii. Highlight the basic elements of a **Computer System**
iii. Explain the following terms;
   - Mouse
   - Keyboard
   - Monitor
   - Motherboard

Main Content

Characteristics of a Computer System

The characteristics of a **Computer** are the features that a **Computer** must have. Below are some characteristics of a computer.

Speed: The **Computer** can manipulate large **Data** at incredible speed and response time can be very fast.

Accuracy: Its accuracy is very high and its consistency can be relied upon. Errors committed in computing are mostly due to human rather than technological weakness. There are in-built-error detecting schemes in the computer.

Storage: It has both internal and external storage facilities for holding **Data** and instructions. This capacity varies from one machine to the other. Memories are built up in K(Kilo) modules where K = 1024 memory locations.

Automatic: Once a program is in the computer's memory, it can run automatically each time it is opened. The individual has little or no instruction to give again.

Reliability: Being a machine, a **Computer** does not suffer human traits of tiredness and lack of concentration. It will perform the last job with the same speed and accuracy as the first job every time even if ten million jobs are involved.

Flexibility: It can perform any type of task once it is reduced to logical steps. Modern computers can be used to perform a variety of functions like on-line processing, multi-programming, real time processing etc.

Box 3.0

List two major characteristics of computer?

Answer

i. Speed
ii. Accuracy

Basic Elements of Computer System

The basic elements of a **Computer System** are Mouse, Keyboard, monitor, memory, CPU, motherboard, Hard Disk, Speakers, Modem, power supply unit and processor.

Mouse: Mouse is used for operating the system. Nowadays, optical mouse is more popular as compared to simple mouse.

Keyboard: Keyboard is used to input **Data** in to the system so that the system gives output to the user. Therefore, the keyboard is an integral part of the input system. A **Computer** is essentially incomplete without a keyboard.

Monitor: Monitor, is another very essential part of the **Computer System** that displays the actions that the **Computer** performs on our command.

Motherboard: Motherboard is a necessary element of the **Computer System** . It contains different elements as memory, processor, modem slots for graphic card and LAN card.

Hard Disk: Hard disk is used to store **Data** permanently on computer.

Modem: Modem is used to connecting to the Internet. Two types of modems are widely used. One is known as software modems and the other is known as hardware modems.

Speakers: Speakers are also included in the basic elements of a computer. It is not indispensable, because a **Computer** can perform its function without speakers. However, we use them for multiple purposes.



Figure 24: Some Basic Elements of a **Computer System**
Source: www. quicklearncomputer.com

Box 3.1

List basic elements of a computer

Answer

i Mouse
ii. Keyboard
iii. Hard disk
iv. CPU
v. Monitor

Summary

In this unit, you have learnt that:

The characteristics of a **Computer** are the features that a **Computer** must have. They are: Speed, Accuracy, Storage, Automatic, Reliability, and Flexibility. Basic elements of a **Computer System** are Mouse, Keyboard, monitor, memory, CPU, motherboard, Hard Disk, Speakers, Modem, power supply and processor.

Self-Study Assessment

i. …… used for operating the system. Nowadays, optical mouse is more popular as compared to simple mouse.
ii. …… used to input **Data** in to the system so that the system gives output to the user.
iii. ……. displays the actions that the **Computer** performs on our command.
iv. ……. contains different elements as memory, processor, modem slots for graphic card and LAN card.
v. ……. used to store **Data** permanently on computer.

Tutor Marked Assignment

i. List and explain the following terms;
   - Accuracy
   - Speed
   - Flexibility
   - Mouse
   - Keyboard

ii. Why is a **Computer System** flexible?



Further Readings

1. "Characteristics of a **Computer System** " by Tutorials Point (online tutorial, 2022)
2. "**Computer System** Characteristics" by GeeksforGeeks (online tutorial, 2022)
3. "**Computer System** Basics" by Microsoft Support (online tutorial, 2022)



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1. "Computer Organization and Design" by David A. Patterson and John L. Hennessy (6th edition, 2020)
2. "Computer System s: A Programmer's Perspective" by Randal E. Bryant and David R. O'Hallaron (3rd edition, 2020)
3. "Computer Architecture: A Quantitative Approach" by John L. Hennessy and David A. Patterson (6th edition, 2020)
4. "The Elements of Computing Systems" by Noam Nisan and Shimon Schocken (2nd edition, 2020)
5. "Computer Hardware and Software" by Peter Norton (2020)
6. Computer System Performance" by Computer Hope (online article, 2022)
7. "How to Evaluate a Computer System " by iFixit (online guide, 2022)



Unit 4: Components of a Computer System

Introduction

In the previous unit, you learnt about characteristics and basic elements of a **Computer System** . You also learnt that a **Computer** is an ensemble of different components that you will be using to accomplish your job. Computers are an integral part of our lifestyles today and are found at offices, homes, schools, colleges, hotels, shops etc. In this unit, you will learn about components of a **Computer System** .

Student Learning Objectives

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

i. List the Component of a **Computer System**

ii. Explain the following terms;

- Compact Disc
- HD DVD
- Floppy Disk
- USB flash drive
- Secondary Storage

 **Main Content**

Components of a Computer System

Motherboard

The motherboard is the main component inside the case. It is a large rectangular board with integrated circuitry that connects the various parts of the **Computer** as the CPU, RAM, Disk drives (CD, DVD, Hard disk or any others) as well as any other peripherals connected via the ports or the expansion slots.

Components directly attached to the motherboard include:

i. *The Central Processing Unit (CPU)* performs most of the calculations that enable a **Computer** to function and it is sometimes referred to as the "brain" of the computer. It is usually cooled by a heat sink and fan.

ii. *The chip set* aids communication between the CPU and the other components of the system, including main memory.

iii. *Random Access Memory (RAM)* stores all running processes (applications) and the current running OS.

iv. *The BIOS* includes boot firmware and power management. The Basic Input Output System tasks are handled by operating system drivers.

v. *Internal Buses* connect the CPU to various internal components and to expansion cards for graphics and sound. These internal buses can either be currently used or an obsolete technology

A. *Current Technology*

- The north bridge memory controller, for RAM and PCI Express
- PCI Express, for expansion cards such as graphics and physics processors, and high-end network interfaces
- PCI, for other expansion cards
- SATA, for disk drives

B. Obsolete Technology

- ATA (superseded by SATA)
- AGP (superseded by PCI Express)
- VLB VESA Local Bus (superseded by AGP)
- ISA (expansion card slot format obsolete in PCs but still used in industrial computers)

vi. *External Bus Controllers* support ports for external peripherals. These ports may be controlled directly by the south bridge I/O controller or based on expansion cards attached to the motherboard through the PCI bus. Examples are; USB, FireWire, SATA, SCSI

Power Supply

A power supply unit (PSU) converts alternating current (AC) electric power to low-voltage DC power for the internal components of the computer. Some power supplies have a switch to change between 230V and 115V. Other models have automatic sensors that switch input voltage automatically or are able to accept any voltage within these limits.

Power supply units used in computers are generally Switch Mode Power Supplies (SMPS). The SMPS provides regulated direct current power at several voltages as required by the motherboard and accessories such as disk drives and cooling fans.

Removable Media Devices

i. CD (compact disc): The most common type of removable media, suitable for music and **Data**
   - CD-ROM Drive: A device used for reading **Data** from a CD
   - CD Writer: A device used for both reading and writing **Data** to and from a CD

ii. DVD (digital versatile disc): A popular type of removable media that is the same size as a CD but stores up to 12 times as much information- the most common way of transferring digital video and is popular for **Data** storage
   - DVD-ROM Drive: A device used for reading **Data** from a DVD
   - DVD Writer: A device used for both reading and writing **Data** to and from a DVD
   - DVD-RAM Drive: A device used for rapid writing and reading of **Data** from a special type of DVD

iii. Blu-ray Disc: A high density optical disc format for **Data** and high-definition video that can store 70 times as much **Information** as a CD
   - BD-ROM Drive: A device used for reading **Data** from a Blu-ray disc.
   - BD Writer: A device used for both reading and writing **Data** to and from a Blu-ray disc

iv. HD DVD: A discontinued competitor to the Blu-ray format

v. Floppy disk: An outdated storage device consisting of a thin disk of a flexible magnetic storage medium used today mainly for loading RAID drivers

vi. Iomega Zip drive: An outdated medium-capacity removable disk storage system, first introduced by Iomega in 1994.

vii. USB flash drive: A flash memory **Data** storage device integrated with a USB interface, typically small, lightweight, removable and rewritable with varying

capacities from hundreds of megabytes (in the same ballpark as CDs) to tens of gigabytes (surpassing, at great expense, Blu-ray discs)

viii. Tape drive: A device that reads and writes **Data** on a magnetic tape, used for long term storage and backups

Secondary Storage

This hardware keeps **Data** inside the **Computer** for later use and retains it even when the **Computer** has no power.

i. Hard disk: A device for medium-term storage of **Data**.

ii. Solid-state drive: A device quite similar to the hard disk, but containing no moving parts and which stores **Data** in a digital format.

iii. RAID array controller: A device to manage several internal or external hard disks and optionally some peripherals in order to achieve performance or reliability improvement in what is called a RAID array

Sound Card

This device enables the **Computer** to output sound to audio devices, as well as accept input from a microphone. Most modern computers have sound cards built-in to the motherboard, though it is common for a user to install a separate sound card as an upgrade. Most sound cards are either built-in or added.

Other Peripherals

In addition, hardware devices can include external components of a **Computer System** . The following are either standard or very common.

i. Text input devices

- Keyboard: A device to input text and characters by pressing buttons (referred to as keys)

ii. Pointing devices

- Mouse: A pointing device that detects two-dimensional motion relative to its supporting surface.

- Optical Mouse: It uses light to determine motion.

- Trackball: A pointing device consisting of an exposed protruding ball housed in a socket that detects rotation about the two axes.

- Touch screen: it senses the user pressing directly on the display

iii. Gaming devices

- Joystick: A control device that consists of a handheld stick that pivots around one end, to detect angles in two or three dimensions

- Gamepad: A handheld game controller that relies on the digits/ fingers (especially thumbs) to provide input.

- Game controller: A specific type of controller specialized for certain gaming purposes

iv. Image, video input devices

- Image scanner: A device that provides input by analyzing images, printed text, handwriting or an object

- Webcam: A low resolution video camera used to provide visual input that can be easily transferred over the Internet

v. Audio input devices

- Microphone: An acoustic sensor that provides input by converting sound into electrical signals

Box 4.0

List three removable media devices discussed in this study session.

Answer

i. Blu-ray Disc
ii. Compact Disc
iii. HD DVD

Summary

In this unit, you have learnt that:

The **Data** received from the keyboard is processed by the CPU, i.e. the Central Processing Unit. The CPU controls and manipulates the **Data** that produce information.

Output devices translate the processed **Information** from the **Computer** into a form that a **Computer** operator can understand.

The motherboard is the main component inside the case. It is a large rectangular board with integrated circuitry that connects the various parts of the **Computer** as the CPU, RAM, Disk drives (CD, DVD, Hard disk or any others) as well as any other peripherals connected via the ports or the expansion slots.



Self-Study Assessment

i. …… A control device that consists of a handheld stick that pivots around one end, to detect angles in two or three dimensions
ii. ……. A device that provides input by analyzing images, printed text, handwriting or an object

iii. ……. A pointing device that detects two-dimensional motion relative to its supporting surface.
iv. ……. A pointing device consisting of an exposed protruding ball housed in a socket that detects rotation about the two axes.
v. ……. A device to input text and characters by pressing buttons (referred to as keys)



Tutor Marked Assignment

i. List and explain three components of a **Computer System** .

ii. Mention some of the components directly attached to the motherboard.



Further Readings

1. "Computer System Components" by Tutorials Point (online tutorial, 2022)
2. "Components of a Computer System " by GeeksforGeeks (online tutorial, 2022)
3. "Computer System Basics" by Microsoft Support (online tutorial, 2022)



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1. "Computer Organization and Design" by David A. Patterson and John L. Hennessy (6th edition, 2020)
2. "Computer System s: A Programmer's Perspective" by Randal E. Bryant and David R. O'Hallaron (3rd edition, 2020)
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5. "How to Assemble a Computer" by iFixit (online guide, 2022)
5. mputer Hardware and Software" by Peter Norton (2020)

Learning Section 2:

Computer Data and Information

Units

Unit 1: Data and Information

Unit 2: Data Processing

Unit 3: Roles of Data Processing in the Society.



Unit 1: Data and Information



Introduction

In the previous study sessions, you were introduced to how **Computer** processes **Data** to give a desired output. **Data** can be explained as an illustration of facts, theories in dignifies way, which can be appropriate for communication, processing by electronic machine, while **Information** is the processed **Data** on which decisions and actions are established. In this study session, you will learn about **Data** and information.

Student Learning Objectives

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

i. Define **Data**
ii. Explain the features of a Processed **Data**
iii. State different forms of **Data**
iv. Explain Information



Main Content

Data and Information

Data can be referred to as a symbol of details, model or **Information** in a formalized method, which can be useful to communication, clarification or processing by human or electronic machine. **Data** is signified with the help of characters like alphabets (A-Z, a-z), digits (0-9) or special characters (+,-,/,*,<,>,=, etc.). **Data** occur in different forms which include:

i. Numbers or text on pieces of paper,
ii. Bytes in **Computer** memory or
iii. Facts stored in a person's mind

Information is to classify **Data** so that it has some significant values/meaning to the receiver. Therefore, **Information** is the processed **Data** on which decisions and actions are founded. The term **Data** is referred to facts about a person, object or place e.g. name, age, complexion, school, class, height e.tc while, **Information** is referred to as processed **Data** or a meaningful statement e.g. Net pay of workers, examination results of students, list of successful candidates in an examination or interview e.tc

However for a decision to be meaningful, the processed **Data** must pose the following features:

- ***Timely:*** **Information** should be obtained when needed
- ***Accuracy:*** **Information** should be precise
- ***Completeness:*** **Information** should be comprehensive

Data is the plural form of the word datum and signifies the elementary facts about an object. An object refers to a person, place, or a thing.

Box 1.0

What is Data?

Data can be referred to as a symbol of details, model or **Information** in a formalized method, which can be useful to communication, clarification or processing by human or electronic machine.

Data involve numbers, words, images, etc. **Data** is baseless until it undergoes some forms of processing. The result of a processed **Data** is information. Though the word **Data** and **Information** are frequently used interchangeably, there is a significant difference between them. In the real sense, **Data** entails the raw number that computers process to produce information. **Data** can basically focus at facts out of context.

Example can be illustrated using registered students of the university. The **Data** items consisting of Matriculation Number, Name, Faculty, Department, State of origin, Place of residence, Status and e-mail are used to hold the students details. **Data** item are actual details or value.

Table 1.0: Registered Student Details

S/N	**Data** Item	Details
1.	Matriculation Number	15/03CMP001
2.	Name	Muhammad Chinedu Afolabi
3.	Faculty	Education
4.	Department	Educational Technology
5.	State of Origin	Kwara
6.	Place of Residence	Abuja
7.	Status	Fresher
8.	E-mail	1503CMP001@alhikmah.edu.ng

Similarly, a commercial bank may request for the following **Data** before the same student can operate an account or enjoy some banking services

Table 1.1: Registered Student Details

S/N	**Data** Item	Details
1.	Matriculation Number	15/03CMP001
2.	Name	Muhammad Chinedu, Afolabi
3.	Date of Birth	1st January, 1900
4.	Nationality	Nigerian
5.	Sex	Male
6.	Occupation	Student
7.	School	Alhikmah University, Ilorin
8.	E-mail	1503CMP001@alhikmah.edu.ng

The Table 1.1 gives details of this student (Muhammad Chinedu, Afolabi) if considered independently may not have particular meanings until it is exposed to some manual or computerized processing. The raw **Data** in the tables may be advance processed by a human or input into a computer, stored, processed and transmitted (output) to another human or a computer.

A classic **Data** processing function will be to trace a student record or **Data** from a large file based on matriculation number. If this process will be carried out manually, a lot of time and efforts will be needed by the **Data** processing personnel. When the technique of **Data** processing is manual, it is called manual **Data** processing. On the other hand, when the process of processing is electronic we refer to it as electronic **Data** processing. Computers are used to turn worthless **Data** by processing them into useful information, such as spreadsheet, graphs, and reports.

However, **Information** is known as either a significant answer to a query or a meaningful stimulus that can flow into further queries. For example, with the **Data** in Table 3.1 and Table 1.1, the bank official may be involved in the number of students from each school that have subscribed to a particular service it offers.

As a result, a query will be run on the existing **Data**base. The result of the query will generate **Information** which will assist the management of the bank to discontinue or continue with the service. Some characteristics of **Information** are:

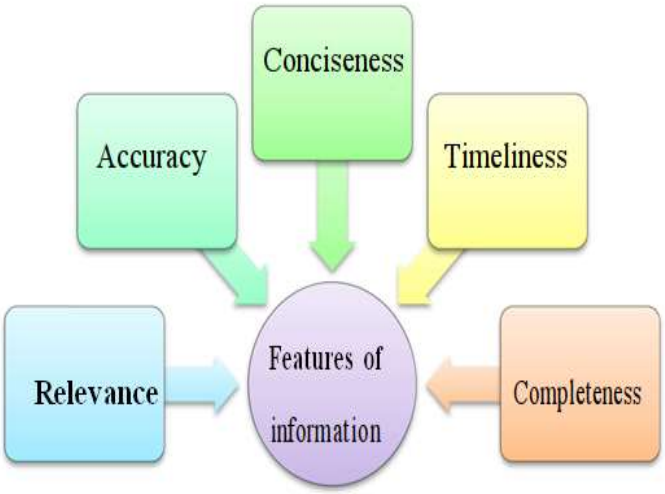


Figure 25: Features of Processed **Data**

Summary

In this unit, you have learnt that:

i. **Data** can be referred to as a symbol of details, model or **Information** in a formalized method, which can be useful to communication, clarification or processing by human or electronic machine. **Data** is signified with the help of characters like alphabets (A-Z, a-z), digits (0-9) or special characters (+,-,/,*,<,>,=, etc.).
ii. **Information** is to classify **Data** so that it has some significant values to the receiver. Therefore, **Information** is the processed **Data** on which decisions and actions are founded.

Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. **Data** is baseless until it undergoes some forms of _____
ii. When the technique of **Data** processing is manual, it is called_____
iii. …… is a symbol of details model or **Information** in a formalized method, which can be useful to communication, clarification or processing by human or electronic machine.

Tutor Marked Assignment

i. Explain What is a **Data**
ii. State three forms of **Data**
iii. Define Information

Further Readings

1. "**Data** and **Information** Tutorial" by Tutorials Point (online tutorial, 2022)
2. "**Data** and Information: A Guide" by **Data**Camp (online tutorial, 2022)
3. "**Data** and **Information** Basics" by Microsoft Support (online tutorial, 2022)



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1. "**Data** and Information: A Guide" by James A. O'Donnell (2020)
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3. "**Information** and **Data** Management" by Ian H. Witten (2020)
4. "**Data**, Information, and Decision Making" by John D. Kelleher (2020)
5. "**Data** and Information: A Hands-On Approach" by Peter Jackson (2020)
6. "**Data** and Information: Key Concepts" by KDnuggets (online article, 2022)
7. "**Data** and Information: Best Practices" by **Data** Science Times (online article, 2022)



Unit 2: Data Processing

Introduction

In the previous unit, you were introduced to **Data** and information.

In this unit, you will learn about electronic **Data** processing system, **Data** processing cycle and methods of **Data** processing

Student Learning Objectives

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

i. Discuss the Electronic **Data** Processing
ii. Explain the term **Data** Processing Cycle
iii. State the Methods of **Data** Processing

Main Content

Data Processing

Data processing can be defined as any process that uses a **Computer** program to move in **Data** summarize, analyze or else transform **Data** into practical information. The process may be programmed and run on a computer. It comprises recording, analyzing, sorting, summarizing, calculating, spreading and storing **Data**. **Data** becomes more worthwhile only when they have experienced some **Computer** processing and well-presented to allow for decision making. **Data** processing systems have become essential in managing **Information** in current day organizations. In recent times, **Data** processing systems are quite often mentioned as **Information** systems to highlight their rationality.

In a nutshell, both terms are more or less the same, performing similar functions; **Data** processing systems normally influence raw figures into information, and likewise **Information** systems usually take raw figures as input to provide useful **Information** as output. In many organizations, these systems exist as payroll systems, sales and marketing systems, finance and accounting systems, manufacturing and production system, human resources systems, University management systems etc. Also, the term **Data** processing can relate to any process of converting **Data** into **Information** and also the transformation of **Information** back to **Data**.

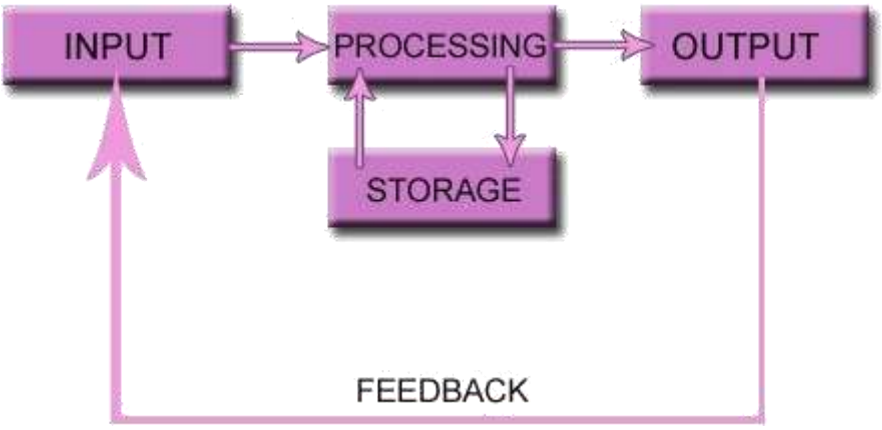


Figure 26: Electronic **Data** Processing
Source: www.flexiprep.com

Box 2.0

What is **Data** Processing?

Answer **Data** processing can be defined as any process that uses a **Computer** program to move in **Data**, summarize, analyze or else transform **Data** into practical information.

The Scope of Data Processing System

The conventional usage of the terms **Data** processing and **Information** systems limits their use to the algorithmic derivations, logical deductions, and statistical calculations

that persist constantly in general business environments, relatively than in the more expansive sense of all conversions of real-world measurements into real-world information. In actual fact, **Data** processing needs the use of computers, the level of computerizations is typically not too computing intensive as may be expected in scientific and engineering applications. Computing is a term constrained to number that is arithmetical calculations. These include adding, multiplying, subtracting and dividing, and exponentiation (raising numbers to specific powers) etc. The basic **Data** processing operations performed on business **Data** include the following:

i. **Data** Collection
ii. **Data** Capture
iii. **Data** Recording
iv. **Data** Entry
v. **Data** Transmission
vi. **Data** Sorting
vii. Updating of Information
viii. Adding of **Data**
ix. Deletion of information
x. **Data** Validation
xi. **Data** Verification
xii. Summarizing of **Data**
xiii. Printing of Results
xiv. Summaries of **Data** for management decision
xv. Calculating **Data**
xvi. Sorting **Data**
xvii. Classifying **Data**
xviii. Summarizing **Data**
xix. Comparing **Data**
xx. Statistical reports
xxi. **Data** Mining

Data Processing Life cycle

Data processing is a significant purpose that transforms our **Data** into meaningful information. As a result, difference calculations are achieved. In modern time, most of **Data** processing is achieved using **Computer** machine to increase their usefulness and add values for particular purpose. **Data** processing life cycle is the collection of steps needed to convert into information. Mostly there are three main steps.

The complete **Data** life cycle is given below:

i. Input

In this step, the composed **Data** is given to the **Computer** as input for processing.

- Verification: The **Data** given to **Computer** is confirmed in order to be sure that **Data** is correct and valid for processing.
- Coding: The **Data** is stored in **Computer** in binary form. In this step **Data** is transformed into binary form in order to be stored into computer.
- Storing: It is stress-free to process sorted **Data**. In this step the **Data** is sorted in different classification so that processing becomes stress-free.

ii. Processing

In this step, the processing on **Data** is functional. Different calculations and formulas are done on stored **Data** to get the preferred outcome in summarizing. There are times having all the stored **Data** summarized form is needed. In this step, **Data** is processed in summarized form. For example, managing director may request for a summary of the activities done in the whole day.

iii. Output

The objective of **Data** processing is to create preferred **Information** from the raw **Data**. In this step, the **Data** is shown on the needed medium e.g. monitor printer.

Steps on Output

- Retrieval: If **Data** is stored on storage devices like hard disk, in this step **Data** is retrieved from the storage devices.
- Conversion: The **Information** in this step is conversion into different forms like charts, graphs etc.
- Communication: In this step, the **Information** is sent to various places.
- Feedback: In this step, the remarks are taken from the users about the **Data** processing system and its output. The process is very significant to develop the **Data** processing system.

Thus, **Data** processing contains those activities apprehensive with the systematic recording Sorting, computing, modifying, reporting displaying and printing of details connecting to business transactions. A **Data** processing system can therefore be viewed as an administrative system overlaid upon the physical business systems such as banking, engineering, insurance etc.

The main objective of **Data** processing is to acquire **Information** which will be to control financial and administrative aspects of the business. In addition, managers and administrators with latest **Information** are able to make good decisions that will positively affect the progress of organization.

Methods of Data Processing

The following are the three main types used for **Data** processing over the years:

i. Manual method

ii. Mechanical method
iii. **Computer** method.

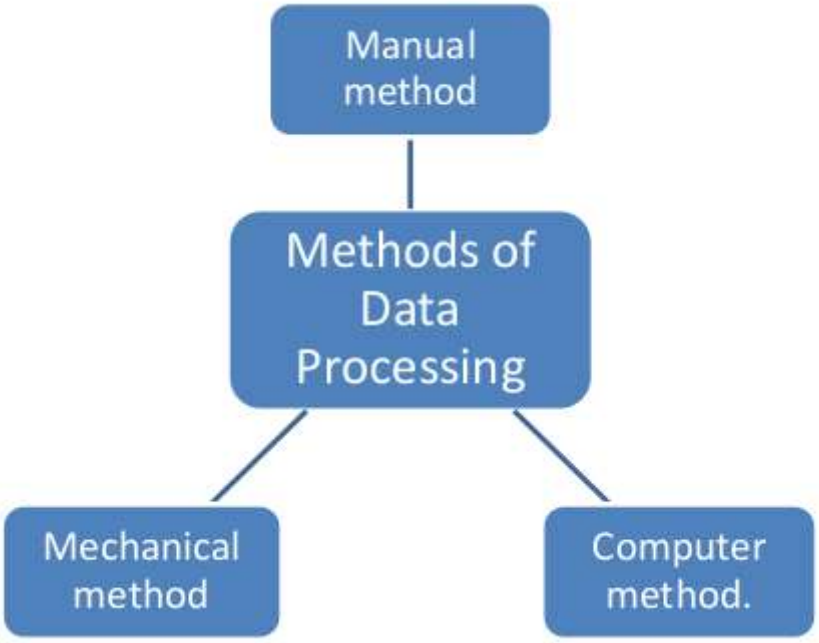


Figure 27: Methods of **Data** Processing

i. Manual Method

The manual method of **Data** processing involves the use of chalk, wall, pen pencil and the like. These tools, machine or tools enable human efforts in recording, organizing, operating, and presenting **Data** or information. The manual **Data** processing processes require extensive manual efforts. Therefore, manual method is bulky, boring, annoying and time wastage. Moreover, the processing of **Data** by the manual method is likely to be affected by human errors. When there are errors, then the reliability, accuracy, neatness, tidiness, and validity of the **Data** would be in doubt. The manual method does not permit for the processing of huge volume of **Data** on a consistent and timely basis.

ii. Mechanical Method

The mechanical method of **Data** processing encompasses the use of machines such as typewriter, rodeo machines, adding machines and the like. The mechanical operations are essentially routine-like in nature. There is almost no innovative thinking. The mechanical operations are noisy, dangerous, error prone and disorderly. The mechanical method does not permit for the processing of big volume of **Data** constantly and timely.

iii. Computer Method

The **Computer** method of carrying out **Data** processing has the following key Features:

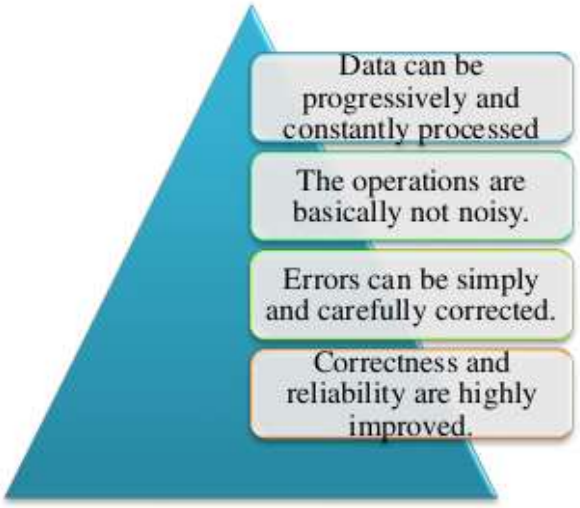


Figure 28: Main features of carrying out **Data** processing.

Box 2.1

What is **Data** Processing Life Cycle?

Answer **Data** processing life cycle is the collection of steps needed to convert into information. Mostly there are three main steps.

Summary

In this unit, you have learnt that:

i. Electronic **Data** processing (DP) can be defined as any **Computer** automated process that transforms raw facts **Data** into output example useful information. **Data** becomes more worthwhile only when they have experienced some **Computer** processing and well-presented to allow for decision making.
ii. The manual method of **Data** processing involves the use of chalk, wall, pen pencil and the like. These tools, machine or tools enable human efforts in recording, organizing, operating, and presenting **Data** or information.

Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. How many steps are involved in **Data** processing life cycle?

ii. **Data** processing systems have become essential in managing **Information** in current day organizations. True or False

iii. ……. objective is to create preferred **Information** from the raw **Data**.



Tutor Marked Assignment

i. List the basic **Data** processing operations performed on business
ii. Differentiate between method and mechanical **Data** method.



Further Readings

1. "Data Processing Tutorial" by Tutorials Point (online tutorial, 2022)
2. "Data Processing: A Guide" by DataCamp (online tutorial, 2022)
3. "Data Processing Basics" by Microsoft Support (online tutorial, 2022)

References

1. "**Data** Processing: A Guide to **Data** Processing" by James A. O'Donnell (2020)
2. "**Data** Processing and Analysis" by David J. Hand (2020)
3. "**Data** Processing: Principles and Practice" by Ian H. Witten (2020)
4. "**Data** Processing for **Data** Science" by John D. Kelleher (2020)
5. "**Data** Processing: A Hands-On Approach" by Peter Jackson (2020)
6. "**Data** Processing: A Key Component of **Data** Science" by KDnuggets (online article, 2022)
7. "**Data** Processing: Best Practices" by **Data** Science Times (online article, 2022)



Unit 3: Roles of Data Processing in the Society

Introduction

In the previous unit, you learnt about electronic **Data** processing system, **Data** processing cycle and methods of **Data** processing.

In this unit, you will learn about the Roles of **Data** Processing in the Society

Student Learning Objectives

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

i. Elaborate on the Roles of **Data** Processing in the Society
ii. Explain the Benefits of **Computer** to the Society

Main Content

Roles of Data Processing in the Society.

Data processing plays a significant role in the society most especially in our businesses and organization. This occurs as a result of processing of **Data** by converting all **Information** and **Data** in a readable method. However, most organizations require a standardized format for all the **Information** that they need processing can actually assist them. With **Data** processing, your organization can confront the problems and competitions among other organizations in your area of specialization because you can focus more on the productive activities that your organization should do.

Therefore, **Data** processing services manage the non-core activities such as conversion of **Data**, **Data** entry, and **Data** processing itself. **Data** processing will transform all **Information** into a standard electronic format in order to assist you to decide on the important things immediately.

Your high objectives can now be accomplished since you can now concentrate more on making your organization very competitive.

Data processing render services which includes:

i. Form processing
ii. Check processing
iii. Insurance claims processing
iv. Image processing

These can appear very minor to your organization but they can generate a good impact in the market. Form processing in an organization will allow all the essential **Information** to be processed faster and easier because the forms will be obtainable in a type that is simple to understand. These forms comprise:

i. Vouchers
ii. Invoices
iii. HTML
iv. Resumes
v. Tax forms
vi. Legal and email forms.

There are many roles that you can obtain from **Data** processing. First, the significant **Data** in your organization will be converted into a standard format that can be logical to you and your employees. Since all the sets of **Information** are in standard electronic format, you can create a backup copy that you can use in case of **Data** loss. These sets of **Information** are confirmed to be precise so that you can make your decision correctly.

Benefits of Computer to the Society.

Even though **Data** processed either manually or electronically have the same standard, the difference can still be described as follows: -

i. Accuracy of **Information** is improved: Computers are commonly precise, whereas humans are disposed to error (errors in the input of **Data**). While there can be software error (error in the programs) and hardware package errors (faults or breakdown in the equipment itself), these are not often common.
ii. The Volume of **Information** to be processed is increased: As business grows and becomes more difficult, their **Data** processing necessities increase in volume and difficulty too. Hence, electronic **Data** processing is always employed to affluence the demands on their workforce.
iii. The speed at which **Information** becomes available is higher: computers can process **Data** much more quickly than a human. This means that a **Computer** can create more timely information. The personnel are freed up for more skillful and judgment work. Although, manual or human method of **Data** processing is more suitable when human judgment is involved in the work, **Computer** will still make the required **Information** available when needed as soon as possible.
iv. There is greater access to **Information** available and more people: The use of **Data**bases and the capacity to connect a number of users via a multi-network

progress the distribution and spreading of **Information** within and outside an organization.

Summary

In this unit, you have learnt that:

Data processing plays a significant role in the society most especially in our businesses and organization currently. This occurs as a result of processing of **Data** and converts all **Information** and **Data** into a readable format.

Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. How **Data** is typically distinguished from information?
ii. **Data** processing will change all **Information** into a standard…… in order to supports you to decide on the essential things immediately.

Tutor Marked Assignment

i. Mention the benefits of commuter to society.
ii. State the services rendered by **Data** Processing

Further Readings

1. "The Role of Data Processing in Society" by Data Science Council of America (online article, 2022)
2. "Data Processing: A Key Component of Modern Society" by TechRadar (online article, 2022)
3. "How Data Processing Impacts Society" by Forbes (online article, 2022)



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1. "**Data** Processing: A Guide to **Data** Processing in the Society" by James A. O'Donnell (2020)
2. "The Role of **Data** Processing in Modern Society" by Marshall Breeding (2020)
3. "**Data** Processing and Society: A Critical Analysis" by David Lyon (2020)
4. "**Data** Processing: A Key to Unlocking Economic Growth" by World Bank (2020)
5. "**Data** Processing and Social Change" by Manuel Castells (2020)
6. "The Impact of **Data** Processing on Business and Society" by Harvard Business Review (online article, 2022)
7. "**Data** Processing and Its Role in Shaping Society" by The Guardian (online article, 2022)

Learning Section 3:

Parts of a **Computer System**

Units

Unit 1: Computer Hardware

Unit 2: Computer Software



Unit 1: Computer Hardware

Introduction

Computer hardware is known as the physical features of a computer, namely Keyboard, Monitor, Mouse, and Printer, including the digital circuitry. **Computer** hardware is an essential part inserted in all present day vehicles, airplanes, mobile phones, compact disc players and other devices.

In this study session, you will learn about hardware devices, central processing unit, input and output devices, and primary and secondary storage devices.

Student Learning Objectives

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

i. Describe **Computer** Devices
ii. Discuss the functions of Central Processing Unit
iii. Explain Primary and Secondary Storage devices
iv. Describe Input and Output Devices

Main Content

Computer Devices

Computer hardware is the collection of physical elements that constitute a **Computer System** . It is the physical parts or components of a computer, such as the monitor, mouse, keyboard, **Computer Data** storage, hard disk drive (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), and so on, all of which are physical objects that can be touched (that is, they are tangible).

A **Computer** consists of several interconnected devices or components. They are five basic components namely, Central Processing Unit, Primary Storage, Secondary Storage, Input Devices and Output Devices. This physical equipment that makes up a **Computer** is called hardware.

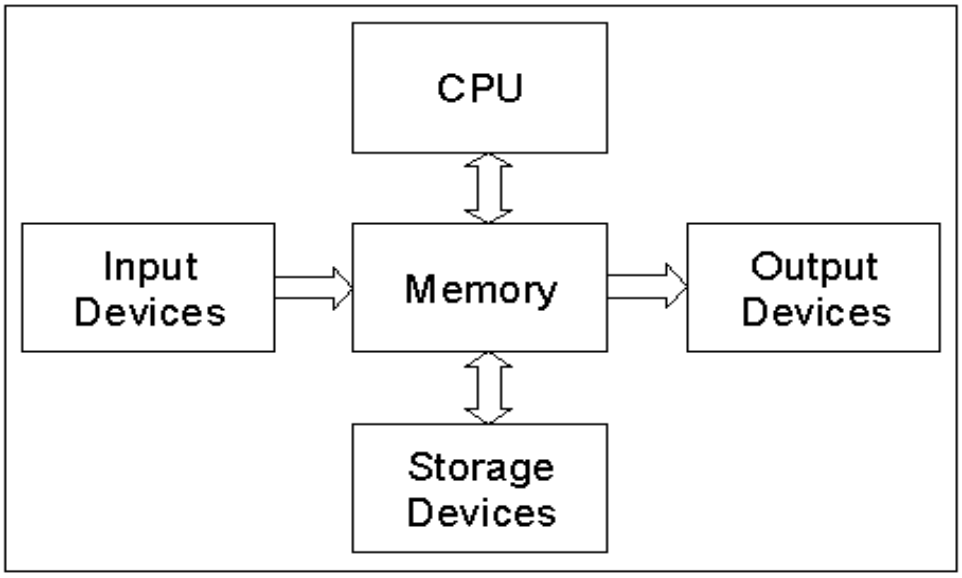


Figure 29: Components of a computer
Source: www.som.csudh.edu

Secondary storage, input and output devices are often called peripheral equipment. The CPU and primary storage contain electronic circuits that store and process **Data** or program instruction. The circuits are formed from place of silicon which is non-metal element. A piece of silicon containing electronic circuits is called an integrated circuit or a chip.

The **Computer** chips for the CPU are called processor chips. In microcomputer, the entire CPU contains only one-processor chips and is called microprocessor. In minicomputer, mainframe **Computer** or super computer, the CPU may require several processor chips. Primary storage is composed of many chips for example; a micro**Computer** may have more than sixteen chips. Each chip is called memory chip

and is capable of storing certain amount of **Data**. The amount of **Data** depends on different types of chips.

All the memory chips are made up of primary storage (RAM). In microcomputers, the microprocessor and the memory chips are mounted on one board, called the Motherboard or mainboard. The chips in the CPU and primary storage are connected by a set of wires called a bus. **Data** is sent back and forth between components over the bus.

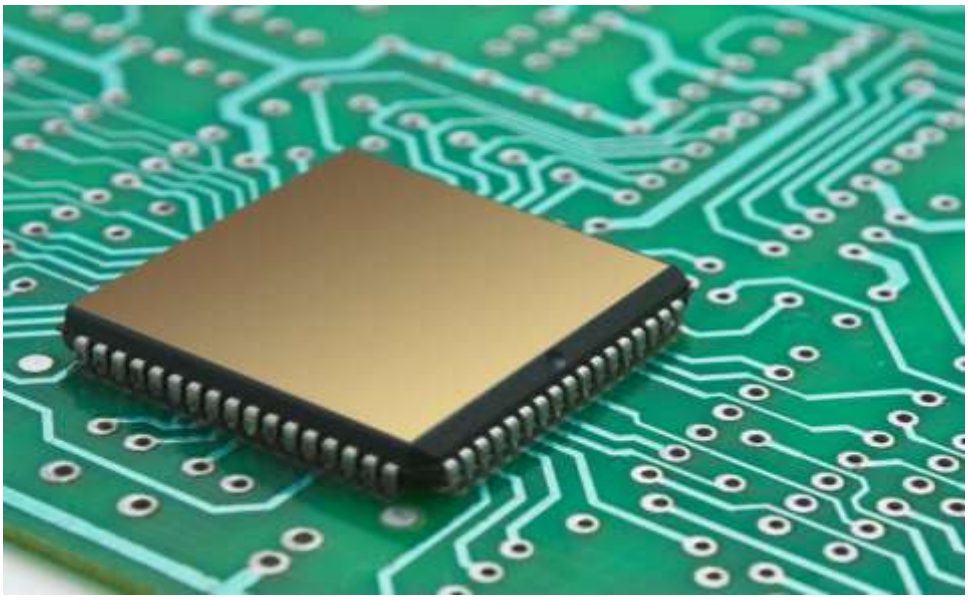


Figure 30: A **Computer** Chip
Source: www.easytechjunkie.com

There are some other chips that are needed to control input/output devices and secondary storage.

Some of these chips are built-in Mainboard or are in a separate board. They are called add-on-boards or cards, and are plugged into sockets on the mainboard. These sockets which are called expansion slots are connected to the other components by the bus.

The combination of all these chips on or outside motherboard form **Computer** devices. They are enclosed in a **Computer** casing. Other devices such as output devices (Monitor, Printer), Input device (keyboard, Mouse), speakers are plugged into **Computer** devices to form personal **Computer System** . Note in Micro**Computer** or stand-alone computer, CPU may be regarded as microprocessor. Primary storage may be regarded as Random Access Memory. Secondary Storage may be regarded as Hard disk, Floppy disk or Compact disk.

Box 1.0

What is Computer Hardware?

Computer hardware is the collection of physical elements that constitutes a **Computer System** . It is the physical parts or components of a computer, such as the monitor, mouse, keyboard, **Computer Data** storage, hard disk drive (HDD), system unit, and so on, all of which are physical objects that can be touched.

Central Processing Unit (CPU)

A central processing unit (CPU) is the electronic circuitry within a **Computer** that carries out the instructions of a **Computer** program by performing the basic arithmetic, logical, control and input/output (I/O) operations specified by the instructions.
The Central Processing Units are also called Processor and also known as the brain or heart of the **Computer System** . The CPU carries out the calculations for the program and controls the other components of the system. It does the function by organizing circuits into two main units, called Arithmetic Logic Unit (ALU) and Control Unit.

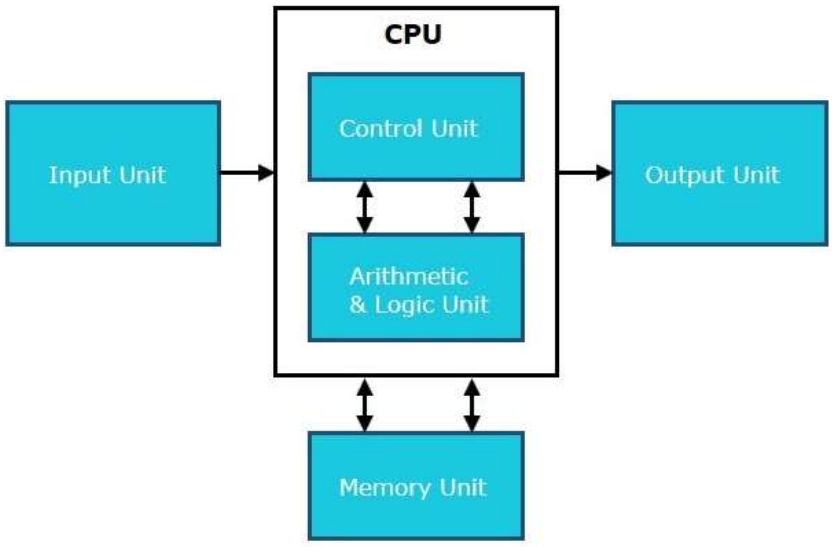


Figure 31: The central Processing Units
Source: www.tutorialspoint.com

The ALU contains circuits that perform arithmetic and logical operations. The control unit contains circuits that analyzed and execute instructions.

i. The Arithmetic Logic Unit

The ALU contains arithmetic circuits that can subtract multiply and divide two numbers. More complex operations such as finding the square root of a number are done by sequence of their basic operations. The ALU has logic circuits that can compare two numbers to determine if they are equal or if one number is greater than storage locations called storage registers for storing numbers used in calculations and

for storing the results of calculations. To perform a calculation or logical operation, number is transferred from primary storage to storage registers in the ALU.
These numbers are sent to the appropriate arithmetic or logic circuit. The results are sent back to the storage registers. The results are transferred from the storage registers to primary storage.

ii. The Control Unit

The Control Unit controls the whole **Computer System** by performing the following functions:

- Directs and coordinates all operation called for by the program
- Activates the appropriate circuits necessary for inputs and output devices.
- Causes the entire **Computer System** to operate in an automatic manner.

The control unit contains a temporary storage location called an instruction register for storing the instruction being executed. It also contains circuits called the instruction decoder – which analyze the instruction register and cause it to be executed.
The control unit executes each instruction by following the same basic sequence of steps:

- The next instruction in the program is retrieved for primary storage and stored in the instruction register
- The instruction is sent to the instruction decoder where it is analyzed.
- The decoder sends signals to the ALU, primary storage, I/O devices, and secondary storage that cause the actions required by the instructions to be performed.

These steps are repeated for each instruction in the program until all instructions have been executed.

Box 1.1


What is Central Processing Unit?



A central processing unit (CPU) is the electronic circuitry within a **Computer** that carries out the instructions of a **Computer** program by performing the basic arithmetic, logical, control and input/output (I/O) operations specified by the instructions.

Primary Storage

Primary storage is also called internal storage or memory. It is used to store programs and **Data** currently being processed by CPU. Primary storage circuits need electricity to stay on. If the power button of the **Computer** is turned off, all the circuits will turn off and all **Data** in primary storage will be lost. When the **Computer** is again powered on, the **Data** will not reappear. The **Data** is lost forever.

Because of this characteristic, primary storage is called volatile storage. This type of primary storage is called Random Access Memory (RAM). RAM is the main type of primary storage used with computers and it is volatile.

Figure 32: Random Access Memory

Source: www.shutterstock.com

Read Only Memory (ROM): Many computers have another type of primary storage called Read Only Memory. ROM is however non-volatile storage. This means that when the power to the **Computer** is turned off, the content of the ROM is not lost. ROM can store preset programs that are always put by **Computer** manufactures.

When you turn on a PC, you will usually see a Referencess on BIOS (Basic Input-output System). This is part of the ROM chip containing all the programs needed to control the keyboard, monitor, disk drive and so on.

What is the non-volatile primary storage called?

There are different types of ROM, including PROM EPROM and EEPROM.

i. PROM (Programmable Read Only Memory): In this type of ROM, **Data** or program can be stored once in PROM but never changed.
ii. EPROM (Erasable Programmable Read Only Memory): In this type of ROM, **Data** or program can be erased by removing the device and exposing it to ultraviolet light.
iii. EEPROM (Electrically Erasable Programmable Read Only Memory): **Data** or program can be completely erased using a special device and new programs or new **Data** can be stored in it.

The Use of Primary Storage (RAM)

Main Memory has several uses, these include:

i. Input area: where the **Data** is stored when it is read into CPU, awaiting processing.
ii. Operating system: controls the operation of the computer.
iii. Working storage: where calculations are performed and **Data** is stored temporarily.
iv. Output area: where the **Information** is stored prior to output. Both the input and output areas are buffer.
v. Application program area: where the user program is held.

Table 1.0: Difference between ROM and RAM

S/N	**Read Only Memory (ROM)**	**Random Access Memory (RAM)**
1.	ROM is nonvolatile RAM is volatile	ROM is nonvolatile RAM is volatile
2.	ROM is cheaper than RAM	RAM is very expensive
3.	The contents of ROM are always known and can be verified	The contents are not known
4.	ROM cannot be updated or corrected	RAM can be updated and corrected
5.	ROM serves as permanent **Data** storage	RAM can serve as temporary **Data** storage

Secondary Storage

Secondary Storage is an optional attachment, which uses cable to connect to the CPU. It is nonvolatile. Any **Data** or programs stored in secondary storage stays there, even with the **Computer** power turned off, unless someone purposely erases them. Secondary storage is a permanent form of storage.

Table 1.1: Difference between Primary and Secondary Storage devices

S/N	**Primary Storage**	**Secondary Storage**
1.	Primary storage/memory is also called Internal or main storage.	Secondary storage or memory is also called External or auxiliary storage.
2.	High speed	Low speed
3.	It is very expensive	It is not expensive as primary storage
4.	It holds **Data** or programs temporarily	It holds **Data** or programs permanently
5.	It holds programs and **Data** in current use in CPU	It holds program or **Data** that will still be used in primary storage
6.	It is faster than secondary	It is not fast as primary
7.	It holds less **Data**	It holds large volume of **Data** or files

i. Hard Disks

Computer System s have internal hard disk, but they may use external disks also. External disks sit alongside the **Computer** in an extra 'box' with its own power supplies and plug socket. An average PC may have 20Gb. The standard size has increased dramatically over recent years as ever more.



Figure 33: Internal Hard Disk
Source: www.shutterstock.com

IDE (Integrated Drive Electronics) and Extended IDE (EIDE) are hard disk technologies common on PC's. More powerful and flexible are SCSI (Small **Computer System** Interface, pronounced 'SCUZZY') and 'firewire' (1394). The difference between these systems lies in the way that **Data** is transmitted between the hard disk and the processor.



Figure 34: External Hard Disk
Source: www.istockphoto.com

ii. Floppy Disks

A floppy disk, also called a diskette, is a disk storage medium composed of a disk of thin and flexible magnetic storage medium, sealed in a rectangular plastic carrier lined with fabric that removes dust particles. Floppy disks are read and written by a floppy disk drive (FDD). A 'floppy' disk can be 3.5" in diameter or 5.25". A 3.5" disk can hold up to 1.44Mb of **Data**. While floppy disk drives still have some limited uses, especially with legacy industrial **Computer** equipment, they have been superseded by **Data** storage methods with much greater capacity, such as USB flash drives, portable external hard disk drives, optical discs and memory cards. As at 2010, **Computer** motherboards were rarely manufactured with floppy drive support.



Figure 35: Floppy Disk
Source: www.istockphoto.com

iii. CD -ROM (Optical Disk).

It uses similar technology to the based laser compact disc audio system for **Data** storage. The latest PCs are now automatically with a CD-ROM drive and some software packages are now only available on CD-ROM. CD-ROM stands for Compact Disc Read-Only Memory. This means that **Data** is implanted onto the disc when it is made, and subsequent users can only retrieve information, they cannot alter or overwrite or delete what is already on the disk.



Figure 36: CD -ROM
Source: www.istockphoto.com

The speed of CD-ROM drive is relevant to how **Data** can be retrieved; an eight speed drive is quicker than four speed drive. CD recorders are now available for general business use with blank CDs (CD-R). A CD-R can hold up to 650Mb. Once made, CD-ROMs are not reusable in the way that floppy disk are. However, a reusable disk (CD-RW) has recently become available.

Input Devices

Input Devices
These accept input **Data**/programs for processing converting if necessary into a form which the **Computer** can understand and operate on. Input is a labor intensive

process, typically involving the keying in of **Data** using a keyboard. In many cases, the process of inputting **Data** by keyboard so that it can be converted into the electronic pulses on which the **Computer** circuitry operates is avoided by a process of **Data** capture, where **Data** is recorded in such a way as to be directly convertible into a machine sensible form without any human intervention. In many situations, **Data** capture or transcription occurs far away from the main **Computer** and **Data** has to be transmitted to where it is to be processed. Examples of Input device include Keyboard, Mouse, Trackball, Document Reading Devices, Scanner etc.

The keyboard and mouse are the most widely used input devices at the moment. The QWERTY keyboard, so called because the keys 'q','w','e','r','t' and 'y' are adjacent, is the commonest form of keyboard. But other types of keyboard are available, some being specially designed for people with special needs. It should be noted that the layout of keys on the QWERTY keyboard owes its origins to typewriter designers who were actually trying to slow down the speed at which a typist could type. The reason was that the old lever-based typewriters were liable to levers getting interlocked if two keys were pressed in rapid succession.



Figure 37: Keyboard
Source: www.istockphoto.com

The mouse is used as a pointing device and to select options from menus. A tracker ball is used for the same purposes as a mouse and it is popular on laptop computers. Another input device is called a light pen which can be used to point at a monitor, serving a similar function to a mouse. A touch sensitive screen is a method of input based on touching a specially designed screen in particular places. It is typically used in an application such as tourist **Information** system, where **Information** can be obtained by touching menu options displayed on the screen.

Barcode scanners are very popular input devices in supermarkets and stores. These devices scan barcodes which identify products. Image scanners are devices which scan an image (document, photograph) and produce a digital version of the image i.e. the image is stored as a sequence of binary numbers. Special software can then display the digital version of the image on a monitor.



Figure 38: Mouse
Source: www.istockphoto.com

Output Devices

These accept output from the **Data** processing device and convert it into a form suitable for use by the computer's human operators. The commonest methods of **Computer** output are printers and screen display although it is also possible to output onto microfilm or fiche and onto transparencies for overhead projection. Many home computers also produce sound output through speakers.
Examples are:
i. Printers
ii. The VDU - Visual Display Unit
Monitors are the commonest output device for a **Computer System** . They range from the lowly dumb terminal screen to the high quality bit-mapped colour screen of workstations. A basic monitor displays up to 24 lines of 80 columns of standard characters. Advanced monitors range from monochrome to full colour and are bit-mapped which means that each point (usually called pixel which stands for picture element) on the screen corresponds to at least one bit in memory.
Printers are the commonest hardcopy output device. They range from cheap low quality dot-matrix to high speed, high quality laser printers with a variety of intermediate quality devices available.



Figure 39: Output Devices
Source: www.123rf.com

Summary

In this unit, you have learnt that:

i. There are five basic components namely, Central Processing Unit, Primary Storage, Secondary Storage, Input Devices and Output Devices
ii. The Central Processing Units are also called Processor. This is the brain or heart of the **Computer System** .
iii. It does the function by organizing circuits into two main units, called Arithmetic Logic Unit (ALU) and Control Unit
iv. Primary storage is also called internal storage or memory. It is used to store programs and **Data** currently being processed by CPU.
v. Secondary Storage is an optional attachment, which uses cable to connect to the CPU. Secondary is nonvolatile
vi. Input Devices accept input **Data**/programs for processing converting if necessary into a form which the **Computer** can understand and operate on.
vii. Output Devices accept output from the **Data** processing device and convert it into a form suitable for use by the computer's human operators

Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. Highlight the five basic **Computer** devices as discussed in this study
ii. Central Processing Units can be subdivided into two, name them
iii. Write short notes on Keyboard

iv. State difference between Primary and Secondary Storage devices

Tutor Marked Assignment

i. Describe the three forms of ROM
ii. Write short notes on hard disks
iii. Describe the functions of Control Unit
iv. State the difference between ROM and RAM
v. Highlight any five basic **Computer** devices

Further Readings

1. "Computer Hardware Tutorial" by Tutorials Point (online tutorial, 2022)
2. "What is Computer Hardware?" by TechRadar (online article, 2022)
3. "Computer Hardware Basics" by Microsoft Support (online tutorial, 2022)



References

1. "**Computer** Hardware: A Comprehensive Guide" by James A. O'Donnell (2020)
2. "Hardware: A Guide to **Computer** Hardware" by Marshall Breeding (2020)
3. "**Computer** Organization and Design" by David A. Patterson and John L. Hennessy (6th edition, 2020)
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6. "**Computer** Hardware Components" by **Computer** Hope (online article, 2022)
7. "**Computer** Hardware" by Coursera (online course, 2022)
8. "**Computer** Architecture" by edX (online course, 2022)
9. "**Computer** Hardware and Networking" by Udemy (online course, 2022)
10. **Computer** Hardware Engineering" by MIT OpenCourseWare (online course, 2022)
11. "**Computer** Architecture and Organization" by Harvard University (online course, 2022)
12. "How to Assemble a Computer" by iFixit (online guide, 2022)



Unit 2: Computer Software

Introduction

Software is a general term for structured assemblages of **Computer Data** and instructions, often broken into two major categories: system software that generates the elementary non-task-specific functions of the computer, and application software which is used by operators to achieve particular responsibilities. The usefulness of the **Computer** depends on the programs that are written to manipulate it. In this Unit, you will learn about **Computer** software, history of **Computer** software, system software (operating system and types), and utility software.

Student Learning Objectives

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

i. Discuss **Computer** software and its importance.
ii. Explain system software and its types.
iii. Discuss Application software and its various types.

 **Main Content**

Computer Software

The **Computer** hardware is driven by the software. The usefulness of the **Computer** depends on the programs that are written to manipulate it. **Computer** software comes in different forms: the operating system, utility software, language translators and application software.

The set of instructions that enable a **Computer** to perform specific tasks is generically called a ***program or software***. These instructions tell the machine's hardware components what to do; without a program, a **Computer** could not do anything at all. When a **Computer** uses a particular program, it is said to be running or executing that program. The physical components of the **Computer** are called ***the hardware*** while all the other resources or parts of the **Computer** that are not hardware, are referred to as the ***Software***.

Software is the set of programs that makes the **Computer System** active. In essence, the software is the programs that run on the computer.

A Program is a series of coded instructions showing the logical steps the **Computer** follows to solve a given problem.

Most programs that run on a **Computer** are not built directly into the **Computer System** . This allows different users to customize their **Computer** to ideally suit their needs. To make software available to the computer, it is installed, which means that the program is written into the computer's permanent storage.

For all but the simplest of programs, installation also usually includes adding References to the new program into the computer's operating system, so that the operating system will know where to find the program, and how to start it. Installation may also include many other tasks, such as the creation and placement of **Data** files for the program to use, establishing connections to devices such as printers for the new software to use, and updating software modules in other programs that are required by the new software.

With few exceptions, the installation of software for consumer devices such as PCs and smart phones is automatic, requiring little else from the user than permission to perform the installation. The **Computer** software could be divided into two major groups namely ***System Software and Application Software.***

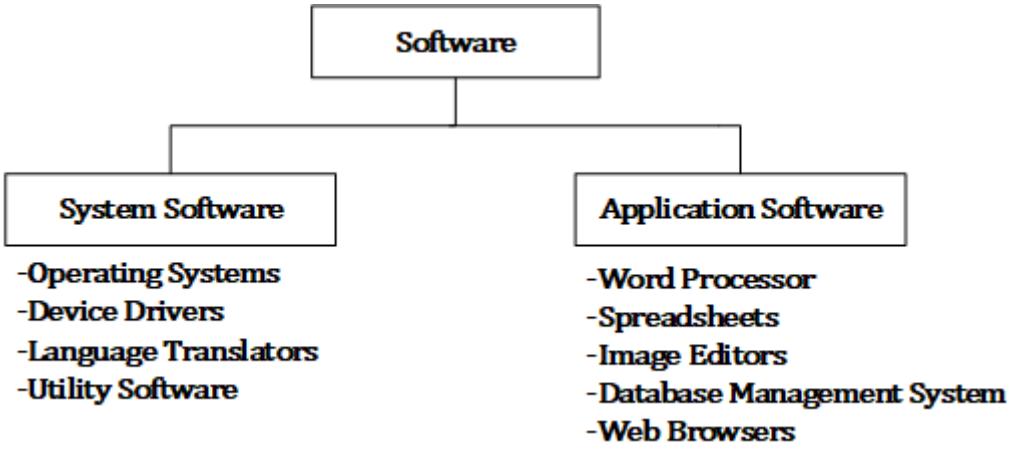


Figure 40: Categories of **Computer** Software
Source: www.codesansar.com

Box 2.0

What is **Computer** Software?

Computer software is the set of programs that makes the **Computer System** active. It is the set of instructions that enable a **Computer** to perform specific tasks. In essence, the software is the programs that run on the computer.

System Software

This is referred to the suits of programs that facilitates the optimal use of the hardware systems and/or provide a suitable environment for the writing, editing, debugging, testing and running of User Programs or simply put; system software is any program that controls the computer's hardware or can be used to maintain the **Computer** in some way so it runs more efficiently. Usually, every **Computer System** comes with collection of these suits of programs which are provided by the Hardware Manufacturer.

Utility Software

A utility is a program that makes the **Computer System** easier to use or performs highly specialized functions. Utilities are used to manage disks, troubleshoot hardware problems and perform other tasks that the operating system itself may not be able to do. Utility software is a set of commonly used programs in **Data** processing departments also called service or general-purpose programs. They perform the following operations:

i. File Conversion: This covers **Data** transfer from any medium to another, making an exact copy or simultaneously editing and validating. For example, copying documents from a hard disk to a diskette.
ii. File Copy: It makes an exact copy of a file from one medium to another or from an area of a medium to another area of the same medium.
iii. Housekeeping Operations: These include programs to clear areas of storage, writing file labels and updating common **Data**.

They are not involved in solving the problem at hand. They are operations that must be performed before and after actual processing.

Operating System

An operating system is a program that acts as an interface between a user of a **Computer** and the **Computer** hardware. The purpose of an operating system is to provide an environment in which a user may execute programs.

The operating system is the first component of the systems programs that interests us here. Systems programs are programs written for direct execution on **Computer** hardware in order to make the power of the **Computer** fully and efficiently accessible to applications programmers and other **Computer** users. Systems programming is different from application programming because the programmer requires an intimate knowledge of the **Computer** hardware as well as the end users' needs.

Moreover, systems programs are often large and more complex than application programs, although that is not always the case. Since systems programs provide the foundation upon which application programs are built, it is most important that systems programs are reliable, efficient and correct. In a **Computer System** the hardware provides the basic computing resources. The applications programs define the way in which these resources are used to solve the computing problems of the users. The operating system controls and coordinates the use of the hardware among the various systems programs and application programs for the various users. The basic resources of a **Computer System** are provided by its hardware, software and **Data**. The operating system provides the means for the proper use of these resources in the operation of the **Computer System** . It simply provides an environment within which other programs can do useful work.

You can view an operating system as a resource allocator. A **Computer System** has many resources (hardware and software) that may be required to solve a problem: CPU time, memory space, files storage space, input/output devices etc. The operating system acts as the manager of these resources and allocates them to specific programs and users as necessary for their tasks. Since there may be many, possibly conflicting, requests for resources, the operating system must decide which requests are allocated resources to operate the **Computer System** fairly and efficiently. An operating system is a control program. This program controls the execution of user programs to prevent errors and improper use of the computer.

Operating systems exist because they are a reasonable way to solve the problem of creating a usable computing system. The fundamental goal of a **Computer System** is to execute user programs and solve user problems. The primary goal of an operating system is a convenience for the user. Operating systems exit because they are supposed to make it easier to compute with an operating system than without an operating system. This is particularly clear when you look at operating system for small personal computers.

A secondary goal is the efficient operation of a **Computer System** . This goal is particularly important for large, shared multi-user systems. Operating systems can solve

this goal. It is known that sometimes these two goals, convenience and efficiency, are contradictory.

A computer's Operating System (OS) is a group of programs designed to serve two basic purposes:

i. To control the allocation and use of the computing system's resources among the various users and tasks, and.
ii. To provide an interface between the **Computer** hardware and the programmer that simplifies and makes feasible the creation, coding, debugging, and maintenance of application programs.

Specifically, we can imagine that an effective operating system should accomplish all of the following:

- Facilitate creation and modification of program and **Data** files through an editor program.
- Provide access to compilers to translate programs from high-level languages to machine language.
- Provide a loader program to move the complied program code to the computer's memory for execution.
- Provide routines that handle the intricate details of I/O programming.
- Assure that when there are several active processes in the computer, each will get fair and noninterfering access to the central processing unit for execution.
- Take care of storage and device allocation.
- Provide for long term storage of user **Information** in the form of files
- Permit system resources to be shared among users when appropriate, and be protected from unauthorized or mischievous intervention as necessary.

Modern **Computer** operating systems may be classified into three groups, which are distinguished by the nature of interaction that takes place between the **Computer** user and his or her program during its processing. The three groups are called batch, time-shared and real time operating systems.



Figure 41: Classification of Operating System
Source: www. bmc.com

i. Batch processing operating system

In a batch processing operating system environment, users submit jobs to a central place where these jobs are collected into a batch, and subsequently placed on an input queue at the **Computer** where they will be run. In this case, the user has no interaction with the job during its processing, and the computer's response time is the turnaround time-the time from submission of the job until execution is complete, and the results are ready for return to the person who submitted the job.

ii. Time sharing operating system

Another mode for delivering computing services is provided by time sharing operating systems. In this environment, a **Computer** provides computing services to several or many users concurrently on-line. Here, the various users are sharing the central processor, the memory, and other resources of the **Computer System** in a manner facilitated, controlled, and monitored by the operating system. The user, in this environment, has nearly full interaction with the program during its execution, and the computer's response time may be expected to be no more than a few second.

iii. Real time operating system

The real time operating systems are designed to service those applications where response time is of the essence in order to prevent error, misrepresentation or even disaster. Examples of real time operating systems are those which handle airlines reservations, machine tool control, and monitoring of a nuclear power station. The systems, in this case, are designed to be interrupted by external signal that requires the immediate attention of the **Computer System** .

Application software

Application software is a set of programs designed to solve problems of a specific nature. It could either be supplied by the **Computer** manufacturer or in some cases; the users produce their own application program called User Programs. Hence, application software could be subdivided into two classes, namely; Generalized and User-defined Software.

Figure 5.3: Classifications of Application Software

- Under the Generalized software, examples are:
- Word Processing Programs e.g. Word Perfect, Word Star, Microsoft word.
- Desktop Publishing e.g. Ventura, PageMaker, CorelDraw likewise the
- Spreadsheet program e.g. LOTUS 1,2,3, Excel, Super-Q

Under the User-defined, we could have some user-defined packages for a particular company or organization, for accounting, payroll or some other specialized purposes.

i. Word Processor: A Word Processor is used to create, edit, save and print reports. It affords the opportunity to make amendments before printing is done. During

editing character, word sentence or a number of lines can be removed or inserted as the case may be. Another facility possible is spell checking. A document can be printed as many times as possible. Word processors are mainly used to produce: Letters, Mailing lists, Label, Greeting Cards, Business Cards, Reports, Manual, Newsletter. Examples are: WordPerfect, WordStar, Display Writer, Professional Writer, LOTUS Manuscript, Ms-Word, LOCO Script, MM Advantage II etc.

ii. Spreadsheet: It is an application mainly designed for numerical figures and reports. Spreadsheets contain columns and rows, in which numbers can be entered. It is possible to change numbers before printing is done. Other features of spread sheets is the ability to use formulas to calculate, use sum and average function, ability to perform automatic recalculation and also it has the capacity to display reports in graphical modes. Spreadsheet is used for Budget, Tables, Cost analysis, Financial reports. Tax and Statistical analysis. Examples are: LOTUS 123, Supercalc, MS Multiplan, MS-excel, VP Planner etc.

iii. Integrated Packages: They are programs or packages that perform a variety of different processing operations using **Data** that is compatible with whatever operation is being carried out. They perform a number of operations like Word Processing, **Data**-base Management and Spread sheeting. Examples are: Office writer, Logistic Symphony, Framework, Enable, Ability, Smart ware II, Microsoft Work V2.

iv. Graphic Packages: These are packages that enable you to bring out images, diagrams and pictures. Examples are PM, PM Plus, Graphic Writer, Photoshop.

v. **Data**base Packages: It is software for designing, setting up and subsequently managing a **Data**base. (A **Data**base is an organized collection of **Data** that allows for modification taking care of different users view). Examples are Dbase II, III, IV, FoxBASE, Rbase **Data** Perfect, Paradox III, Revelation Advanced and MS Access.

vi. Statistical Packages: These are packages that can be used to solve statistical problems, e.g. Stat graphical, SPSS (Statistical Packages for Social Scientists).

vii. Desktop Publishing: These are packages that can be used to produce books and documents in standard form. Examples are PageMaker, Ventura, Publishers, Paints Brush, Xerox Form Base, News Master II, Dbase Publisher.

viii. Game Packages: These are packages that contain a lot of games for children and adults. Examples are Chess, Scrabble, Monopoly, Tune Trivia, Star Trek 2, California Game, Soccer Game, War Game, Spy Catcher Dracula in London.

ix. Communication Packages: Examples are Carbon Plus, **Data** talk V3.3, Cross talk, SAGE Chit Chat, **Data** Soft.

There are so many packages around, virtually for every field of study but these are just to mention a few of them. Advantages of these packages include quick and cheaper implementation, time saving, minimum time for its design, they have been tested and proven to be correct, they are usually accompanied by full documentation and are also very portable.

Summary

In this unit, you have learnt that:

i. The set of instructions that enable a **Computer** to perform specific tasks is generically called a program or software. These instructions tell the machine's hardware components what to do; without a program, a **Computer** could not do anything at all.
ii. System software refers to the suits of programs that facilitates the optimal use of the hardware systems and/or provide a suitable environment for the writing, editing, debugging, testing and running of User Programs
iii. A utility is a program that makes the **Computer System** easier to use or performs highly specialized functions.
iv. An operating system is a program that acts as an interface between a user of a **Computer** and the **Computer** hardware. The purpose of an operating system is to provide an environment in which a user may execute programs.
v. Application software is a set of programs designed to solve problems of a specific nature. It could either be supplied by the **Computer** manufacturer or in some cases; the users produce their own application program called User Programs.

Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. What is the difference between hardware and software?
ii. What is utility software?
iii. The basic resources of a **Computer System** are provided by its ……..., ……. and ……
iv. Why is an operating system called a control program?

Tutor Marked Assignment

i. Write short notes on the following
   - **Computer** Software
   - System software
   - Utility software
   - Operating system
   - Application software



Further Readings

1. "Computer Software Engineering" by Coursera (online course, 2022)
2. "Software Development" by edX (online course, 2022)
3. "Computer Software Applications" by Udemy (online course, 2022)



References

1. "**Computer** Software: A Comprehensive Guide" by James A. O'Donnell (2020)
2. "Software: A Guide to **Computer** Software" by Marshall Breeding (2020)
3. "**Computer** Software Engineering" by Ian Sommerville (10th edition, 2020)
4. **Computer** Software Tutorial" by Tutorials Point (online tutorial, 2022)
5. "What is **Computer** Software?" by TechRadar (online article, 2022)
6. "**Computer** Software Basics" by Microsoft Support (online tutorial, 2022)

Learning Section 4:

Computer Application

Units

Unit 1: Application Areas of Computers

Unit 2: Internet Technology

Unit 3: Electronic Mail



Unit 1: Application Areas of Computers

Introduction

In the early days of computing, computers were originally meant to assist in scientific and engineering applications. Today, computers are widely used to perform wide ranging tasks from routine accounting operations to management decision making. Corporate operations are becoming more complex and competitive thus increasing the need to produce and process more accurate and timely **Data** both in quantity and quality.

In this study session, you will learn about **Computer** application in education, business and industry, science and engineering.

Student Learning Objectives

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

i. Discuss **Computer** application in education
ii. Explain **Computer** applications in business and industry
iii. Discuss **Computer** applications in science and engineering
iv. Enumerate **Computer** applications in health, marketing, agriculture and law

Main Content

Application of Computers in Education

Computer has become a universal tool of any modern man (or woman). Literacy today is not defined only in terms of the ability to read and/or write but also, it includes the ability to use and communicate with the aid of computer. In the education sector, computers are being used to promote teaching and learning. The field of education provides the most fascinating application of computing system. This has consequently attracted considerable attention from educationist and policy makers since the late 1960s, when computers were introduced into the classroom. The entry of the **Computer** into the classroom has now offered opportunities and possibilities for students to develop their potentials with computer-aided instruction packages.



Figure 42: Students using **Computer** to learn
Source: www.krome.co.uk

A considerable number of fascinating and entertaining educational **Computer** software packages are now available in almost every subject. These self-tutor instruction packages are well designed to enable the user to learn on his/her own time, speed and convenience. The role of the teacher here is that of a guide so that the student can think more logically and can gain meaningful experience in such structured situations, role playing and other well programmed exercise so that the student can have a better understanding of the interrelationships of variables to real life situations. Apart from the use of **Computer** as an instructional aid, it is also used in the execution of routine and administrative tasks such as the keeping of academic and administrative records on admissions, examinations, staffing and other routine functions. The **Computer** has also

revolutionized the services rendered by libraries to readers. A **Computer** based on-line public access catalogue system manages a search for materials using indices such as author's name, book title, subject and class-mark. Readers using public terminals can go through a menu-driven programme to find specific books or periodicals, recall books on loans and also make requisition for short loan items. Furthermore, optical character reading devices are used to scan the bar codes on readers' library cards to offer a **Computer** based issuing of books to readers. A **Computer** based security system is used to maintain security services in libraries as well. In educational institutions such as nursery schools, primary schools, secondary schools, polytechnics, colleges of education and universities, **Computer** can be used for the following:

i. **Computer** aided self-tutored application packages.
ii. **Computer** instructional aids e.g. digital projectors.
iii. Microsoft PowerPoint application software for preparing slide shows, speeches, seminars, workshop, lectures etc.
iv. **Computer** simulated graded exercises, group work.
v. Computer-aided laboratory experiments and investigations.
vi. Computer-aided software packages for special students e.g. the mentally/physically disable (the blinds, deaf e.tc), adults, KGs, teenagers etc.
vii. Distant learning programs e.g. sandwich programs, through the Virtual Library Technology.
viii. Teleconferencing technology.
ix. Placing and sourcing of educational materials/resources e.g. papers, journals, newsletters, magazines, textbooks, films, on the internet.
x. Computerization of Library Services to make cataloguing indexing, retrieval, borrowing, return and other library services easier and faster.
xi. Keeping the records of students, teachers and teaching facilities.
xii. Estimating the teachers-student ratio with a view to assessing the adequacy of teaching and learning.
xiii. Estimating the ratio of students to teachers and teachers to teaching facilities with a view to assessing the adequacy of teaching and learning.
xiv. Timely generation of students' examination results.
xv. Automatic generation of lecture and examination time tables.
xvi. Aiding students to learn basic theoretical concepts. There are currently, some **Computer** aided learning software packages and hardware devices that are readily available in the market.

Computer Applications in Business and Industry

The following are the areas of application of **Computer** technology in business:

i. Payroll.
ii. Inventory Control.
iii. Auditing Operations.

iv. Personnel Record Keeping.
v. Preparation of Customer Utility Bills and Payment Orders.
vi. Management **Information** System.
vii. High Quality Production Controls.
viii. Point of Sale Service.
ix. Financial Market Transactions.
x. Publishing Industry.



Figure 43: Application of **Computer** in a business organization
Source: www.gdk.ie

Payroll

Payroll preparation is basically a repetitive and a predictable task which has to be done occasionally for every single worker in an organization at specific points in time weekly, fortnightly or monthly. Payroll preparation is a work plan which demands speed, accuracy, carefulness and honesty. It contains making References to a number of source documents which by their nature also involve constant and periodic notifying. These qualities clearly provide themselves to the use of computers which have the competences to meet the challenging demands in payroll preparation. These contain the competence of the **Computer** to:

i. Handle the massive amount of **Information** necessary in payroll preparation.
ii. Store **Information** and provide the **Information** available as at when it is required.
iii. Handle uninteresting recurrent tasks and check on its own work as a way of controlling human errors.
iv. Create a much better and dependable technique for the essential security checks to monitor and detect fraud and other misconducts.

Computer application in payroll preparation contains a number of procedures which comprise the following:

Procedures in payroll preparation

i. Bring up-to-date the personal records of personnel whenever new appointments, resignations, terminations, dismissals and other changes are made within a period of time.
ii. Computing wages and salaries for each individual workers based on regular and overtime hours worked.
iii. Making deductions for income tax and for other payments such as union dues and repayment of loans.
iv. Preparation of pay advice slips and cheques to employees and banks.
v. Updating the master payroll file centered on the records received from the personnel department.
vi. Preparation of summary report and analysis for management.

Inventory Control

A similarly significant business application of the **Computer** is observed in the performance of the vital business function involved in keeping a necessary level of inventory in a business organization.

Auditing Operations

The **Computer** served as a device used by auditors to report correctly on the business register which establishes the most essential aspect in the audit trail. With the support of the computer, it is easier for auditors, in their inspection of the accounting records of a business, to trace routine business operations so that alterations can be noticed and confirmed precisely using numerous **Computer** audit packages.

Personnel Record Keeping

One of the key functions of the personnel department is to uphold and frequently bring up-to-date a master file and other records in the personnel department in an organization. The **Computer** enables the real keeping of a full and up to-date record of every single worker by creating a comprehensive **Data**base involving names, addresses, ages, qualifications, marital status, salaries, dates of promotion and so on. By keeping such an up-to-date record, a stable flow of several reports can be arranged at the suitable time to create the essential **Data** to support management decision making in areas such as appointments, promotions, awards of incremental credits, leave periods, staff training, staff development and so on. Besides, management can offer the needed accurate and up-to-date reports on a timely and continual basis to aid payroll preparation and also to satisfy other needed **Data** requirements from **Data** users such as governments, trade unions, banks, credit unions and tax collectors.

Preparation of Customers Utility Bills

The routine and periodic preparation of customer's utility bills principally those centered on meter readings for such utility services as water, electricity, telephone, gas, demands accuracy and speed in which the **Computer** has shown very active and well-organized. With the help of the computer, precise and up-to-date customer's bills can be sent to them occasionally and in good time to allow settlement to be made. Computers can be used to make warnings of defaulters. Also, it enables the **Computer** to be used to calculate dividend, pension and other periodic payments as at when they become due.

High Quality Production Controls

One more significant application of the **Computer** which has proved very valuable in the world of business is the nursing of production processes so that extraordinary quality products and services are delivered to customers. **Computer** Aided Designs (CAD) tools are used in the plan of products while **Computer** monitored quality control procedures are used in production process to identify items that fail to meet the appropriate quality standards and specifications. Such programmed devices are used in car assembly plants, oil plants, and business of drugs and so on. **Computer** aided quality control devices are also used to monitor weight, size, quantity, contents and other standard specifications in the course of a manufacturing process.

Point of Sale Services

Point of sale in supermarkets and departmental stores are now extremely computerized to notice the prices of items. Magnetic Character Readers are used to scan Universal Product Codes on substances to generate fast, efficient and acceptable services to customers in commercial transaction in retail outlets, departmental stores, libraries and other point of sale service.

Publishing industry

In the publishing industry, **Computer** is used in the following methods:

The usage of **Computer** in publishing industry:

i. Innovative writing
ii. Typesetting document
iii. Drawing pictures.
iv. Creating the table of contents and the index of a book repeatedly.
v. Making the page size of a book and cut and paste diagrams automatically.
vi. Handling images such as the scanning of pictures and recording them automatically in the **Computer** store for future recovery or printing.
vii. Confirmation and validation of spellings.
viii. Support the writer of an article to recognize the words that have related meaning.

Computer Application in Science and Engineering

Computer is commonly used to find the accurate solutions to both scientific and engineering problems. Weather forecasting has now become a daily activity to which the **Computer** has proved very useful in providing **Information** on the kind of weather we are likely to expect over a period of time. Such accurate predictions help the farmers, airline operators, navigators and other activities which depend on the weather for their operations. **Computer** aided critical path study is used to monitor the optimum and efficient use to time, money, material and human resource in the execution and implementation of projects. Such critical path study is used successfully on various projects, for example, the construction of roads, bridges, buildings, manufacturing, the conduct of election and sales campaigns. Another scientific application of the **Computer** is the monitoring, simulation modeling techniques to provide indicators as to how systems such as the human body, economy, weather, demographic variables and so on react to changes in situations. The application of simulation techniques helps in taking decision and precautions in advance should in case such repercussions happen when the desired changes are introduced in practical situations. Computers are also to design buildings, roads, bridges, vehicles, aero planes, ships and complex architectural, ships and complex works and so on. Prototyping is increasingly being used to minimize the financial commitment to the real life construction of these systems. The **Computer** is used to find solution to very complex mathematical and statistical computations at incredible speed and accuracy. Furthermore, various software packages are now increasingly being developed to analyze surveyed **Data**, construct life tables, and perform mortality demographic and other multivariate **Data** analysis designed to revolutionize scientific research and to find practical solutions to complex, challenging and everyday life situations. We now outline the use of **Computer** in the following specific areas among others.

i. Research Institutions
   a. Evaluating, monitoring and controlling laboratory experiments.
   b. Storing the readings obtained in laboratory experiments.
   c. Standardizing the reading obtained in laboratory experiments.
   d. Tabulating or plotting the graph of the results obtained from laboratory experiments.
   e. Interpreting the results obtained from laboratory experiments.
   f. Modeling and simulating systems.
   g. Developing the prototypes of systems.

ii. Engineering and Architecture
   a. Designing and drawing with very high precision, accuracy and at minimum cost.
   b. Modeling and simulating the behavior of engineering or architectural systems.

c. Developing the prototype of say, an aircraft, a motor car, assembly plant and so on. It is possible to test and monitor the performance of these systems without serious financial commitments.
d. Fabricating, constructing and assembling the component parts of machines such as motor car, aircraft and engineering plants without any hazards.

Other Applications

i. Marketing Department

a. Comparative analysis of products of two or more companies with a view to predicting some areas of improvement.
b. Market survey, statistical analysis of proportional market gains and prediction of new market areas.
c. Creation of the awareness and appreciation of products.

ii. Agriculture

a. Keep records of soil, rainfall, weather conditions, land size, crops, chemicals and ultimately process the records to estimate the soil fertility and yield per hectare over a number of years.
b. Keep records, of poultry and animal husbandry farm with a view to estimating the feed mix, environmental condition desirable for optimal yield.
c. Assess the behavior patterns of farmers in a cooperative venture and assist in matching the farmers that have identical behavior with a view to optimizing their productivity.

iii. Law and Justice

a. Modeling and simulating legislative procedures.
b. Indexing, storage and retrieval of law reports.
c. Indexing, storage and retrieval of court proceedings.
d. Assisting the human experts in crime investigation.
e. Statistical analysis of criminal and civil cases in the law court and estimating the rate of growth.
f. Assisting the court registrar in the allocation of cases to courts.
g. Monitoring and evaluating congestion in police custody and prisons.
h. Identifying the causes of crime and assisting with the provision of preventive and curative measures.

iv. Health Care

The delivery of health care facilities has been one of the notable areas in which **Computer** applications have proved most beneficial to mankind. The **Computer** is used to conduct fast and accurate laboratory tests for blood, urine, stool and so on.

The **Computer** is used in the diagnosis and physiological monitoring of patients life during surgical operation and intensive care programme. There is also a wide range of application packages for the scientific preparation and administration of drugs, x-ray techniques, blood bank management and so on. An equally important application of the **Computer** is the **Computer** simulation provided in the training of medical and paramedical staff and students. Computers are being used to perform routine clerical functions in hospitals such as keeping records of hospital admission and discharges, administration of drugs and prescriptions and other hospital administrative functions. Furthermore, the **Computer** is used to provide a **Data** bank of medical history to meet the **Data** needs of health insurance schemes and vital health care statistical reports.

The summaries that can be drawn about the use of computers in the hospitals are as follows:

a. Keeping and reviewing in a timely, effective and efficient manner the records of patients, staff, drugs and equipment.
b. Monitoring the temperature, blood pressure, heart beat and a host of other parameters of patients and raising an alarm when abnormal situation is about to occur.
c. Assisting medical practitioners in the diagnosis of patient disease.
d. Assisting the medical practitioners in the prescription of drugs to patients and ultimately the treatment of patients.
e. Assisting the medical practioners in the monitoring, controlling and reviewing basic health services, birth rate, death rate, outbreak of disease and a host of others.



Summary

In this unit, you have learnt that:

i. The field of education provides the most fascinating application of computing system. Some of the applications in education include:
   - **Computer** aided self-tutored application packages.
   - **Computer** instructional aids e.g. digital projectors.
   - Microsoft PowerPoint application software for preparing slide shows, speeches, seminars, workshop, lectures etc.
   - **Computer** simulated graded exercises, group work.

ii. Payroll preparation is basically a repetitive and a predictable task which has to be done occasionally for every single worker in an organization at specific points in time weekly, fortnightly or monthly.

iii. In Auditing Operations, The **Computer** served as a device used by auditors to report correctly on the business register which establishes the most essential aspect in the audit trail.

iv. The **Computer** enables the real keeping of a full and up to-date record of every single worker by creating a comprehensive **Data**base involving names, addresses, ages, qualifications, marital status, salaries, dates of promotion and so on



Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. List the application areas of **Computer** in agriculture
ii. List the application areas of **Computer** in law and justice.
iii. List the application areas of **Computer** in health care



Tutor Marked Assignment

i. Mention one major function of Personnel Record Keeping
ii. Mention three usage of **Computer** in publishing industry.
iii. Highlight four application areas of **Computer** in educational institutions.
iv. List five application areas of **Computer** in research institutions.



Further Readings

1. **Computer** Applications Tutorial by Tutorials Point (online tutorial) - A beginner-friendly tutorial that introduces **Computer** applications.
2. Internet Technology Tutorial by Codeforwin (online tutorial) - A tutorial that focuses on internet technology.
3. Electronic Mail Tutorial by GeeksforGeeks (online tutorial) - A tutorial that explains electronic mail concepts.



References

1. **Computer** Applications: An Introduction by Peter Denning and Robert M. Metcalfe (2017) - A textbook that introduces various application areas of computers.
2. Application Areas of Computers by S. Dandamudi (2003) - A research paper that discusses various application areas of computers.
3. **Computer** Applications in Industry, Commerce, and Education by David J. Barnes (2016) - A textbook that covers various application areas of computers.
4. Internet Technology: An Introduction by James K. Petersen (2017) - A textbook that introduces internet technology.
5. Internet and World Wide Web: How to Program by Paul Deitel and Harvey Deitel (2015) - A textbook that covers internet programming.
6. Internet Technology and Applications by Rajiv Chopra (2020) - A textbook that covers internet technology and its applications.
7. Electronic Mail: An Introduction by Lawrence Hughes (2013) - A textbook that introduces electronic mail.
8. Email Essentials: How to Write Effective Email by Diana Booher (2015) - A textbook that covers effective email writing.
9. Electronic Mail Systems by S. Dandamudi (2003) - A research paper that discusses electronic mail systems.



Unit 2: Internet Technology

Introduction

In the present age of **Information** Technology (IT), use of Internet is becoming quite popular for accessing **Information** on any topic of your interest. It also provides tremendous opportunities to students; researchers and professionals for getting **Information** on matters related to academic and professional topics and lot more. In the present world, most of the people who have computers around themselves use Internet to access **Information** from the World Wide Web, exchange messages & documents and e-services.

In this study session, you will learn about basics of Internet, and its various applications

Student Learning Objectives

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

i. Explain the concept of Internet.
ii. Discuss Internet and its application areas.

Main Content

Introduction to Internet

The Internet or simply the Net is a worldwide network of **Computer** networks. It is an interconnection of large and small networks around the globe. The Internet is a **Computer** network made up of thousands of networks worldwide. No one knows exactly how many computers are connected to the Internet. It is certain, however, that this number is in the millions and it is increasing at a rapid rate. No one is in charge of the Internet. There are organizations which develop technical aspects of this network and set standards for creating applications on it, but no governing body is in control. Private companies own the Internet backbone, through which Internet traffic flows.

Box 2.0

What is Internet?

Answer The Internet or simply the Net is a worldwide network of **Computer** networks. It is an interconnection of large and small networks around the globe.

Applications of Internet

With the help of Internet, you can:

i. Exchange messages using e-mail (Electronic mail).
ii. Transfer files as well as software.
iii. Browse through **Information** on any topic on web.
iv. Communicate in real time (chat) with others connected to the Internet.
v. Search **Data**bases of government, individuals and organizations.
vi. Read news available from leading news groups.
vii. Send or receive animation and picture files from distant places.
viii. Set up a site with **Information** about your company's products and services.

Types of Internet Connections

Any terminal to activate internet services on it requires an internet connection from an Internet Service Provider. To have a connection, one needs to contact the Internet Service Providers. There are several Internet Service Providers (ISPs) in each locality. There are some nominal charges that you need to pay to the ISP for the installation of the connection and for the rent (either monthly or annually). Depending on the requirement, you can choose any one of the available options. If you need a high speed dedicated network, then you can opt for a high bandwidth broadband or leased line connection. An Internet service provider (ISP) is an organization that provides services for accessing, using, or participating in the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned. Internet services typically provided by ISPs include Internet access, Internet transit, domain name registration, web hosting, Usenet service, and colocation. If you need to have connection on a single PC, then you choose a low bandwidth or dialup connection. For small services at your hand, you can even have mobile phones connected to your Internet. There are many ways to get connected to the Internet.

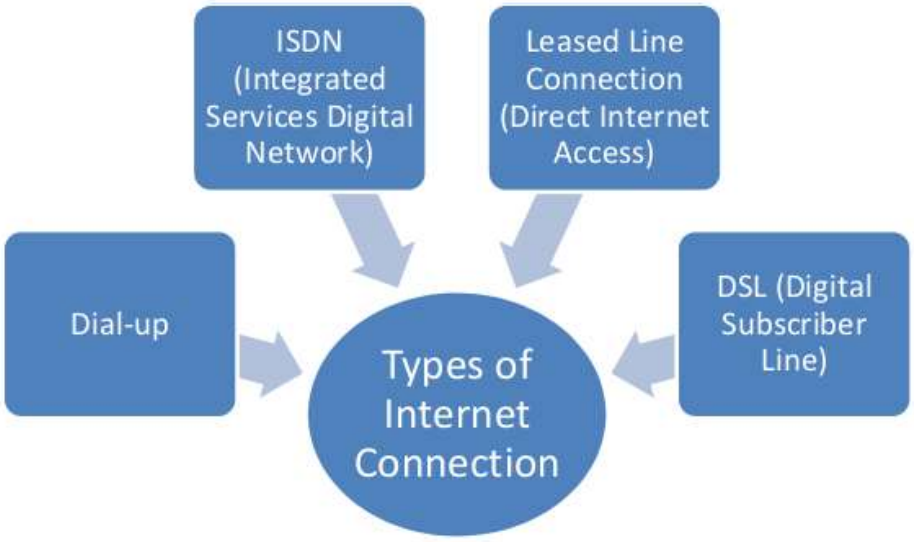


Figure 44: Types of Internet Connection

You can get internet connection in any of the following ways:-

i. Dial-up

This is the most common basic type of connection available from ISPs (Internet Server Providers). In Dial-up connection, you use your computer, dial a phone number (provided by ISP) to get connected to server at providers' end through which you access Internet. It means you are not directly connected to Internet; you access the Internet through an Internet Service Provider.

ii. ISDN (Integrated Services Digital Network)

The process of connecting to server to access Internet is almost same as Dial-up, but it offers connectivity through the use of digital phone lines instead of Analog. It offers Internet connectivity at speeds of up to 128 Kbps, allows the user to receive or make calls simultaneously on the same line. ISDN comes through a regular telephone wire from the telephone pole on the street. The line combines two 64 Kbps channels to offer 128 Kbps bandwidth broken into three bands: One band for the ringing signal of your phone, one band for your telephone conversation, and one band for **Data** transfer.

iii. Leased Line Connection (Direct Internet Access)

It is a "permanent connection" between a **Computer System** (single CPU or LAN, and the Internet). It is generally used by larger institutions, corporate and government agencies. It involves establishing your own Internet gateway (connection) and payment to have a direct full time line with the network. Your computers, in effect, become part of the Net. The main advantage of this connection is that: it is on line – 24 hrs. A day, seven days a week, (24x7) and provides faster access. Dedicated links are established through an internet service provider who places a computer-controlled router (message director) at your site. A router is used to connect your local network to the Internet, allow all the members of network to have complete access to Internet.

iv. DSL (Digital Subscriber Line or Dedicated Service Line) Broadband Connection

DSL, an "always-on' **Data** connection is becoming widely available these days. It can provide an excellent Internet connection. It connects your home or office to the Internet through the same telephone wire that comes from telephone pole on the street. Like ISDN, with DSL, user can make and receive telephone calls while connected to the Internet. The difference between DSL and dial-up / ISDN is that a DSL Internet connection uses a high-speed dedicated circuit filtering out standard phone calls and Internet signals.

Web Browser

A web browser is the software program, used to access the World Wide Web. A browser (also known as client software) retrieves **Data** from remote web servers and displays a web page. Through this tool the user send their request to Internet server to access the information, Server process the request and responds with required **Information** as a web page to the user. The most popular browsers are Internet Explorer, Netscape Navigator, Mozilla Firefox, Safari and Google Chrome.

The steps for connecting to a website are explained further.

i. Type a URL for a website in browser say www.lautechcdl.com/lautechcdlms/
ii. Your browser attempts to make a connection and sends the request to Web Server.

iii. The Web Server receives and processes the request.
iv. The Web Server responds to the request with the homepage of the website.
v. The webpage is displayed by your browser and the connection between the server and your browser is closed

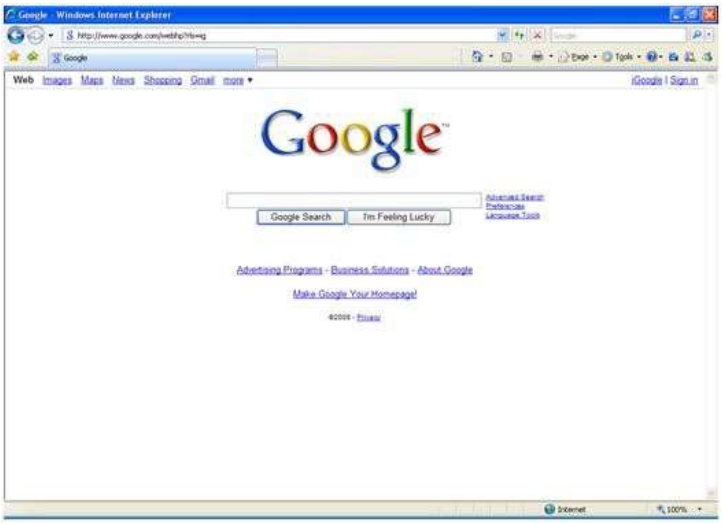


Figure 45: Internet Explorer
Source: www.medium.com

Frequently Used Terms in Internet

In this section, we will discuss common internet terms to help you understand the relationship of various Internet technologies.

i. World Wide Web (WWW): The World Wide Web ("WWW" or simply the "web") is a collection of electronic documents (called web pages) that are linked together like a spider web. These documents are stored on computers called servers located around the world.
ii. Web Server: A Web Server is a **Computer** that stores web pages. It is responsible for accepting request(s) from users and serves them with web pages. Two important web server programs are: IIS (Internet **Information** server) and Apache, etc. Web servers are connected to the Internet 24 hours a day, seven days a week.
iii. Hyperlink: It is an element in an electronic document that links to another place in the same document or to an entirely different document or other resource. Hyperlinks usually appear as underlined text and in a different color, but they may also appear as graphics, such as buttons to click. Hyperlinks may be used to link another place in the same page, or another page, to play an audio or video file, to download a file, to set up a message to an e-mail address, and to link to other Internet resources.
iv. HTML (Hypertext Markup Language): It is a language that consists of certain key words called 'Tags', used for writing the documents on the web.

v. Web Page: A web page (such as the one you are looking at now) is an electronic document written in a **Computer** language called HTML (Hypertext Markup Language). Web pages can contain text, graphics, video, animation, and sound, as well as interactive features, such as **Data** entry forms. Each page has a unique address known as a URL (Uniform Resource Locator) that identifies its location on the server. Web pages usually contain hyperlinks to other web pages.

vi. Website: A website (often shortened to just site) is one or more web pages, belonging to a particular company, institute, government or an individual. The first page is called the home page, which acts like an index, indicating the content on the site.

Box 2.1

What is Internet service provider (ISP)?

Answer An Internet service provider (ISP) is an organization that provides services for accessing, using, or participating in the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.

Summary

In this unit, you have learnt that:

i. The Internet or simply the Net is a worldwide network of **Computer** networks. It is an interconnection of large and small networks around the globe.

ii. The Internet is a **Computer** network made up of thousands of network worldwide. No one knows exactly how many computers are connected to the Internet.

iii. An Internet service provider (ISP) is an organization that provides services for accessing, using, or participating in the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.

iv. Types of Internet connections include: Dial up, ISDN (Integrated Services Digital Network), Leased Line Connection (Direct Internet Access), DSL (Digital Subscriber Line)

Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. How can you use internet to communicate with relations that are far away?
ii. How is DSL different from ISDN?

Tutor Marked Assignment

i. Define Internet
ii. State 5 applications of Internet
iii. Define the following terms:
- World wide web
- Hyperlink
- Webpage
- Website

Further Readings

1. "Internet Technology Tutorial" by Tutorials Point (online tutorial, 2022)
2. "How the Internet Works" by TechRadar (online article, 2022)
3. "Internet Technology Basics" by Microsoft Support (online tutorial, 2022)



References

1. "Internet Technology and Applications" by James K. Summers (2020)
2. "The Internet: A Guide to Internet Technology" by Marshall Breeding (2020)
3. "Internet Technology: A Comprehensive Guide" by Daniel G. Siegel (2020)
4. Internet Technology" by Coursera (online course, 2022)
5. "Internet Fundamentals" by edX (online course, 2022)
6. "Internet Technology and Applications" by Udemy (online course, 2022)



Unit 3: Electronic mail

Introduction

In this study session, you will learn about basics of Electronic mail and E-mail Privacy.

Student Learning Objectives

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

i. Explain the concept of Electronic mail
ii. Discuss E-mail Privacy

 **Main Content**

Electronic mail

Electronic mail, or e-mail, is your personal one-to-one communication connection to the world of the Internet. Most of the millions of people around the world who use the Internet have their own e-mail addresses. The basic concepts behind e-mail parallel those of regular mail, but e-mail has advantages over regular mail. The most obvious is speed. Instead of several days, your message can reach the other side of the world in hours, minutes, or maybe even seconds. E-mail is also convenient. You send your messages when it's convenient for you and your recipients respond at their conveniences.

E-mail Addresses

In order to use e-mail over the Internet effectively, users need a certain amount of knowledge about addressing. All Internet e-mail addresses have a minimum of three parts: a user name (which may or may not be the same as the person's real name); an 'at' sign (i.e., @); and a domain address, (frequently the service provider's name).
The domain name is followed by a period dot,' in Internet parlance) and a domain type, which specifies a domain's institution type. Although there has been much talk lately about adding domain types to prevent running out of Web addresses, so far these types generally fall into one of seven categories:

- com – business or commercial
- edu – educational (e.g. a college or university)
- mil – military
- net – network resource
- org – organization (frequently nonprofit in nature)
- it – international organizations (such as NATO or the United Nations)

If the address ends in one of these types, it generally means the domain is located in the United States. However, since domains do not require a country specification in order to be registered, this is not a hard and fast rule. Usually, countries other than the U.S. tack on a country code to the end of the Internet address. Some of these codes are as follows

- au – Australia
- ca – Canada
- fr – France
- ie – Ireland
- is – Israel
- it – Italy
- ng – Nigeria
- nz – New Zealand
- ru – Russia

- uk – England
- us – United States
- za – Zaire

Standards E-mail Protocols

As with every technology, e-mail has its own set of standards to ensure usability. Additionally, the Internet requires standards as well, enabling such capabilities as multimedia file attachments around the world.

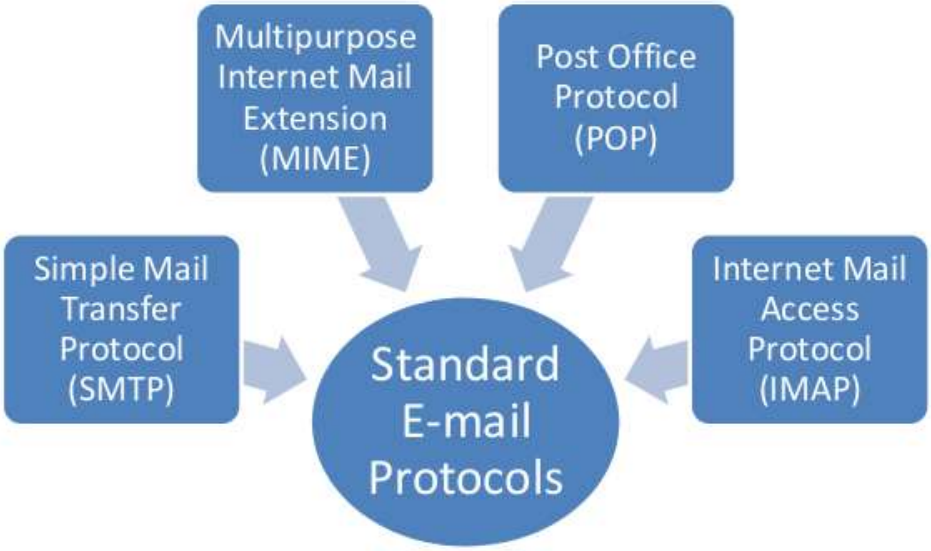


Figure 46: Standard E-mail Protocols

i. Simple Mail Transfer Protocol (SMTP)

First established in 1982, this standard allows for mail messages that contain a single 'human readable' message, with several restrictions: the message must contain only ASCII characters; the message may not contain any line longer than 1,000 characters; and the message must not exceed a certain length.

ii. Multipurpose Internet Mail Extension (MIME)

This standard for attaching non-text files to standard Internet mail messages extends the SMTP format by defining new formats, such as those for **Data** other than text. Developed by the Internet Engineering Task Force with the purpose of handling new media types, it so far supports seven of them: plain text of any length (without word processor formatting), audio, video, still images, pointers to messages located elsewhere, multipart messages (even if each part consists of a different type), and application-specific **Data**.

iii. Post Office Protocol (POP)

Now in its third iteration (POP3), this standard supports downloading mail from any location without having to connect to a fixed server. In other words, it means that the server you connect to holds your mail until you log on and retrieve it. It is the

standard supported by most mail clients on the Internet, but it is beginning to be superseded by IMAP.

iv. Internet Mail Access Protocol (IMAP)

A client/server protocol now in its fourth version, IMAP4 takes POP a step further. Instead of requiring users to transfer a complete mail item to a client before beginning the message, IMAP lets users selectively download portions of a message.

For example, users can download a text portion but retain the graphic file attachment on the server for later download. Additionally, it lets users pick up messages on a remote server, edit them on- or offline, and otherwise manipulate server-based folders.

Advantages of Using E-mail

Using Internet e-mail instead of conventional mail, overnight delivery services, the telephone, or a fax can often lead to tremendous cost savings. For example, the cost of sending a 100-page document to any part of the Lagos via e-mail (which, travelling at 28.8k bps could arrive at its destination in about a minute) costs less than N50.00. Compare this to the cost of using any Courier service, N2000.00 or even regular postage, and the savings are clear. Furthermore, companies can save money by attaching files to e-mail and eliminating the costs of rekeying.

E-mail Privacy

Perhaps the biggest concern in sending Internet e-mail is the assurance that no one but the intended recipient will read it. To this end, a variety of options exist for ensuring e-mail privacy, comprising encryption algorithms and authentication methods. There are presently five separate encryption protocols and all of them have the potential to become standards as time goes on.

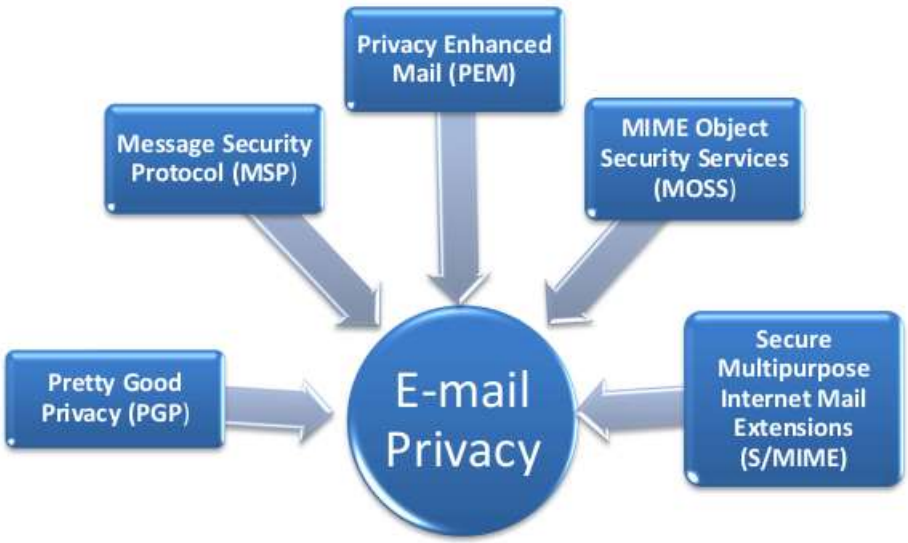


Figure 47: E-mail Privacy

i. Pretty Good Privacy (PGP)
Originally released as freeware in 1991 by its developer, Philip Zimmermann, this is widely used for mail encryption on the Internet. It cannot, however, encrypt multimedia **Data**, so another version, called PGP/MIME, has recently been developed which will address this shortcoming.

ii. Message Security Protocol (MSP)
This protocol is used in the Defense Message System. It offers a signed receipt capability that proves that a message got to its destination without modification. While its use so far is within the military, such a feature can be just as important in commercial environments.

iii. Privacy Enhanced Mail (PEM)
This standard for secure e-mail outlines necessary security services including encryption, authentication, and certificate-based key management. Additionally, it defines the algorithms to be used. However, unlike MSP, PEM does not provide authentication of the recipient. This standard was never accepted widely and seems to have been replaced by MSP.

iv. MIME Object Security Services (MOSS)
MOSS is actually derived from PEM and adds security services to MIME. It uses two cryptographic techniques--digital signatures and encryption--and provides the capability to authenticate a message's origin, that it has not been altered on its way to its destination, and that only the intended recipients can read it.

v. Secure Multipurpose Internet Mail Extensions (S/MIME)
This encryption scheme was developed by a consortium headed by RSA **Data** Security and supported by Microsoft. It supports encryption of multimedia **Data** types, as well as text, and a strong point is that it guarantees interoperability between any two implementations. Since it is, however, patented technology, there have been some speculations as to whether it should be considered for approval as a standard. It is already part of both Netscape Navigator and Microsoft Internet Explorer.



Summary

In this unit, you have learnt that:

i. Standards E-mail Protocols are: Simple Mail Transfer Protocol (SMTP), Multipurpose Internet Mail Extension (MIME), Post Office Protocol (POP), Internet Mail Access Protocol (IMAP)

Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. Explain the following
   - Simple Mail Transfer Protocol
   - Multipurpose Internet Mail Extension
   - Post Office Protocol
   - Internet Mail Access Protocol

Tutor Marked Assignment

i. State the major differences between Simple Mail Transfer Protocol and Multipurpose Internet Mail Extension.
ii. Discuss any four security protocols that ensure the privacy of e-mails

Further Readings

1. "Email Essentials" by Coursera (online course, 2022)
2. "Email Marketing" by edX (online course, 2022)
3. "Email Management" by Udemy (online course, 2022)



References

1. "Email: A Guide to Electronic Mail" by Marshall Breeding (2020)
2. "The Email Revolution: How Email Changed the Way We Communicate" by Daniel G. Siegel (2020)
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4. "Email Tutorial" by GCFLearnFree (online tutorial, 2022)
5. "How Email Works" by TechRadar (online article, 2022)
6. "Email Basics" by Microsoft Support (online tutorial, 2022)

Learning Section 5:

Office Productivity Tools

Units

Unit 1: Word processing

Unit 2: Worksheet



Unit 1: Word Processing

Introduction

Office Productivity tools are software programs designed to make **Computer** users more productive and efficient at their workplace. Office productivity tools range from word processing to spreadsheet, presentation and **Data**base etc. In this study session, productivity tools for doing word processing and spreadsheet related work will be explained.

Student Learning Objectives

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

i. Explain basic menu details of Word processing
ii. Create, save and modify Word files and protect a Word document

Main Content

Starting Word Program

You can start the WORD program as follows

i. Click on the Start button.

ii. In the menu that appears select All Programs (registered) Microsoft Office - Microsoft Office Word 2007



Figure 48: Starting word program

Source: www.examrace.com

Word screen layout

In a few seconds you will see Word screen on the monitor



Figure 49: Word screen layout
Source: www.techrepublic.com

i. Office button

It is one of the important parts of the screen used in file management containing menus like New, Open, Print etc.

ii. Title bar

Title bar is the topmost part of the screen which contains quick access tool bar on the left, title of the document in the center and the sizing buttons on the extreme right of it.

iii. Ribbon

The Ribbon is designed to help you quickly find the commands that you need to complete a task.

iv. Rulers

The rulers display horizontal and vertical scales that reflect the width and height of your typing area. The horizontal scale is invaluable when you want to quickly set tabs, margins, and indents. Select the View tab on the main word screen to be able to select/deselect the Ruler/Gridlines and other options.

v. Typing Area

The open area below the ribbon is writing or typing area. There are certain objects that are a permanent part of the typing area. These are: (a) Insertion Point, (b) Mouse Pointer

vi. Insertion Point

The black vertical blinking line is the cursor and place where it is blinking is insertion point that is initially at the top left side of the typing area i.e., at the beginning of the document. It indicates the place where your typing is inserted into the document. As you type, the blinking line continuously moves along towards right.

vii. Mouse Pointer

When you move the mouse around in the typing area, the mouse pointer is in the shape of a thin I- beam. As you move the mouse near the menu bar and toolbars, the mouse pointer becomes a pointing arrow.

viii. Scrollbars

The typing area is bordered on the right side by the vertical scroll bar with a scroll button and arrows. The single down arrow scrolls through the document line by line. The double down arrow allows you to move to the top of the next page. The double up arrow allows you to move to the top of the previous page. The double down arrow allows you to move to the top of the next page. You can also drag the vertical scroll button up and down the scroll bar to move up and down through the document.

ix. Status bar

It is situated at the bottom of the screen and contains status of the document.

Documents

Managing Documents

This section of the lesson explains how to open a new/existing document, save a document, print a document, finding a document, and closing an opened document. There are several ways of create new documents, open existing documents, and save documents in Word. Click on the Office Button to use one of the following options from the menu pull down bar.

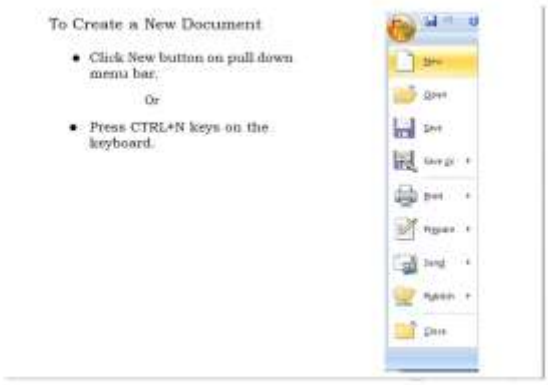


Figure 50: Creating New Document

To enter text, just start typing in the text area. As you type, the text will appear where the blinking cursor is located and will move from left to right. Unlike with a typewriter, you need not press ENTER key at the end of each line, the texts automatically shift to next line.

i. To Open an Existing Document

To open an existing document, follow one of the following methods:

- Click the Open button on the pull down menu.

Or

- Press CTRL+O keys on the keyboard.

Each of the above method will show the Open dialog box. Choose the file and click the Open button.

ii. To Save a New or Existing Document

To save a new/existing document that is opened, follow one of the following methods:

- Click the Save button on the pull down menu.

Or

- Press CTRL+S keys on the keyboard.

If the document is already named and saved earlier, it will simply save the document. On the other hand, if the file is a new document then it will prompt you by opening Save As dialog box. Select the folder where you want to place your document in Save In: box, type the name of the document in File Name: box, and then click OK. You can also save a new document by choosing CTRL-S on the keyboard and then selecting the above actions in Save As dialog box.

iii. To Close a Document

Close the current document by selecting Office Button-Close command on the menu bar or click the Close icon if it is visible on the Standard toolbar.

Editing a Document

Editing a document includes basic three tasks which are Editing a document includes basic three tasks which are Inserting text, Deleting text and Replacing text

i. Inserting Text

To insert the text in an existing document, follow the steps given below:

- Move the cursor by using the arrow buttons on the keyboard or positioning the mouse and clicking the left button where you want to insert the text.
- Type the text you want to insert.

ii. Deleting Text

Use the BACKSPACE and DELETE keys on the keyboard to delete text. Backspace will delete the text to the left of the cursor and Delete will erase the text to the right

iii. Replacing Text

Word can com bi ne t h e steps of deleting un w anted text , positioning the insertion point, and inserting replacement text. To replace text, follow the steps given below:

- Select the text to be removed as explained above.
- Start typing the new text. Observe that the new text is replacing the selecting text.

Formatting Document

Formatting a document mainly involves formatting of Font and Paragraph.

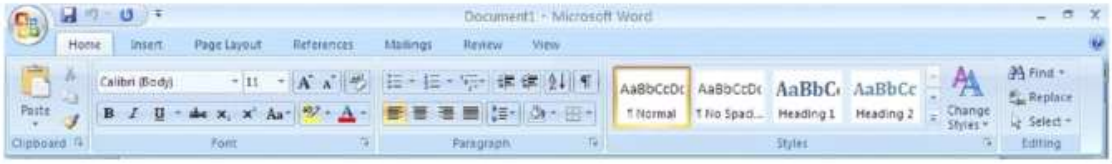


Figure 51: Document formatting tab

i. Font Formatting

Using the Formatting toolbar is the easiest way to change many attributes of text. If the toolbar as shown below is not displayed on the screen, select Home Tab. Under Home Tab you can select desired Formatting commands under Font, Paragraph subtask as per the diagram given below.

ii. Font Face

Font is the basic typeface in which your words are displayed. Font comes in families such as Times New Roman or Ariel. Each font family has a specific way of formatting individual letters.

iii. Font Size - It determines how large each letter will appear.

The font size is measured in points (1/72 of an inch). Click on the white part of the font size box in the Font Formatting subtask menu to enter a value for the font size or click the arrowhead to the right of the box in the Formatting toolbar to view a list of font sizes available.

iv. Font Style - Font style determines the emphasis or weight that the letters have when they are displayed. Each font can be displayed as bold, italicize and underline.

- Alignment - Text can be aligned to the left, center, or right side of the page or it can be justified across the page.
- Numbered and Bulleted Lists - Lists are used to highlight the main points of the document.
- Increase/Decrease Indent - Change the indentation of a paragraph in relation to the side of the page.

- Outside Border - Add a border around a text selection.
- Highlight Color - Use this option to change the color behind a text selection. The color shown on the button is the last color used. To select a different color, click the arrowhead next to the image on the button.
- Text Color - This option changes the color of the text.
  The color shown on the button is the last color chosen. Click the arrowhead next to the button image to select another color.

v. Line Spacing: Line Spacing determines the height of each line of text in the paragraph.

The default (single line spacing) depends on the size of the font characters. The preview area demonstrates the relative effect of single, one-and-a-half and double line spacing.

vi. Bulleted and Numbered Lists

Bulleted lists and Numbered lists are often used to bring main points to a reader's attention.

- Creating a Bulleted and Numbered Lists

  To create a bulleted or numbered list, use the list features provided by Word. Click the Bulleted List button or Numbered List button on the formatting toolbar. Then type the first entry and press ENTER. This will create a new bullet or number on the next line. If you want to start a new line without adding another bullet or number, hold down the SHIFT key while pressing ENTER. You can also type the text first, highlight the section, and press the Bulleted List or Numbered List buttons to add the bullets or numbers.

vii. Working with Tables

There are two ways to add a table to the document using the Insert feature:

- Click on the Insert Table tab on the standard tool bar and select table icon from the sub task menu
- Drag the mouse along the grid, highlighting the number of rows and columns required for the table. And as you select the number of rows and columns, accordingly the table will get created on the document.
- Alternatively select Insert Tab-Table from the sub-task menu bar. Then select Insert Table options to display the input screen for number of rows and columns the table will have.

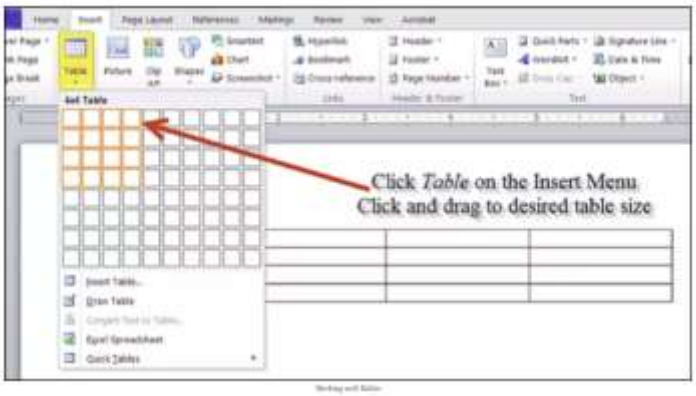


Figure 52: Working with table



Figure 53: Insert Table

viii. Adding Graphics

Word accepts most popular graphic file formats in use today, and it comes with large collection of ready-to-use clip art. You can also import your own graphic files from any source such as scanners and digital cameras. You can also create your own artwork by using drawing tools in Word. The tools to insert graphics in to the document are available in Illustrations groups under Insert tab from the main tab bar.

ix. Copying Text and Moving Text

- Copying Text

Copying means to make a copy of the selected text and insert it at another location, leaving the original text unchanged. To copy text, follow the steps given below:

- ✓ Select the text that will be copied.
- ✓ Select Home □□Clipboard sub task menu command on the menu bar, or click the Cut button on the standard tool bar, or press CTRL+X keys. This will move the text to a clipboard.

- ✓ Choose Home □□Clipboard sub task menu command on the menu bar, click the Copy button on the standard toolbar, or press CTRL+C keys to copy the text to the clipboard.

- Moving Text

  Moving text means to remove (cut) the selected text from one location and insert (paste) it at another location. To move texts, follow the steps given below:

  - ✓ Select the text that will be moved.
  - ✓ Select Home□ Clipboard sub task menu command on the menu bar, or click the Cut button on the standard tool bar, or press CTRL+X keys. This will move the text to a clipboard.
  - ✓ To paste cut text, move the cursor to the location you want to move the text to and select Home. Click the Paste button on the standard toolbar, or press CTRL+V keys.
  - ✓ To move a small amount of text a short distance, the drag-and- drop method may be quicker.
  - ✓ Highlight the text you want to move, click the selection with the mouse, drag the selection to the new location, and release the mouse button.

x. Spelling and Grammar

The spelling and grammar checkers check for misspelled words or grammar errors. Word will automatically check for spelling and grammar errors as you type unless you turn this feature off.

To use the spelling and grammar checker, follow these steps:

- Select button from the main tab bar or press F7 button on the keyboard.
- The Spelling and Grammar dialog box will notify you of the first mistake in the document and misspelled words will be highlighted in red.
- If the word is spelled correctly, click the ignore button or click ll button if the word appears more than once in the document.

xi. Page Layout

In this section, you will learn designing pages suiting to your needs. For instance, the page setup options which included paper size and page orientation etc. are normally set either by you or by default at the beginning of the opening a new document. These options are available under Page Layout tab and can easily be changed at any time according to your needs

xii. Page Margins

There are two methods by which you can change the page margins of your document:

- using ruler
  - ✓ Move the mouse over the area where the white ruler changes to grey

- ✓ When the cursor becomes a double-ended arrow, click with the mouse and drag the margin indicator to the desired location
- ✓ Release the mouse when the margin is set.

- Using Page Setup dialog box.

The margins can also be changed using the Page Setup dialog box:

- ✓ Select Page Layout Tab
- ✓ Click on the command on the menu bar
- ✓ Choose the Margins button under Page Setup sub task group to display the margin dialog box.

xiii. Headers and Footers

A header is text that is added to the top margin of every page such as a document title or page number and footer is text added to the bottom margin. Follow these steps to add or edit headers and footers in the document.

- Select Insert Header and Footer subtask menu on the main tab bar. Click on the Header or Footer option as per the requirement.
- On selecting Header option, header toolbar will appear and the top of the page will be highlighted.
- Type the heading in the Header box. You may use many of the standard text formatting options such as font face, size, bold, italics, etc.

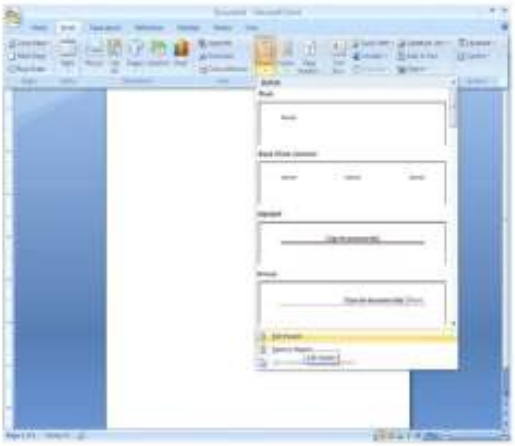


Figure 54: Header and Footer

Similarly you can select the designated command for Footer and customized it as per requirement.

xiv. Page Numbers

Use these steps to add page numbers to a document as shown in figure.

- Select Insert- Page Numbers from the main tab bar and the following dialog box will appear.

- Select the Position of the page numbers by choosing “Top of page” or “Bottom of page” from the Position drop-down menu.
- Click OK when finished.

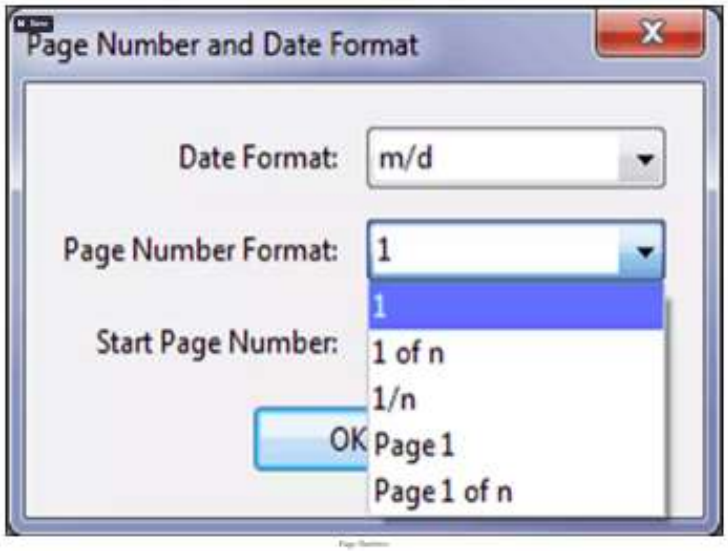


Figure 55: Page Number

xv. Printing Document

While printing a document you have the following options in Print dialog box:

1. Name of the printer (if you have more than one printers).
2. Choose paper size, orientations, resolution etc. by pressing Properties button.
3. Print the

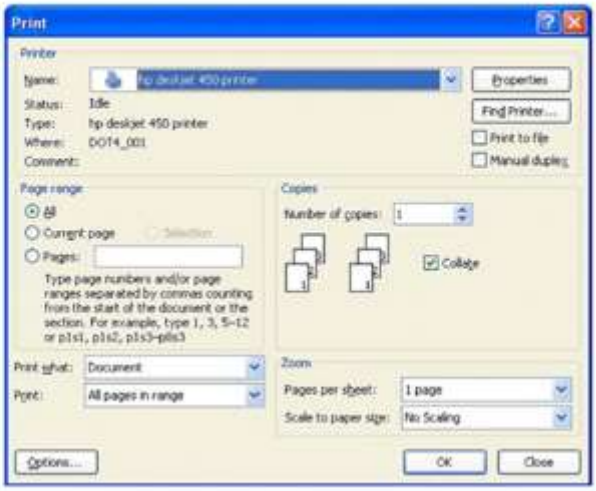


Figure 56: Printing Document

3. Print the entire document or only current page or specific pages or even the selected part of the document.
4. Print a draft copy, which omits graphics to allow faster printing.
5. Number of copies to be printed, etc.

To print a document or selected pages follow the steps given below:

i. Open the document to be printed.

ii. Choose Office Button Print command on the menu bar.

The Print dialog box will open. Select the Options like print range, Number of copies, Printer name etc. See that printer is switched on and the paper is available in the printer tray.

iii. Click OK.

xvi. Exit Word Program

When finished your work in Word and closing all the files, you can quit the Word program by selecting office Button Exit command on the menu bar.

xvii. Mail Merge

Mail merge is one of the importing features of Word which is used to produce letters, mailing labels and envelops and send it to different people or organization. Mail Merge requires three types of documents:

- Main Document: In a Mail Merge operation, the personalized document (such as, a standard letter, or mailing label) is known as the main document. It is the document containing the text and graphics that stay the same for each version of the merged document.
- **Data** Source: **Data** source is a file that contains the names and addresses or any other **Information** that vary with each version of a mail-merge document
- Merge Document: When you merge the main document with **Data** source, a third document called merge document will be produced. The merge document can be merged to the screen to view letters along with addresses; or directly to the printer to print the letters along with addresses.

To do Mail Merge in Word click on the 'Mailings' tab on the main tab bar to activate the mailings features and tools, which comprises subtask such as "Create", "Start Mail Merge", "Write & Insert Fields", "Preview Results" and "Finish & Merge"

Mail Merge Wizard

The Mail Merge wizard guides you through the process of doing a mail merge. This involves creating and editing main document; creating a new **Data** file, opening an existing **Data** file; and merging the **Data** fields with main document. To use Mail Merge Wizard, select Mailings then Start Mail Merge subtask from the main tab bar. Then select Step by Step Mail Merge Wizard option on the subtask bar.

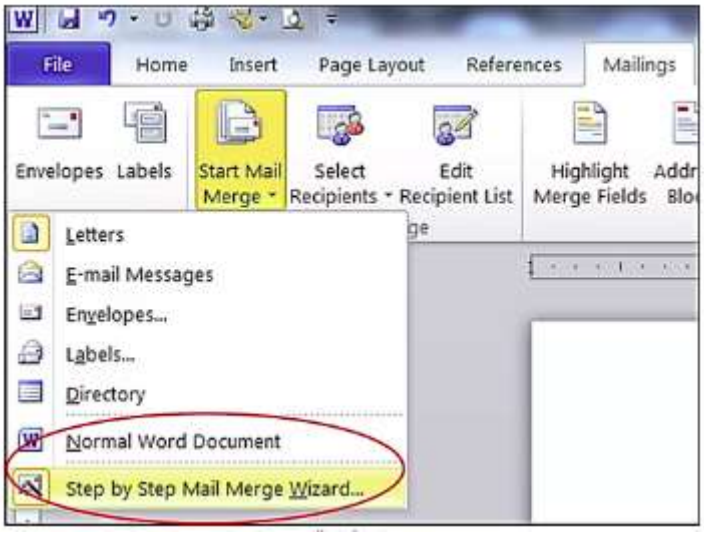


Figure 57: Mail Merge Wizard

The Mail Merge Wizard menu will appear on the screen. This will help you to create mail merge documents in customized step manner.

Select Document Type

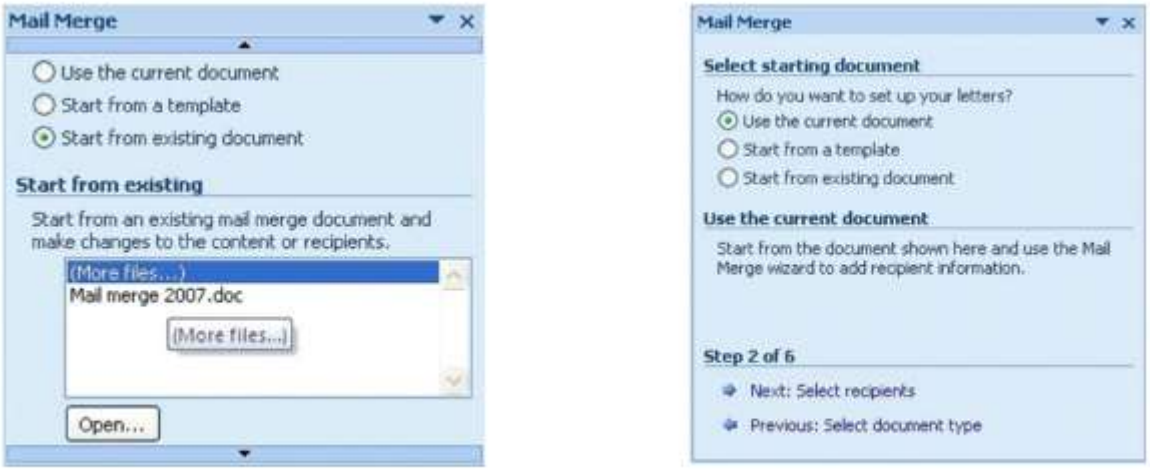
Selecting a Document Type is the first step towards creating a mail merge document. Using this option you can choose the type of main document such as Letters, E-Mail Messages.

Envelopes, Labels, Directory

When you select Letters type, you can use this letter to send to a group of people with a personalized letter that is received by different people in that group with different address. Select Letters from the options given in the Select Document type box and click on the "Next: Starting document" located on the lower end of the Wizard dialog box to move to the next step.

Select Starting Document

i. The 2nd step in the process is to select starting document under Letters option. There are three options available.
ii. Use the current document: This is to use the current document shown and use the mail merge features to add recipients address



(a) (b)

Figure 57: Mail Merge

iii. Start from a Template: Similarly if you don't have a drafted letter for use, you can choose for ready to use mail merge template already available with Word 2007.

iv. Start from existing document: If you already have a document available with you, you can select the existing mail merge document and make necessary changes to the content of the letter and/or recipients. Now you type the body of the letter Save your document.

Creating a **Data** Source

The 3rd step in Mail Merge Wizard is to select a list of recipients or address to whom the drafted letter will be addressed and dispatched. If you do not have existing **Data**base information, you must create your own **Data** source of the fields of **Information** that will be inserted into the letter or any other main document. For example,

> A Mail Merge letter which you have created earlier might require that you have the following fields in address list of students as **Data** source: Name, Address1, Address2, City, State, and PIN Code.

Creating a **Data** Source Using Mail Merge Helper

You can use the Mail Merge Wizard to create a Microsoft Word, Excel or Access **Data**base **Data** source. Follow these steps to create a **Data** source using Mail Merge Wizard: Open a new blank document if you have not yet created the main document or open your existing main document.

i. Select "Type a new list" from the "Select Recipients" dialog box in step 3 of the Mail Merge Wizard and then select "Create" option

ii. A dialog box appears to create a list with new set of **Data** such as Title, First Name, Last Name, Company Name and Address Line 1 and so on.

iii. You can start entering **Data** to the respective field as per your requirement directly into the displayed New Address List dialog box.

iv. If you want to Customize Columns in the new address list to remove or add any other field as per your requirement, click on the customized button located on the lower right side of the New Address List dialog box.
v. This will display a list of available **Data** field to which you can add a customized **Data** field, delete or rename an existing **Data** field in the list. Once done click on the "OK" button.
vi. When you finish specifying the required **Data** fields to the new address list, click OK. The Save As dialog box appears.
vii. Locate the folder that you want to save the **Data** source in, type a file name, and then click Save As in the Save As dialog box. The file will be saved with an extension name mdb. (Microsoft **Data**base).

Merging Documents

Once if you have created your main document and **Data** source document, the next two steps in mail merge are to insert merge fields in the main document and then merge **Data** in the main document.

To merge the fields in the main document you may have to do some editing in the main document. Follow these steps as defined:

i. Click on the location of your letter where you want the addresses to be displayed and then
ii. Select Address block option on the dialog box displayed in step 4 of the Mail Merge Wizard. The Mail Merge Wizard displays the Insert Address Block dialog box.
iii. Using Insert Address Block you can select the individual address field to be inserted into the main letter.
iv. After you complete the main document and insert all of the merge fields, click on the Office Button and select Save As option. Now select "Word Document" to save the file as a Word 2007 document or Select "Word 97-2003 Document" to save it as Word 97 or 2003 compatible document. Name the document, and then click Save. Now your main document will work as merge document.

Merging the **Data** into the Main Document

Merging the **Data** into the main document is the last step of the Mail Merge Wizard. Click on the << or >> button to display the preview of the main letter with address **Data** before you close the merge document and take the printout of the letter. Once finished click on the "Next: Complete the Merge" option on the dialog box to complete the merging process.

Features of Spreadsheet

The new results-oriented user interface makes it easy for you to work in Microsoft Office Excel. Commands and features that were often buried in complex menus and toolbars are now easier to find on task-oriented tabs that contain logical groups of commands and features. Many dialog boxes are replaced with drop-down galleries that display the available options, and descriptive tooltips or sample previews are provided to help you to choose the right option.

Starting Spreadsheet

i. Click on the Start button
ii. In the menu click All Programs -> Microsoft Office-> Microsoft Office Excel, 2007.

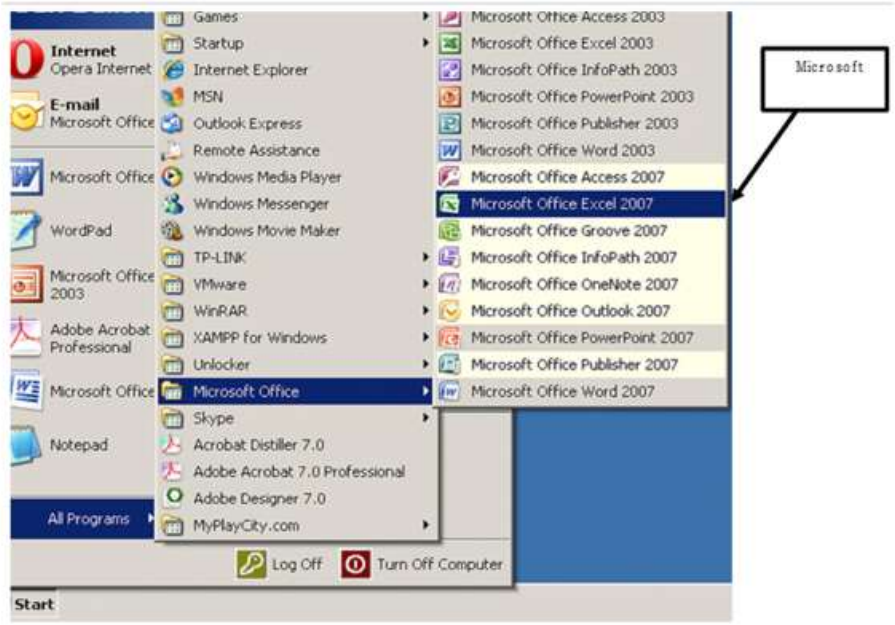


Figure 58: Starting Spreadsheet

It will start MS Excel 2007. The opening Excel screen is shown in Figure 1.15 and the description of all the screen features are shown in table.

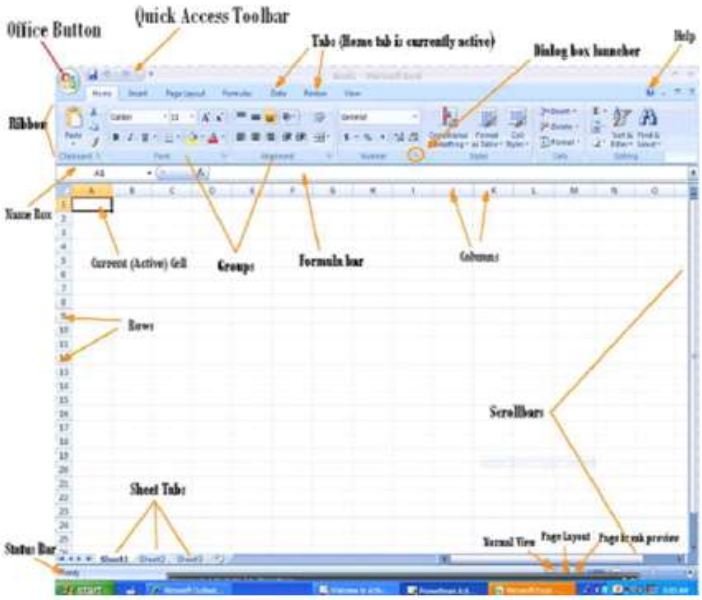


Figure 59: Spreadsheet Screen

Table 1.0: Excel Screen Features

Office Button	Displays as a Microsoft Office logo and when clicked, displays a list of document management actions, such a s save or print, and a list of recently opened workbooks.
Quick Access toolbar	Contains buttons for commonly used commands which can be executed with a single mouse click
Tabs	Commands and features in the ribbon are organized into related groups which are accessed by clicking a tab name.
Title Bar	Displays workbook name followed by Microsoft Excel
Ribbon	Area from which commands and feature s for performing actions on a cell or work sheet are accessed. Begin by selecting a tab and then choosing the command or feature.
Name Box	Displays the active cell address or name assigned to active cell.
Formula Bar	Displays the contents stored in the active cell
Active Cell	Location in the worksheet that will display typed **Data** or that will be affected by a command.
Worksheet Area	Contains calls used to create the worksheet
Vertical Horizontal scrollbars	Used to view various parts of the worksheet beyond the current screen
Sheet Tabs	Identifies the worksheets in the workbook. Use these tabs to change the active worksheet
Status Bar	Displays current mode, action messages, View buttons, and Zoom slider.

Summary

In this unit, you have learnt:

i. The basic menu details of Word processing
ii. How to Create, save and modify Word files and protect a Word document
iii. How to mail merge and mail merge wizard.

Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. Distinguish between Document Formatting and Document merging.

Tutor Marked Assignment

i. Write short note on the following:
   - Text Inserting
   - Text Replacing
   - Mail merge

ii. Discuss the term Document Formatting.

Further Readings

1. "Microsoft Word 2019" by Coursera (online course, 2022)
2. "Google Docs" by edX (online course, 2022)
3. "Word Processing" by Udemy (online course, 2022)



References

1. "Microsoft Word 2019 Inside Out" by Katherine Murray (2019)
2. "Word Processing: A Comprehensive Approach" by James A. O'Donnell (2020)
3. "Google Docs: A Guide to Word Processing in the Cloud" by Michael R. Grover (2020)
4. "Microsoft Word Tutorials" by Microsoft Support (online tutorials, 2022)
5. "Google Docs Tutorials" by Google Docs Support (online tutorials, 2022)
6. "Word Processing Software" by TechRadar (online article, 2022)



Unit 2: Worksheet

Introduction

Worksheet commonly refers to a sheet of paper with questions for students and places to record answers. The term may also refer to a single array of **Data** in spreadsheet software or an informal piece of paper that an accountant uses to record information.

Student Learning Objectives

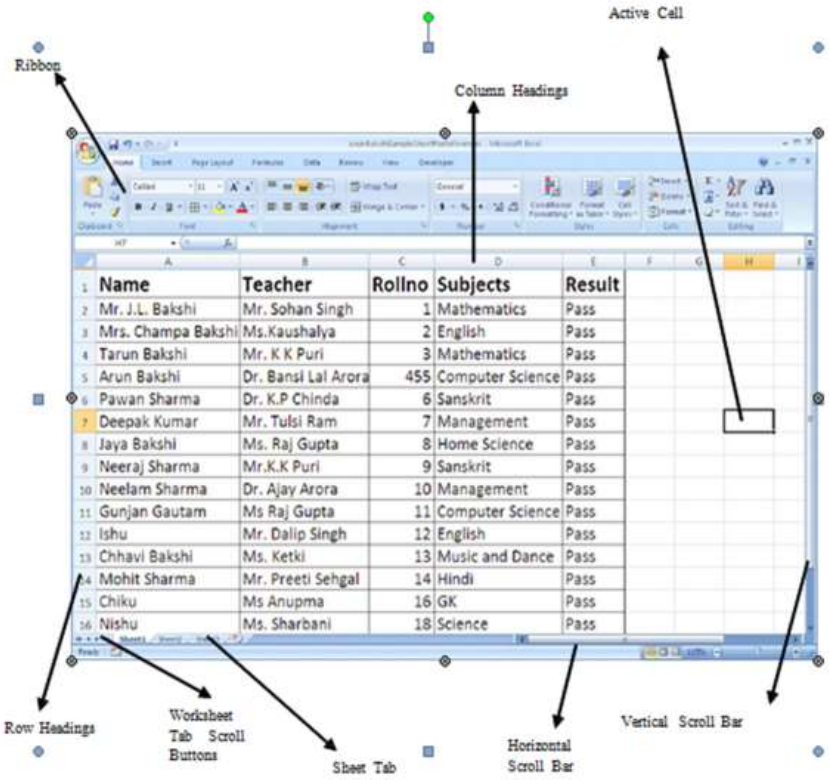
At the end of this unit, you should be able to:

i. Define the term worksheet
ii. Enter and edit **Data** on worksheet
iii. Modifying a worksheet
iv. Set page breaks and page setup within the worksheet

Main Content

The Term Worksheet

Information is created in Excel in a worksheet and is saved in a file called a workbook. Each Excel file is a workbook that can hold many worksheet s. The worksheet is a grid of columns (designated by letters) and rows (designated by numbers). The letters and numbers of the columns and rows (called labeled) are displayed in grey buttons across the top and left side of the worksheet. The intersection of a column and a row is called a cell. **Data** is entered into a cell. Columns are lettered from A to Z, AA to AZ, BA to BZ and so on. Similarly Rows are numbered 1, 2, 3, and so on. A column letter and a row number together identify a cell which is called cell addressed. Each worksheet is composed of a very large number cell which is the basic storage unit for **Data** in a file or workbook. The cells are arranged in a grid pattern using rows and columns.



	Name	Teacher	Rollno	Subjects	Result
2	Mr. J.L. Bakshi	Mr. Sohan Singh	1	Mathematics	Pass
3	Mrs. Champa Bakshi	Ms.Kaushalya	2	English	Pass
4	Tarun Bakshi	Mr. K K Puri	3	Mathematics	Pass
5	Arun Bakshi	Dr. Bansi Lal Arora	455	Computer Science	Pass
6	Pawan Sharma	Dr. K.P Chinda	6	Sanskrit	Pass
7	Deepak Kumar	Mr. Tulsi Ram	7	Management	Pass
8	Jaya Bakshi	Ms. Raj Gupta	8	Home Science	Pass
9	Neeraj Sharma	Mr.K.K Puri	9	Sanskrit	Pass
10	Neelam Sharma	Dr. Ajay Arora	10	Management	Pass
11	Gunjan Gautam	Ms Raj Gupta	11	Computer Science	Pass
12	Ishu	Mr. Dalip Singh	12	English	Pass
13	Chhavi Bakshi	Ms. Ketki	13	Music and Dance	Pass
14	Mohit Sharma	Mr. Preeti Sehgal	14	Hindi	Pass
15	Chiku	Ms Anupma	16	GK	Pass
16	Nishu	Ms. Sharbani	18	Science	Pass

Figure 60: Spreadsheet

Creating New Workbook

A workbook is a collection of many worksheets. You can create a blank workbook or create a new workbook based on an existing workbook. By default, a workbook opens with three worksheets and it can contain a maximum of 255 worksheets.

i. For creating a new workbook:

- Click on the MS Office button.
- Click on New.
- In the new dialog box, click Blank workbook.
- Click on create button.

ii. Opening Workbook

To work on any worksheet in a workbook, first of all you have to open a workbook.

- Click on the MS Office button.
- Click on open. (or press ctrl + O Keys together)
- In the open dialog box, choose drive, folder name that contains the workbook.
- Click on Open.

iii. Saving a workbook

Click on MS Office button.

- Click on Save As.
- In Save As dialog box, specify the location where you want to save the file in the Save in box.
- In the File name box, give the name of the file.
- In the save as type box, give the type of the file.
- Click save button.

iv. Closing a Workbook

Click on MS Office button.

- Choose Close
- You can select Exit Excel command to exit from MS Excel.

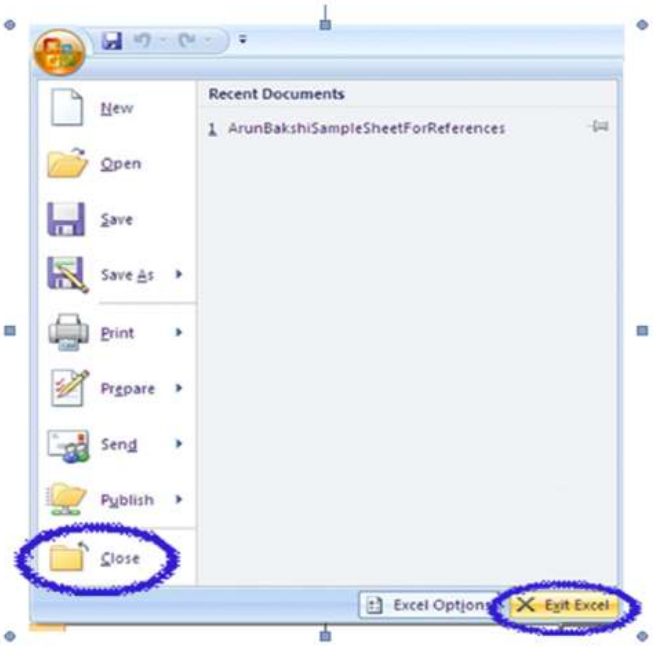


Figure 61: How to close a worksheet

v. Inset a New Worksheet

To quickly insert a new worksheet at the end of existing worksheets Click the Insert Worksheet tab to insert a new worksheet before an existing worksheet, Select and right click the worksheet before which you want to insert a new worksheet. Select Insert Option from Pop Up menu. In the Insert dialog box click on the worksheet and then click on OK. Name the worksheet as Sheet 2.

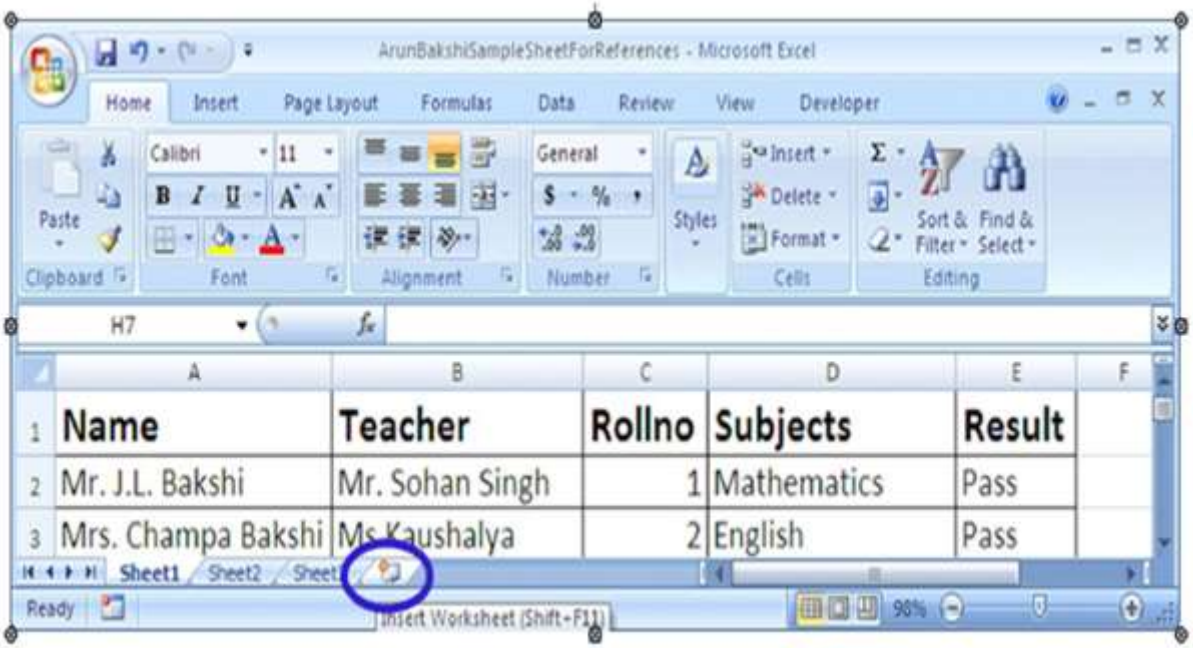


Figure 62: How to insert a new worksheet

vi. To rename a worksheet

To rename a worksheet follow the steps as:

- Right click on the worksheet tab which you want to rename
- Select rename from the Pop Up menu, the sheet name gets highlighted.
- Type new name for the Worksheet (Chemistry in our example)
- Previous name sheet 2 has been renamed as 'chemistry' as shown in figure

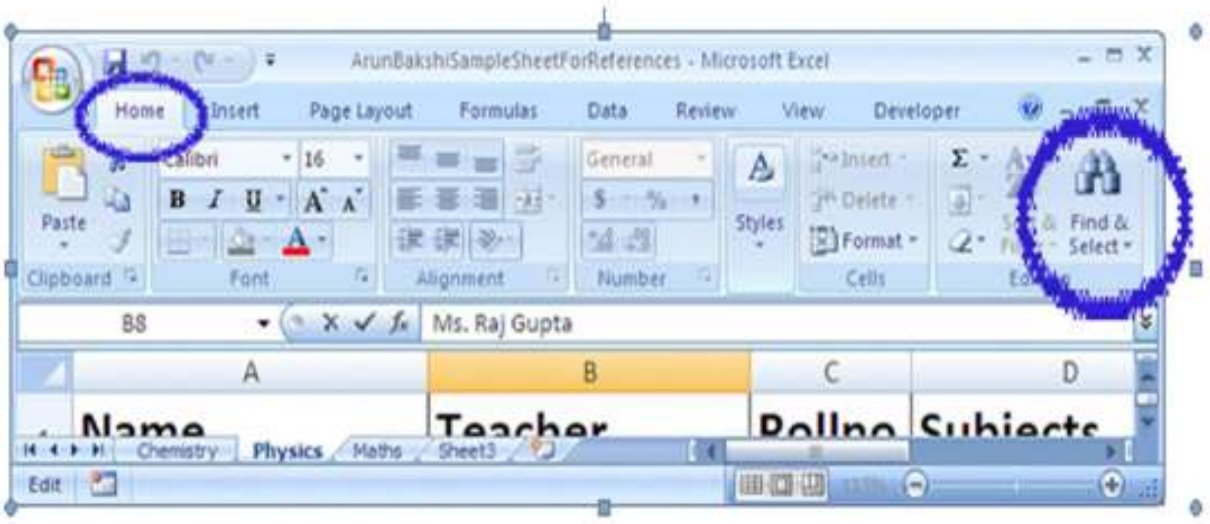


Figure 63: How to rename a worksheet

Selecting Cells and Ranges

To enter **Data** into your worksheet you must first have a cell or range selected. When you open an Excel worksheet, cell A1 is already active by default. An active cell will appear to have a darker border around it than other cells on the worksheet. The simplest way to select a cell is with your mouse pointer. Move your mouse to the desired cell and click on it with right button. Whatever you type goes into the cell. To select a range of cells, click on one cell, hold down the left mouse button and drag the mouse pointer to the last cell of the range you want to select. You can also use keyboard shortcuts given at the end of this lesson for selecting cells. Another way to select particular range of cells is Go to Name Box® Select range by typing (for example A1:C5) Press Enter All the cells between range A1 to C5 will be selected.

Entering and Editing Data

Entering **Data** in a cell of the Excel Worksheet involves following steps:

i. Click on the desired cell where you want to enter **Data**.
ii. Type your **Data** in the active cell.
iii. Press Enter.

Text in a cell can include any combination of letters, numbers and keyboard symbols. A cell can contain up to 32000 characters.

Editing your Excel worksheet **Data** is very easy. You can edit your **Data** by any of the following ways:

i. Select the cell containing **Data** to be edited. Press F2. Use Backspace key and erase the wrong entry. Retype the correct entry
ii. Select the cell and simply retype the correct entry.
iii. If you want only to clear the contents of the cell, select the cell and press Delete key.
iv. To bring back the previous entry, either click on Undo button on standard Toolbar or select Edit Undo command or use keyboard shortcuts CTRL+Z.

Find and Replace Data in a Worksheet

You may want to locate a number or text that is already typed in the worksheet. This is done through Home Tab at Find. You can also locate your **Data** and replace with new **Data** with Home Tab at Find at Replace.

MODIFYING A WORKSHEET

Insert Cells, Rows, Columns and Delete Cells

i. Insert blank cells in a worksheet
- Select the cell or the range (range: Two or more cells on a sheet. The cells in a range can be adjacent or nonadjacent) of cells where you want to insert the new blank cells
- Select the same number of cells as you want to insert. For example, to insert five blank cells, you need to select five cells.
- On the Home tab, in the Cells group, click the arrow next to Insert, and then click Insert Cells.
- You can also right-click the selected cells and then click insert on the shortcut menu. In the Insert dialog box, click the direction in which you want to shift the surrounding cells.

ii. Insert rows in a worksheet
- To insert a single row, select the row or a cell in the row above which you want to insert the new row. For example, to insert a new row above row 5, click a cell in row 5.
- To insert multiple rows, select the rows above which you want to insert rows. Select the same number of rows as you want to insert. For example, to insert three new rows, you need to select three rows.

- To insert nonadjacent rows, hold down CTRL while you select nonadjacent rows. Alternate method of inserting rows is; on the Home tab, in the Cells group, click the arrow next to Insert, and then click Insert Sheet Rows.

iii. Insert columns in a worksheet

- To insert a single column, select the column or a cell in the column immediately to the right of where you want to insert the new column. For example, to insert a new column to the left of column B, click a cell in column B.
- To insert multiple columns, select the columns immediately to the right of where you want to insert columns. Select the same number of columns as you want to insert. For example, to insert three new columns, you need to select three columns.
- To insert nonadjacent columns, hold down CTRL while you select nonadjacent columns.

Alternate method of inserting columns is; on the Home tab, in the Cells group, click the arrow next to Insert, and then click Insert Sheet Columns.

Delete cells, rows, or columns

i. Select the cells, rows, or columns that you want to delete.
ii. On the Home tab, in the Cells group, do one of the following:
- To delete selected cells, click the arrow next to Delete, and then click Delete Cells.
- To delete selected rows, click the arrow next to Delete, and then click Delete Sheet Rows.
- To delete selected columns, click the arrow next to Delete, and then click Delete Sheet Columns.

iii. If you are deleting a cell or a range of cells, using the Delete dialog box, click Shift cells left, Shift cells up, Entire row, or Entire column.

Move or copy entire cells

When you move or copy a cell, Excel moves or copies the entire cell, including formulas and their resulting values, cell formats, and comments.

i. Select the cells that you want to move or copy.
ii. On the Home tab, in the Clipboard group, do one of the following:
- To move cells, click Cut. Keyboard shortcut or press CTRL+X.
- To copy cells, click Copy or press CTRL+C.

iii. Select the upper-left cell of the paste area.
iv. On the Home tab, in the Clipboard group, click Paste. Or press CTRL+V.

Move or copy entire cells by using the mouse

By default, drag-and-drop editing is turned on so that you can use the mouse to move and copy cells.

i. Select the cells or range of cells that you want to move or copy.
ii. Do one of the following:
    - To move a cell or range of cells, point to the border of the selection. When the pointer becomes a move pointer, drag the cell or range of cells to another location.

Copy cell values, cell formats, or formulas only

When you paste copied **Data**, you can do any of the following:

- Convert any formulas in the cell to the calculated values without overwriting the existing formatting.
- Paste only the cell formatting, such as font colour or fill colour (and not the contents of the cells). Paste only the formulas (and not the calculated values).

i. Select the cell or range of cells that contains the values, cell formats, or formulas that you want to copy.
ii. On the Home tab, in the Clipboard group, click Copy.
iii. Select the upper-left cell of the paste area or the cell where you want to paste the value, cell format, or formula.
iv. On the Home tab, in the Clipboard group, click the arrow below Paste, and then do one of the following:
    - To paste values only, click Paste Values.
    - To paste cell formats only, click Paste Special and then click Formats under Paste.
    - To paste formulas only, click Formulas.

Drag and Drop method of moving cells

If you are moving the cell contents only a short distance, the drag- and-drop method may be easier. Simply drag the highlighted border of the selected cell to the destination cell with the mouse.

Page Breaks

To set page breaks within the worksheet, select the row you want to appear just below the page break by clicking the row's label. Then choose Page Layout Setup Group → Breaks → Input Page Break. Excel will start a new page from the row selected.

Page Setup

Page setup is necessary to set the page layout, margins etc. before printing. For this first select File→ Page Setup from the menu bar. Page setup dialog box appear. In this dialog

box there are various options for formatting the page, setting margins, and adding headers and footers.

Print Preview

Print preview helps to view the worksheet before the final printout is taken. It helps to edit the worksheet if required as per the need. The steps to see the print view of document are; Select Print from Office Button Select prints Click Print Preview. Click the buttons like Next and Previous with respect to Print Preview Tab. Select the Zoom button to view the pages closer. Make page layout modifications needed by clicking the Page Setup button. Click Close to return to the worksheet or Print to continue printing.

Print

To print the worksheet, select Print from Office Button. Print dialog box appears with the following:

i. Print Range - Select either all pages or a range of pages to print.
ii. Print What - Select selection of cells highlighted on the worksheet, the active worksheet, or all the Worksheets in the entire workbook.
iii. Copies - Choose the number of copies that should be printed. Check the Collate box if the pages should remain in order.
iv. Click OK to print.



Summary

In this unit, you have learnt:

A worksheet or sheet is a single page in a file created with an electronic spreadsheet program such as Excel or Google Spreadsheets. A worksheet is used to store, manipulate, and display **Data**. Worksheet commonly refers to a sheet of paper with questions for students and places to record answers.



Self-Study Assessment

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Study Session.

i. Mention the steps in creating new workbook.
ii. Mention the steps in setting page breaks and page setup within the worksheet

Tutor Marked Assignment

i. Write briefly on the following terms
   - Creating New Workbook
   - Selecting Cells and Ranges
   - Entering and Editing **Data**
   - Modifying a Worksheet

ii. Define Worksheet

Pilot Answers for Study Session on Computer System

Computer System can be define as the following

A **Computer System** is basically made up of the Central Processing Unit (normally known as the computer), the monitor, the keyboard and the mouse. A **Computer** consists of several interconnected devices or components. They are five basic components namely, Central Processing Unit, Primary Storage, Secondary Storage, Input Devices and Output Devices

Discuss the application of **Computer** in education

In educational institutions such as nursery schools, primary schools, secondary schools, polytechnics, colleges of education and universities, **Computer** can be used for the following:

i **Computer** aided self-tutored application packages.

ii. **Computer** instructional aids e.g. digital projectors.

iii. Microsoft PowerPoint application software for preparing slide shows, speeches, seminars, workshop, lectures etc.

Explain the following terms as it relates to a **Computer System** :

The hardware is a **Computer System** that combines the physical tangible things like keyboards, mouse, monitors, internal circuits and communication media.

The software is a device or set of devices that works under the control of a stored program that spontaneously accepts and processes **Data** to supply information.

Pilot Answers for Study Session on Classification of Computer System

6. Identify the classes of computers
7. Digital Computer
8. Analog Computer
9. Hybrid Computer

Describe the following in term of their classifications

Digital Computer:

Digital **Computer** Represent its variable in the form of digits. It counts the **Data** it deals with, whether representing numbers, letters or other symbols are converted into binary form on input to the computer.

Analog Computer:

The aspect of analog **Computer** deals with quantities that are continuously varied, it measures rather than counts. This type of **Computer** sets up a model of a system. Common type signifies it variables in terms of electrical voltage and sets up circuit analog to the equation linking the variables

Hybrid Computer:

A hybrid **Computer** is a type of **Computer** that is planned to provide the types and functions that are seen by both the digital and the analog computers

Mini Computer:

Mini**Computer** is a small scale device that functions as a **Computer** with radios attached to it. Capable of performing tasks like browsing the internet, sending emails, similar to desktops and laptops but in a more compact form

Personal Computer:

A personal computer, often referred to as a PC or simply computer, is a **Computer** designed for individual use

Pilot Answers for Study Session on Characteristics of a Computer System

iv. List major characteristics of a **Computer System**

Below are some characteristics of a computer.

Speed: The **Computer** can manipulate large **Data** at incredible speed and response time can be very fast.

Accuracy: Its accuracy is very high and its consistency can be relied upon. Errors committed in computing are mostly due to human rather than technological weakness. There are in-built-error detecting schemes in the computer.

Storage: It has both internal and external storage facilities for holding **Data** and instructions. This capacity varies from one machine to the other. Memories are built up in K(Kilo) modules where K = 1024 memory locations.

Automatic: Once a program is in the computer's memory, it can run automatically each time it is opened. The individual has little or no instruction to give again.

Reliability: Being a machine, a **Computer** does not suffer human traits of tiredness and lack of concentration. It will perform the last job with the same speed and accuracy as the first job every time even if ten million jobs are involved.

Flexibility: It can perform any type of task once it is reduced to logical steps. Modern computers can be used to perform a variety of functions like on-line processing, multi-programming, real time processing etc.

v. Highlight the basic elements of a **Computer System**

i Mouse
ii. Keyboard
iii. Hard disk
iv. CPU
v. Monitor

vi. Explain the following terms;

Mouse: Mouse is used for operating the system. Nowadays, optical mouse is more popular as compared to simple mouse.

Keyboard: Keyboard is used to input **Data** in to the system so that the system gives output to the user. Therefore, the keyboard is an integral part of the input system. A **Computer** is essentially incomplete without a keyboard.

Monitor: Monitor, is another very essential part of the **Computer System** that displays the actions that the **Computer** performs on our command.

Motherboard: Motherboard is a necessary element of the **Computer System** . It contains different elements as memory, processor, modem slots for graphic card and LAN card.



Further Readings

1. Codecademy
2. Coursera - **Computer** Science 101
3. edX - Introduction to **Computer** Science in Python
4. GeeksforGeeks

References

1. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
2. "**Computer** Science: An Overview" by J. Glenn Brookshear
3. "Introduction to **Computer** Science" by John Guttag
4. "**Computer** Organization and Design" by David A. Patterson and John L. Hennessy
5. "**Data** Structures and Algorithms in Python" by Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser
6. "**Computer** Organization and Design" Worksheet by Coursera (online worksheet, 2022)
7. "**Computer** Architecture" Study Guide by edX (online study guide, 2022)
8. "Digital Design" Practice Problems by Udemy (online practice problems, 2022)

K. Recommended books/Materials /Web Documents

1. "**Computer** Organization" Practice Questions by GeeksforGeeks (online practice questions, 2022)
2. "**Computer** Architecture" Quizzes by tutorialspoint (online quizzes, 2022)
3. "Digital Design" Exercises by Codecademy (online exercises, 2022)
4. "**Computer** Organization and Design" Study Notes by EasyEngineering (online study notes, 2022)
5. "**Computer** Architecture" Lecture Notes by NPTEL (online lecture notes, 2022)
6. "Digital Design" Tutorials by TutorialsPoint (online tutorials, 2022)



Glossary of Terms

1. **Computer System** A collection of hardware components (such as the CPU, memory, storage devices, input/output devices) and software programs that work together to perform tasks, process **Data**, and produce outputs efficiently.
2. **Data** Raw, unorganized facts or figures that represent values related to objects, events, or phenomena. **Data** can include numbers, text, images, or sound, but in raw form, it has no meaning until processed.
3. **Information** Processed or organized **Data** that is meaningful and useful for decision-making. **Information** provides context, relevance, and purpose to raw **Data**.
4. **Electronic Data Processing (EDP)** The use of computer-based systems to automate the collection, processing, storage, and retrieval of **Data**, making **Data** handling more efficient and less error-prone.
5. **Entities** Objects or things of importance in a particular context, such as students, courses, or publications, which can have associated **Data** representing their attributes.
6. **Entity-Relationship Model (E-R Model)** A diagrammatic technique used to visually represent entities (objects) and the relationships between them in a **Data**base system, aiding in **Data**base design.
7. **Data Integrity** The accuracy, consistency, and reliability of **Data** stored in a **Data**base or system over time. Ensuring **Data** integrity involves validation rules and constraints to prevent errors and invalid **Data** entry.
8. **Data Redundancy** The unnecessary duplication of **Data** within systems or **Data**bases; excessive redundancy can lead to inconsistencies, increased storage costs, and maintenance difficulties.
9. **Database Management System (DBMS)** Software that enables users to define, create, maintain, and manipulate **Data**bases. It ensures **Data** security, integrity, and ease of access, supporting multiple users and applications.
10. **Internet Technologies** Systems, protocols, and tools used to enable communication, **Data** exchange, and services over the internet. Examples include HTTP/HTTPS, email protocols, and web browsers.
11. **Word Processing** Using software to create, edit, format, and print text documents. Examples include Microsoft Word and Google Docs, which support features like spell check, formatting, and graphics insertion.
12. **Distance Learning** An educational method where students learn remotely, often via online platforms, without attending physical classrooms, allowing flexibility in time and location.
13. **E-learning** Learning that is implemented via electronic means, primarily through internet-enabled devices, incorporating multimedia content, interactive modules, and assessments.
14. **Learning Support Devices** Tools and resources provided to students to enhance learning, especially in remote or online environments, including tutorials, videos, simulations, and interactive software.
15. **User Interface Elements** Facilitative components such as mouse pointers, scrollbars, cursors, menus, toolbars, and status bars that enable users to interact with and control software applications effectively.
16. **Course Objectives (Student Learning Objectives - SLOs)** Specific goals that define what students are expected to learn or achieve after completing a course or module, guiding instruction and assessment.
17. **Removable Storage Devices** Portable hardware used to store and transfer **Data** easily, such as USB flash drives, external hard drives, SD cards, and DVDs.

18. **Hardware** The physical parts of a **Computer System** , including input devices (keyboard, mouse), output devices (monitor, printer), storage media (hard disk), and processing units (CPU).
19. **Software** The collection of programs, applications, and operating systems that instruct hardware to perform tasks.
20. **Central Processing Unit (CPU)** The brain of the **Computer** that performs instructions, processes **Data**, and manages system operations.
21. **Input Devices** Hardware components used to enter **Data** into the computer, e.g., keyboard, mouse, scanner.
22. **Output Devices** Hardware that displays or presents **Data** processed by the computer, e.g., monitor, printer, speakers.
23. **Storage Devices** Hardware used to store **Data** persistently, such as hard disks, SSDs, flash drives, and optical discs.
24. **Data Processing** The process of converting raw **Data** into meaningful **Information** through operations such as sorting, calculating, summarizing, and organizing.
25. **Characteristic of Computer System : Speed** The ability of a **Computer** to perform tasks rapidly, manipulating large amounts of **Data** at high speeds.
26. **Characteristic of Computer System : Accuracy** The degree to which a **Computer** produces correct and consistent results without errors.
27. **Characteristic of Computer System : Storage** The capacity to hold **Data** and instructions either temporarily (RAM) or permanently (hard drive).
28. **Characteristic of Computer System : Automatic** A feature whereby computers execute stored instructions automatically after setup, requiring minimal human intervention.
29. **Characteristic of Computer System : Reliability** The capability of a **Computer System** to perform consistently without failure over time, unaffected by fatigue or emotions.
30. **Characteristic of Computer System : Flexibility** The ability of a **Computer** to perform different tasks once programmed, accommodating various functions like real-time processing or multi-tasking.