UG CA S1- 01
(DSC)

FOUR YEAR BACHELOR'S DEGREE COURSE

(CBCS in Accordance with NEP 2020)

SEMESTER - I

# COMPUTER FUNDAMENTALS AND PC SOFTWARE

# COMPUTER SCIENCE

Hiranya Chandra Bhuyan School of Science and Technology
KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

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## DETAILED SYLLABUS

**UNIT 1 : INTRODUCTION TO COMPUTER** 7-20

Computer– a Definition; Characteristics of Computer; Generations of Computers; Structural Evolution of Computers; File Structure of Computers; Flynn's Classification of Computer Architecture; Applications of Computer: Advantages of Computer.

**UNIT 2 : BASIC FEATURES OF COMPUTER CLASSIFICATION** 21-33

Computer Classification based on Operating Principles: Analog Computers, Digital Computers, Hybrid Computers; Computer Classification based on Applications: General Purpose Computers, Special Purpose Computers; Computer Classification based on Size and Capability: Micro Computers, Mini Computers, Mainframe Computers, Super Computers.

**UNIT 3 : BASIC COMPONENTS OF COMPUTER** 34-62

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**UNIT 8 : GETTING STARTED WITH WRITER** 127-144

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**UNIT 14 : INTRODUCTION TO IMPRESS** 231-243

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**UNIT 15 : WORKING WITH MULTIMEDIA AND ANIMATIONS IN IMPRESS** 244-251

Adding images, audio, and video to a presentation, Creating and modifying animations to enhance visual effects, Using Impress's built-in tools for recording and rehearsing presentations.

**UNIT 16 : INTRODUCTION TO BASE** 252-272

Overview of Base and its features as a database management tool, Launching Base and creating a new database, Navigating the Base interface and understanding the different components of the database window, creating tables, forms, queries, and reports using Base's built-in tools.

## COURSE INTRODUCTION: COMPUTER FUNDAMENTALS AND PC SOFTWARE

The course is designed with an aim to acquaint the learners with the fundamentals of computer which include characteristics of computer, generations, structural evolutions of computer, various components, classifications of computer and about operating systems. The course also deals with LibreOffice which is a powerful and free office suit comprising different applications that help in official as well as academic works. The course comprises the following units:

**Unit 1** introduces you to the evolution of computers. The different generations and applications of computer are also discussed in this unit.

**Unit 2** discusses how classifications of computer have been made based on various criteria.

**Unit 3** describes various components of computer with their functionalities.

**Unit 4** describes computer memory and storage. Different types of memory such as primary memory, secondary memory, and their types along with some other important computer memories are discussed in this unit.

**Unit 5** is about MS Windows operating system. Components of Windows, Coccept of files and folders etc. are covered in this unit.

**Unit 6** induces you to the Linux operating system. It includes the concept of open source and free software, basic Linux commands, Text editor etc.

**Unit 7** gives an overview of LibreOffice software suite including its features and advantages. Installation and configuration of LibreOffice on different platforms is also included at the end of this unit.

**Unit 8** discusses the basics of LibreOffice Writer. This unit describes different components of the document window, how to create a new document, formatting a document, opening and closing a document etc.

**Unit 9** is about templates and styles in LibreOffice Writer. It describes the use of different templates for formatting and layout, creating character style, managing styles and formatting dialog box.

**Unit 10** discusses formatting of documents in Writer. It includes formatting images, tables, and other objects, and various options for advanced formatting.

**Unit 11** gives the overview of Calc and its features as a spreadsheet program.

**Unit 12** deals functions and formulas in Calc. It describes how to use built-in functions as well as creating custom functions and formulas in LibreOffice Calc.

**Unit 13** discusses advanced formatting and charting in Calc. Applying advanced formatting options, such as conditional formatting, data validation etc. are included in this unit.

**Unit 14** gives and overview of Impress which is the presentation program included in LibreOffice.

**Unit 15** is about working with multimedia and animation in Impress. This unit includes how images, audio, and video can be added, how animations can be added to enhance visual effects in a presentation.

**Unit 16** is about LibreOffice Base. It describes various features of Base as a database management tool.

While going through a unit, you will notice some boxes, containing such information as would help you to understand some of the difficult, unfamiliar terms. You will find an item called “ACTIVITY’ where you will apply your knowledge and thoughts in some questions pertaining to the relevant topic. Again, we have included some relevant concepts in “LET US KNOW” along with the text. And, at the end.
of each seection, you will get “CHECK YOUR PROGRESS” questions. These have been designed to self-check your progress of study. It will be better if you solve the problems put in these boxes immediately after you go through the sections of the units and then match your answers with “ANSWERS TO CHECK YOUR PROGRESS” given at the end of each unit.

# UNIT 1: INTRODUCTION TO COMPUTER

## UNIT STRUCTURE


1.1 Learning Objectives

1.2 Introduction

1.3 Computer– a Definition

1.4 Characteristics of Computer

1.5 Generations of Computers

1.6 Structural Evolution of Computers

1.7 File Structure of Computers

1.8 Flynn's Classification of Computer Architecture

1.9 Applications of Computer

1.9.1 Advantages of Computer

1.10 Let Us Sum Up

1.11 Answers to Check Your Progress

1.12 Further Reading

1.13 Model Questions


## 1.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define the term ‘‘Computer’’
- describe the key characteristics of a computer
- describe the generations of computers
- trace the structural evolution of computers
- describe the applications of computer.

## 1.2 INTRODUCTION

Computer is the most powerful tool man has ever created. Computers have made a great impact on our everyday life. Today, computer technology has permeated every sphere of existence of modern human beings. With the growing information needs the computer has become one of the vital components for the survival of the business houses. Their presence is felt

at almost every working place from the bus and railway ticket reservation to satellite launching, from retail stores to medical diagnosis and from home use to research and design organization– everywhere, we witness on elegance, sophistication and efficiency that have been made possible only with the help of computers.

In this unit, we shall introduce you to the computer fundamentals including its various components and functionality. We shall discuss the characteristics of computers including its evolution and generations. We will also discuss the categories of computers along with its application in the various fields of the modern world.

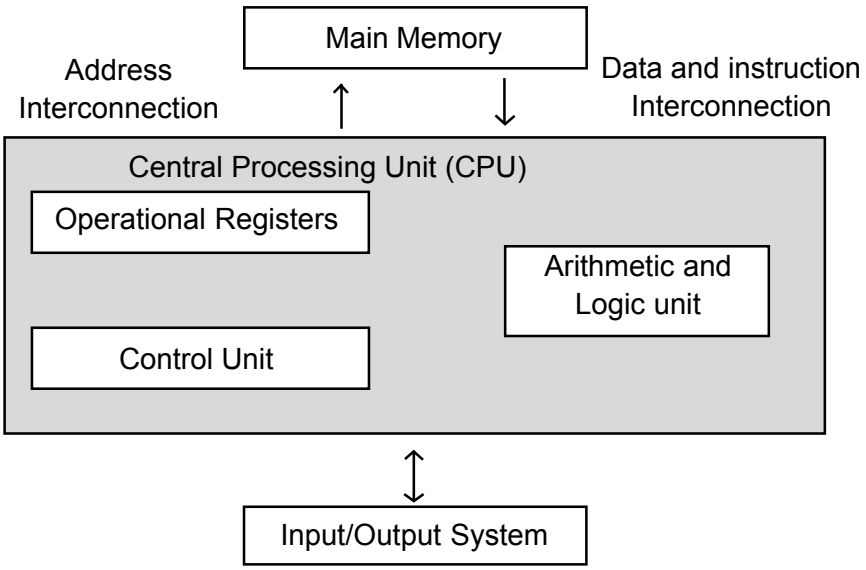
## 1.3 COMPUTER– A DEFINITION

The term ***computer*** is derived from the word ***compute***, which means ***to calculate.*** In the simplest form a computer can be defined as a ***programmable machine.*** In a more formal way it can be defined as an ***Electronic machine*** capable of performing calculations and other manipulations of various types of data, under the control of a stored set of instructions. A computer accepts data from an input device and processes it into useful information which it displays on its output devices. Actually, a computer is a collection of ***hardware*** and ***software*** components that help you to accomplish many different tasks. The machine itself is the hardware; and the instructions are the program or software.

Most of today's computer designs are based on the concepts developed by ***John Von Neumann*** referred to as the ***"Von Neumann architecture"***. According to this structure a computer must have two units - a processing unit and a single separate storage unit. The term "stored program computer" is generally used to mean a computer of this design. The processing unit is termed as ***Central Processing Unit (CPU)*** which mainly comprises with two other units namely ***Arithmetic and Logic Unit (ALU)*** and ***Control Unit (CU)***. The ALU performs the arithmetic operations on data such as addition, subtraction, multiplication and division, and the logical operations such as >, <, >=, <= etc. The control unit directs the ALU to perform specific arithmetic and logical functions on the data.

The storage unit is used to store instructions and data temporarily. This component is referred to as memory. The memory unit stores all the information in a group of memory cells, also called memory locations, as ***binary digits (bits).*** Each memory location has a unique address and can be addressed independently.

The instruction and data can be put into the computer with the help of the input module. Similarly, it needs another component that will report the results in proper format and form. This component is called output module. The following figure shows the basic structure of a conventional *Von Neumann machine:*




## 1.4 CHARACTERISTICS OF COMPUTER

Some of the main characteristics of computers that make them an essential part of every emerging technology and a desirable tool in human development can be cited as follows:

- **Speed:** In a few seconds a computer can perform such a huge amount of task that a normal human being may take days or even years to complete. At present, a powerful computer can perform billions of operations in just one second.
- **Accuracy:** The computers are very accurate. The level of accuracy depends on the instructions and the type of machine used.

- **Diligence:** Being a machine, computers do not suffer from tiredness and lack of concentration even if the same job has to be done repeatedly unlike we human beings. It can perform even millions of calculations all with the same accuracy and speed.
- **Reliability:** Computers are reliable, because at the machinery level, they do not require any human intervention between its processing operations. Computers also have built-in diagnostic capabilities, which help in continuous monitoring of the system.
- **Storage Capacity:** Computers can store large amounts of data and can recall the required information almost instantaneously.
- **Versatility:** Computers can perform multiple tasks simultaneously.
- **Resource Sharing:** With the tremendous growth in computer technologies resource sharing is easily possible.
- **Lack of Intelligence:** A computer can only perform what it is programmed to do. It cannot take any decision. This is the main limitation of a computer.

## 1.5 GENERATION OF COMPUTERS

The history of computer development is often considered with reference to the different generations of computing device. Each generation of computers is characterized by a major technological development that had fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, and more powerful and more efficient and reliable devices. There are five generations of computers. They are :

- **First Generation (1945 - 55):** Examples of computers of first generation are:

  ENIAC– Electronic Numerical Integrator And Calculator

  EDSAC– Electronic Delay Storage Automatic Calculator

  EDVAC– Electronic Discrete Variable Automatic Computer

  UNIVAC– Universal Automatic Computer IBM 701

  **Characteristics of first generation computers:**

  - Vacuum tubes were used
  - Basic arithmetic operations took few milliseconds

- Bulky i.e., very large in size
- Consume more power with limited performance
- High cost
- Use assembly language to prepare programs. These were translated into machine level language for execution
- Electrostatic memories were used
- Punched cards and paper tape were invented to feed programs and data and to get results
- Magnetic tape /magnetic drum were used as secondary memory
- Mainly used for scientific computations.

- **Second Generation (1955-65):** Examples of computers of second generation are– IBM 7030, Digital Data Corporation's PDP 1/5/8 Honeywell 400.

  **Characteristics of second generation computers:**

  - Transistors were used in place of vacuum tubes
  - Smaller in size
  - Less power consumption and better performance
  - Lower cost
  - Magnetic ferrite core memories were used as main memory which is a random access non-volatile memory
  - Magnetic tapes and magnetic disks were used as secondary memory
  - High level languages such as FORTRAN, COBOL etc. were used
  - Separate input-output processors were developed that could operate in parallel with CPU.
  - Punched cards continued during this period also
  - Increasingly used in business, industry and commercial organizations for preparation of payroll, inventory control, marketing, production planning, research, scientific and engineering analysis and design etc.

- **Third Generation (1965-75):** Examples of computers of third generation are– 360 Mainframe from IBM, PDP-8 Mini Computer from Digital Equipment corporation).

**Characteristics of third generation computers**

- ICs were used
- Small Scale Integration and Medium Scale Integration technology were implemented in CPU, I/O processors etc.
- Smaller and better performance
- Comparatively lesser cost
- Faster processors
- In the beginning magnetic core memories were used. Later they were replaced by semiconductor memories (RAM & ROM)
- Introduced microprogramming
- Operating system software were introduced
- Cache and virtual memories were introduced (Cache memory makes the main memory appear faster than it really is. Virtual memory makes it appear larger)
- Database management, multi-user application, online systems like closed loop process control, airline reservation, interactive query systems, automatic industrial control etc. emerged during this period.

- **Fourth Generation (1975-89):** Examples of computers of fourth generation are– Intel's 8088, 80286, 80386, 80486, .., Motorola's 68000, 68030, 68040, Apple II, CRAY I/2/X/MP etc)

  **Characteristics of fourth generation computers :**

  - Microprocessors were introduced as CPU-Complete processors and large section of main memory could be implemented in a single chip
  - Tens of thousands of transistors can be placed in a single chip (VLSI design implemented)
  - CRT screen, laser & inkjet printers, scanners etc were developed.
  - Semiconductor memory chips were used as the main memory.
  - Secondary memory was composed of hard disks - Floppy disks and magnetic tapes were used for backup memory
  - Parallelism, pipelining cache memory and virtual memory were applied in a better way

- Local Area Networks (LAN) and Wide Area Networks (WAN) were developed
- Introduced C language and Unix OS
- Introduced Graphical User Interface (GUI).

- **Fifth Generation (1989 to present):** Examples of computers of fifth generation are- IBM notebooks, Pantium PCs-Pentium 1/2/3/4/ Dual core/Quad core. SUN work stations, Origin 2000, PARAM 10000, IBM SP/2).

  **Characteristics of fifth generation computers:**

  - Computers based on artificial intelligence are available
  - Computers use extensive parallel processing, multiple pipelines, multiple processors etc
  - Massive parallel machines and extensively distributed system connected by communication networks fall in this category.
  - Introduced ULSI (Ultra Large Scale Integration) technology - Intel's Pentium 4 microprocessor contains 55 million transistors millions of components on a single IC chip.
  - Superscalar processors, Vector processors, SIMD processors, 32 bit micro controllers and embedded processors, Digital Signal Processors (DSP) etc. have been developed.
  - Memory chips up to 1 GB, hard disk drives up to 180 GB and optical disks up to 27 GB are available.
  - Object oriented language like JAVA suitable for internet programming has been developed.
  - Portable notebook computers introduced
  - Storage technology advanced– large main memory and disk storage available
  - Introduced World Wide Web. (and other existing applications like e-mail, e-Commerce, Virtual libraries/Classrooms, multimedia applications etc.)
  - New operating systems developed– Windows 95/98/XP/…, LINUX, etc.
  - The recent development in the application of internet is the Grid technology which is still in its upcoming stage.

- Quantum mechanism and nenotechnology will radically change the phase of computers.

## 1.6 STRUCTURAL EVOLUTION OF COMPUTERS

The ABACUS can be considered as the ancestor of today's computer. It was built by the people of Asia Minor almost 2000 years ago. It was simply a wooden rack holding parallel wires on which beads were strung. When these beads were moved along the wire according to some rules that the user must memorize, all ordinary arithmetic operations could be performed.

An English mathematics professor, named **Charles Babbage**, in the early 1800s designed a machine to perform differential equations, called **Difference Engine.** It was a steam powered machine as large as a locomotive and had a stored program and could perform calculations and print results automatically.

After Babbage, between 1850 and 1900, many of the new advances in mathematics and physics took place which involved complex calculations and formulas that were very time-consuming for human calculation. Then people started rethinking of the development of a device to help complex calculations.

In the 1890's census of the United States, a machine developed by **Herman Hollerith** was used. Hollerith developed a new punched-card system that could automatically read information on cards without human intervention.

In 1942, John P. Eckert, John W. Mauchley, and their associates at the University of Pennsylvania built a high-speed electronic computer to do the job known as **ENIAC(Electrical Numerical Integrator And Calculator).** It could multiply two numbers at the rate of 300 products per second, by finding the value of each product from a multiplication table stored in its memory. ENIAC was about 1,000 times faster than the previous generation of Computers. ENIAC used vacuum tubes to make the internal parts of the computer and electricity to run. It used punched-card input and output.

In 1945 **John Von Neumann** undertook a theoretical study of computation that demonstrated that a computer could have a very simple

architecture and yet be able to execute any kind of computation effectively by means of proper programmed control without the need for any changes in hardware. Von Neumann came up with incredible ideas which came to be referred to as the **stored-program technique** that became fundamental for future generations of high-speed digital computers and were universally adopted.

With the first wave of modern programmed electronic computers to take the advantage of these improvements there came the first group of modern programmed electronic computers. This group included computers using Random Access Memory (RAM),which is a memory designed to give almost constant access to any particular piece of information. This group of machines included EDVAC, EDSAC(Electronic Delay Storage Automatic Calculator) and UNIVAC, the first commercially available computers. The UNIVAC was developed by John W. Mauchley and John Eckert, Jr. in the 1950s.

In the 1960s efforts to design and develop the fastest possible computers with the greatest capacity reached a turning point with the completion of the **LARC** machine for **Livermore Radiation Laboratories** by the Sperry-Rand Corporation, and the Stretch computer by IBM. During this time the major computer manufacturers began to offer a range of computer capabilities, as well as various computer-related equipment. Input means such as consoles and card feeders; output means such as page printers, cathode-ray-tube displays, and graphing devices; and optional magnetic-tape and magnetic-disk file storage.

In the 1970s entire assemblies, such as adders, shifting registers, and counters, became available on tiny chips of silicon. In 1971 Marcian E. Hoff, Jr., an engineer at the Intel Corporation, invented the microprocessor and another stage in the development of the computer began.

A new revolution in computer hardware was now well under way, involving miniaturization of computer-logic circuitry and of component manufacture by what are called ***large-scale integration*** techniques. In the 1980s ***very large scale integration (VLSI),*** in which hundreds of thousands of transistors are placed on a single chip, became increasingly common.

The trend of reduction in size led to the introduction of Personal Computers (PCs), which are programmable machines small enough and inexpensive enough to be purchased and used by individuals. By the late 1980s some PCs were run by microprocessors, a processor on a single ***integrated circuit (IC)*** chip. The trend continued leading to the development of smaller and smaller microprocessors with a proportionate increase in processing powers.

## 1.7 FILE STRUCTURE OF COMPUTERS

File Structure is the way we organize our folders on our computer. Keeping all our documents under one folder is a great way to keep ourselves organized and making things easy for backing up our computer.

## 1.8 FLYNN'S CLASSIFICATION OF COMPUTER ARCHITECTURE

Computer architecture has been classified into four categories according to Flynn's classification based upon the number of concurrent instruction (or control) streams and data streams available in the architecture. These four categories are:

a) Single instruction stream, single data stream (SISD)
b) Single instruction stream, multiple data streams (SIMD)
c) Multiple instruction streams, single data stream (MISD)
d) Multiple instruction streams, multiple data streams (MIMD)

**a) Single instruction stream, single data stream (SISD):** A sequential computer which exploits no parallelism in either the instruction or data streams. Single control unit (CU) fetches single instruction stream (IS) from memory. The CU then generates appropriate control signals to direct single processing element (PE) to operate on single data stream (DS) i.e., one operation at a time.

Examples of SISD architecture are the traditional uniprocessor machines like older personal computers (PCs of 2010, many PCs had multiple cores) and mainframe computers.

**b) Single instruction stream, multiple data streams (SIMD):** A computer which exploits multiple data streams against a single

instruction stream to perform operations in a parallel manner. For example, an array processors or graphics processing unit (GPU)

c) **Multiple instruction streams, single data stream (MISD):** Multiple instructions operate on one data stream. This is an uncommon architecture which is generally used for fault tolerance. For example, the Space Shuttle flight control computer.

d) **Multiple instruction streams, multiple data streams (MIMD):** Multiple autonomous processors simultaneously execute different instructions on different data. MIMD architectures include multi-core superscalar processors, and distributed systems, using either one shared memory space or a distributed memory space.

## 1.9 APPLICATIONS OF COMPUTERS

Now a days, computers are being used almost in every aspects of life. Every company, small or large, government offices, educational institutions are now directly or indirectly dependent on computers mainly for information processing. Computer based railway and airway reservation system is a common example of computer application. Computer system is helping in the efficient management of the banking sector, hospital records, payroll records and so on.

### 1.9.1 Advantages of Computers

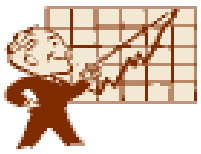
Some of the areas where computers are being used to our advantage can be listed as below:

- **Science:** Scientists are using computers to carry out their research works based on complex computations because of the computer's fast speed and accuracy.
- **Education:** Computers are used now-a-days in schools and colleges, to make education much more interesting. Computer Aided Education (CAE) and Computer Based Training (CBT) packages are making learning much more interactive.
- **Health and Medicine:** Starting from diagnosing illness to monitoring a patient's status during surgery, in pathological

analysis, in CAT scans or MRI scans etc., doctors are using computers. Some special purpose computers are available which can even be operated within the human body.

- **Engineering:** Engineers and architects are using computers in designing machineries, drawing design layouts. Architects can design objects that can be viewed from all the three dimensions by using techniques like virtual reality. In manufacturing industries, using computerized robotic arms hazardous jobs can be performed. The packages like Computer Aided Designing (CAD), Computer Aided Manufacturing (CAM) and so on are used in designing the product, ordering the parts and planning production.
- **Entertainment:** With the use of multimedia facilities, computers are now greatly used in the entertainment industry. Computers are used to control and bring special effects on image and sound.
- **Communication:** Computer network and the Internet have brought drastic changes in communication system. Through E-mail or Electronic mail, it is possible to send messages and reports very fast from one person to another or a group of persons with the aid of computers and telephone lines.
- **Business and Banking:** Computer network and finally the Internet have brought drastic changes in communication system. Through E-mail or Electronic mail, it is possible to send messages and reports very fast from one person to another or a group of persons with the aid of computers and telephone lines.

In order to deposit or withdraw cash from bank, people can use ATM (Automated Teller Machine) services 24 hours of the day. Through the computer networks among different branches of a bank, inter branch transactions can be carried out without delay.



### CHECK YOUR PROGRESS

**Q.1:** State True or False:

i) PARAM is a super computer.

ii) A laptop is a portable computer.

iii) Vacuum tubes were part of the second generation computers.

iv) EDSAC is an example of a second generation computer.

**Q.2:** Fill in the blanks:

i) Physical components of a computer are called .....

ii) The basic components of first generation computers was .....

iii) PDA stands for .....

iv) ..... is a very small computer that can be held in the palm of the hand.

v) Analytical Engine was developed by .....



## 1.10 LET US SUM UP

- The computer is an electronic device that is used to perform diverse operations with the help of instructions to process the data in order to produce desired results.
- Speed, accuracy, reliability, versatility, diligence, lack of intelligence are the characteristics of computers.
- There are five generations of computers. In the first generation of computers, **vacuum tubes** were used for circuitry and **magnetic drums** for memory.
- In the second generation of computers, **vacuum tubes** replaced by **transistors.**
- **Integrated circuits** were used in the third generation of computers.
- The fourth generation of computers based on **microprocessors.**
- Fifth generation computers are based on **artificial intelligence.**



## 1.11 ANSWERS TO CHECK YOUR PROGRESS

**Ans. to Q. No. 1:** i) True, ii) True, iii) False, iv) False

**Ans. to Q. No. 2:** i) Hardware, ii) Vacuum tubes, iii) Personal Digital Assistant, iv) Palmtop, v) Charles Babbage.



## 1.12 FURTHER READING


1) Goel, A. (2010): *Computer Fundamentals*; Pearson Education India.
2) Rajaraman, V. & Adabala, N. (2014): *Fundamentals of Computers*; PHI Learning Pvt. Ltd.
3) Sinha, P. K. & Sinha, P. (2010): *Computer Fundamentals* (Vol. 4); BPB publications.




## 1.13 MODEL QUESTIONS

**Q.1:** Who invented the concept of stored program? Why is this concept so important?

**Q.2:** List the key hardware technologies used in building computer of each of the five generations.

**Q.3:** What are the advantages of transistors over vacuum tubes?

**Q.4:** What is an IC? How does it help in reducing the size of computers

**Q.5:** Discuss the important features of various generations of computers. Give some examples of the computers of each generation.

**Q.6:** Describe in brief Flynn's classification of computer?

**Q.7:** Describe the evolution of computers.

**Q.8:** What are the characteristics of a Computer? Do you think computers are superior to human being?

*** ***** ***

# UNIT 2: BASIC FEATURES OF COMPUTER CLASSIFICATION

## UNIT STRUCTURE


2.1 Learning Objectives

2.2 Introduction

2.3 Computer Classification based on Operating Principles

- 2.3.1 Analog Computers
- 2.3.2 Digital Computers
- 2.3.2 Hybrid Computers

2.4 Computer Classification based on Applications

- 2.4.1 General Purpose Computers
- 2.4.2 Special Purpose Computers

2.5 Computer Classification based on Size and Capability

- 2.5.1 Micro Computers
- 2.5.2 Mini Computers
- 2.5.3 Mainframe Computers
- 2.5.4 Super Computers

2.6 Let Us Sum Up

2.7 Answers to Check Your Progress

2.8 Further Reading

2.9 Model Questions


## 2.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- describe the different classifications of computers
- learn analog, digital and hybrid computers
- describe general and special purpose computers
- describe minicomputers, microcomputers, mainframe and supercomputers.

## 2.2 INTRODUCTION

In the previous unit we got an introduction to the computer system. We discussed the evolution and generations of computers.

In this unit we shall learn about the different classifications of computers. We shall discuss how the computers are classified based on operating principle and on the basis of applications. In addition, we shall learn about the classification of computers based on their size and power.

## 2.3 COMPUTER CLASSIFICATION BASED ON OPERATING PRINCIPLES

Based on the operating principles, computers can be classified into one of the following types:

- Digital Computers
- Analog Computers
- Hybrid Computers

### 2.3.1 Analog Computers

An analog computer is a form of computer that uses the continuously changeable aspects of physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved. In contrast, digital computers represent varying quantities symbolically, as their numerical values change.

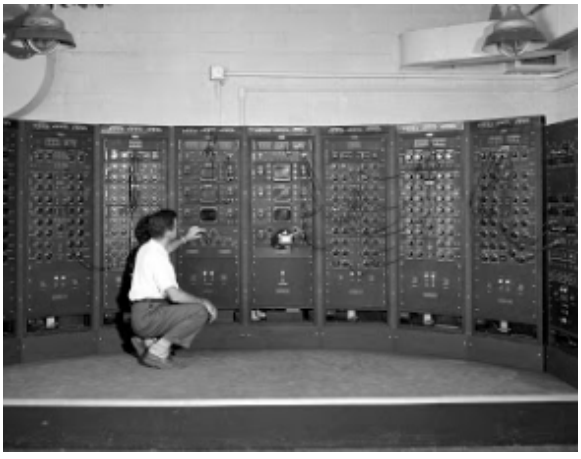


**Fig. 2.1: Analog Computers**

### 2.3.2 Digital Computers

Digital computers operate essentially by counting. All quantities are expressed as discrete or numbers. Digital computers are useful for evaluating arithmetic expressions and for manipulations of data (such as preparation of bills, ledgers, solution of simultaneous equations etc.)



**Fig. 2.2: Digital Computer**

### 2.3.3 Hybrid Computers

Hybrid computers are computers that exhibit both the features of analog computers and digital computers. The digital component normally serves as the controller and provides logical operations, while the analog component normally serves as a solver of differential equations.



**Fig. 2.3: Hybrid Computers**

## 2.4 COMPUTER CLASSIFICATION BASED ON APPLICATIONS

Modern computers depending upon their applications are classified as: -

- General Purpose Computers
- Special Purpose Computers

### 2.4.1 General Purpose Computers

General purpose computers are designed to meet the needs of many different applications. In these computers, the instructions needed to perform a particular task are wired permanently into the internal memory. When one job is over, instructions for another job can be loaded into the internal memory for processing. Thus, a general purpose machine can be used to prepare pay-bills, manage inventories, print sales report and so on.



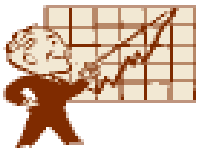
**Fig. 2.4: General Purpose Computer**

### 2.4.2 Special Purpose Computers

Special purpose computers are designed only to meet the requirements of a particular task or application. The instructions needed to perform a particular task are permanently stored into the internal memory, so that it can perform the given task on a single command. It therefore doesnot possess unnecessary options and is less expensive.



**Fig. 2.5: Special Purpose Computer**



**CHECK YOUR PROGRESS**

**Q.1:** What are the different categories of computers based on applications?

**Q.2:** What are the different categories of computers based on operating principles?

**Q.3:** What are hybrid computers?

**Q.4:** What is the need of special purpose registers?

## 2.5 COMPUTER CLASSIFICATION BASED ON SIZE AND CAPABILITY

Computers can be classified according to their size and power into four categories. They are:

- Micro Computers
- Mini Computers
- Mainframe Computers
- Supercomputers

Let us look at each of these categories in detail now.

### 2.5.1 Micro Computers

A microcomputer uses a microprocessor as its Central Processing Unit. Microcomputers are tiny computers that can vary in size from a single chip to the size of a desktop model. They are designed to be used by only one person at a time. Microcomputers are small to medium data storage capacities 500MB-2GB or more. The common examples of microcomputers are chips used in washing machines, TVs, Cars and Notebook/Personal computers. They are: IBM PC, PS/2 and Apple Macintosh.

Micro computers are used in the field of desktop publishing, accounting, statistical analysis, graphic designing, investment analysis, project management, teaching, entertainment etc. The different models of microcomputers are given below:

a) **Personal computers:** The name PC was given by IBM for its microcomputers. PCs are used for word processing, spreadsheet calculations, database management etc.

b) **Notebook or Laptop :** Very small in terms of size. The notebook or laptop can be folded and carried around. The monitor is made up of LCD and the keyboard and system units are contained in a single box. These machines contain all the facilities of a personal computer (HDD, CDD, aound card, network card, modem etc) and a special connection to connect to the desktop PC which can be used to transfer data.

c) **Palm Top:** A smaller model of the microcomputer. A palm top is similar to a calculator– pocket size. It has a processor and memory and a special connection to connect to the desktop PC which can be used to transfer data.

d) **Wrist PC:** The smallest type of microcomputer. The wrist PC can be worn on our wrist like a watch. It has a processor and memory and a wireless modem.

The following figures show the various types of micro computers:



a) Personal Computer



b) Notebook Computer



c) Laptop Computer



d) Palmtop Computer



e) PDA (Personal Digital Assistant)

**Fig. 2.6: Micro Computer**

### 2.5.2 Mini Computers

Mini computer uses a microprocessor and performs better than micro computers. Mini computers are large in size and costlier than micro computers. These computers are designed to support more than one user at a time. They posses large storage capacities and operate at higher speed. They are used to support faster peripheral devices like high speed printers and can also be used to communicate with main frames.

Some of the applications of mini computers are given below. These computers are:

- used when the volume of processing is large for e.g., Data processing for a medium sized organization
- used to control and monitor production processes

- to analyze results of experiments in laboratories
- used as servers in LANs (Local Area Networks)

Examples of mini computers are: Digital Equipments PDP 11/45 and VAX 11 etc. The following figure shows a mini computer:



**Fig. 2.7: Mini computer**

### 2.5.3 Maintrame Computers

Mainframe computers are able to process large amounts of data at very high speed. They support multi-user facility. The number of processors varies from one to six. The cost ranges from 3500 to many million dollars. They are kept in air conditioned room to keep them cool. Mainframe computers support many I/O and auxiliary storage devices and also support network of terminals. Some of the applications of mainframe computers are as follows. They are:

- used to process large amount of data at very high speed such as in the case of Banks/ Insurance Companies/ Hospitals/ Railways etc. which need online processing of large number of transactions and requires massive data storage and processing capabilities
- used as controlling nodes in WANs (Wide Area Networks)
- used to manage large centralized databases

Examples of main frame computers are: IBM 370, IBM 3081, IBM 3000 series, Univac 1180, DEC IBM 3000 series, CDC Cyber-2000V etc.



**Fig. 2.8: Mainframe computer**

### 2.5.4 Super Computers

Super computer is a broad term for one of the fastest computers currently available. The main characteristics of a super computer are:

- The most powerful computer system– needs a large room
- Minimum world length is 64 bits
- CPU speed: 100 MIPS (Million instructions per second)
- Equivalent to 4000 computers
- High cost: 4-5 millions dollars
- Able to handle large amount of data
- High power consumption
- High precision

**Some of the applications of supercomputers are:**

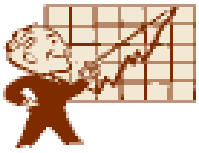
- In Petroleum industry– to analyze volumes of seismic data which are gathered during oil seeking explorations to identify areas where there is possibility of getting petroleum products inside the earth
- In Aerospace industry– to simulate airflow around an aircraft at different speeds and altitude. This helps in producing an effective aerodynamic design for superior performance

- In Automobile industry– to do crash simulation of the design of an automobile before it is released for manufacturing - for better automobile design
- In structural mechanics– to solve complex structural engineering problems to ensure safety, reliability and cost effectiveness. Eg. Designer of a large bridge has to ensure that the bridge must be proper in various atmospheric conditions and pressures from wind, velocity etc and under load conditions.
- Meteorological centers use super computers for weather forecasting
- In Biomedical research - atomic nuclear and plasma analysis - to study the structure of viruses such as that causing AIDS
- For weapons research and development, sending rockets to space etc.

Examples of supercomputers are: Cray-1(1976), Cray-2(1985), Cray T3D(1993), NEC's SX-S/44(1991), Fujitsu VP 2600/10(1991), Hitachi 820/80(1987), C-DAC's PARAM Series of supercomputers etc. A PARAM 10000 series super computer of IIT Guwahati is shown in the above below.



**Fig. 2.9: PARAM 1000 Series Super Computer**



### CHECK YOUR PROGRESS

**Q.5:** What are the different categories of computers based on size and power?

**Q.6:** Mention two applications of supercomputers.

**Q.7:** How are mini computers different from micro computers?

**Q.8:** Give two properties of mainframes.



## 2.6 LET US SUM UP

- An analog computer is a form of computer that uses the continuously changeable aspects of physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved.
- Digital computers operate essentially by counting. All quantities are expressed as discrete or numbers.
- Hybrid Computers are computers that exhibit features of analog computers and digital computers. The digital component normally serves as the controller and provides logical operations, while the analog component normally serves as a solver of differential equations.
- General purpose computers are designed to meet the needs of many different applications. In these computers, the instructions needed to perform a particular task are wired permanently into the internal memory.
- Special purpose computer is designed only to meet the requirements of a particular task or application.
- A microcomputer uses a microprocessor as its Central Processing Unit. Microcomputers are tiny computers that can vary in size from a single chip to the size of a desktop model.
- A mini computer uses a microprocessor performs better than micro computers. They are large in size and costlier than micro computers. These computers are designed to support more than one user at a time.
- A mainframe computer is able to process large amount of data at very high speed. They support multi-user facility. The number of processors varies from one to six.

## 2.7 ANSWERS TO CHECK YOUR PROGRESS

**Ans. to Q. No. 1:** The different categories of computers on applications are:

1) General Purpose Computers
2) Special Purpose Computers

**Ans. to Q. No. 2:** The different categories of computers on operating principles are:

1) Analog Computers
2) Digital Computers
3) Hybrid Computers

**Ans. to Q. No. 3:** Hybrid Computers are computers that exhibit features of analog computers and digital computers. The digital component normally serves as the controller and provides logical operations, while the analog component normally serves as a solver of differential equations.

**Ans. to Q. No. 4:** Special purpose computer is designed only to meet the requirements of a particular task or application. The instructions needed to perform a particular task are permanently stored into the internal memory, so that it can perform the given task on a single command.

**Ans. to Q. No. 5:** The different categories of computers based on size and power are:

1) Mini Computers
2) Micro Computers
3) Mainframe Computers
4) Super computers

**Ans. to Q. No. 6:** Two applications of supercomputer are in:

1) In Aerospace industry– to simulate airflow around an aircraft at different speeds and altitude. This helps in producing an effective aerodynamic design for superior performance.
2) In Automobile industry– to do crash simulation of the design of an automobile before it is released for manufacturing– for better automobile design.

**Ans. to Q. No. 7:** A minicomputer uses a microprocessor performs better than micro computers. They are large in size and costlier than micro computers. These computers are designed to support more than one user at a time. They posses large storage capacities and operates at higher speed.

**Ans. to Q. No. 8:** Two properties of mainframes are:

1) They process large amount of data at very high speed.
2) They support multi-user facility. The number of processors varies from one to six.



## 2.8 FURTHER READING

1) Goel, A. (2010): *Computer Fundamentals*; Pearson Education India.
2) Rajaraman, V. & Adabala, N. (2014): *Fundamentals of Computers*; PHI Learning Pvt. Ltd.
3) Sinha, P. K. & Sinha, P. (2010): *Computer Fundamentals* (Vol. 4); BPB publications.



## 2.9 MODEL QUESTIONS

**Q.1:** Give the importance of special purpose computers.

**Q.2:** Why do we need supercomputers? How are they different from mainframes?

**Q.3:** How are analog computers different from digital computers? Are hybrid computers better than analog and digital computers? Give reasons explaining your answer.

**Q.4:** Give the basic properties that differentiate between mini, micro, mainframes and supercomputers.

**Q.5:** Why do we need general purpose computers? Give its two applications.

**Q.6:** Give two examples where analog and digital computers are used.

*** ***** ***

# UNIT 3 : BASIC COMPONENTS OF COMPUTER

## UNIT STRUCTURE


3.1 Learning Objectives

3.2 Introduction

3.3 Concepts of Bits and Bytes

3.4 Block Diagram of a Computer

3.5 Computer Memory

- 3.5.1 Primary Memory
- 3.5.2 Secondary Memory

3.6 Input Devices

- 3.6.1 Keyboard
- 3.6.2 Mouse
- 3.6.3 Hand-held Devices
- 3.6.4 Optical Input Devices

3.7 Output Devices

- 3.7.1 Display Devices
- 3.7.2 Printers

3.8 Computer Bus

3.9 Let Us Sum Up

3.10 Answers to Check Your Progress

3.11 Further Reading

3.12 Model Questions


## 3.1 LEARNING OBJECTIVES

After going through this unit, you will be able to :

- describe the concept of bits and bytes
- understand the block diagram of a computer
- discuss the primary and secondary memory in computer
- analyse the different types of input and output devices
- describe the different types of buses

## 3.2 INTRODUCTION

A computer system is composed of various components which perform many functions. In this unit, we will introduce you to the basic components of a computer system where, you will first learn how the data is represented in the form of bits and bytes. Through this unit you will be acquinted with the types of computer memory. Various types of input and output devices and the basic functioning of a bus are also included as a part of discussion in this unit.

## 3.3 CONCEPTS OF BITS AND BYTES

You may be surprised to know that the computer is made up of millions of tiny electric circuits that are not visible to us. The memory elements are also built with these tiny circuits which are used for storing data. For every circuit in a computer chip, there are two possibilities:

- an electric current flows through the circuit, or
- an electric current does not flow through the circuit.

When an electric current flows through a circuit, the circuit is on. When no electricity flows, the circuit is off. An "on" circuit is represented by the number one (1) and an off circuit is represented by the number zero (0). The number 1 or 0 is called ***bit***. A number system that uses only two digits, 0 and 1, is called the ***binary number system***. The binary number system is also called the base two system. The two symbols 0 and 1 are known as binary digits. The word **bit** comes from "**bi**nary digi**t**".

Always remember that each time a computer reads an instruction, it translates that instruction into a series of bits, 1's and 0's. On most computers

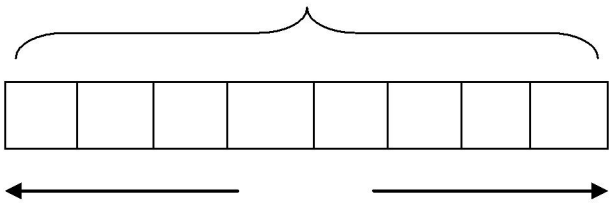


**Figure 3.1 Byte representation**

every character from the keyboard is translated into eight bits, a combination of eight 1's and 0's. Each group of 8 bits is called 1 byte as shown in figure 3.1. Each group of four bits is called a nibble.

Thus, 8 bits = 1 byte and 4 bits = 1 nibble

and 1024 byte = 1 kilo byte

We know that, all the quantities, physical or abstract, can be measured in some units. For example, time is measured in seconds; length is measured in metres, and mass in grams. Similarly, the computer memory can be measured in terms of bits, bytes, kilobytes, megabytes, gigabytes etc.

The followings are the measuring units given in terms of bytes :

1 kilobyte (KB) = 1,024 byte

1 megabyte (MB) = 1,048,576 bytes

1 gigabyte (GB) = 1,073,741,824 bytes

1 terabyte (TB) = 1,099,511,627,776 bytes

## 3.4 BLOCK DIAGRAM OF A COMPUTER

All general-purpose computers require the following hardware components:

**Input Unit :** This is the unit through which data and instructions are entered into a computer. Usually a keyboard and mouse are the common input devices.

**Output Unit :** This unit communicates the results to the user. A display screen and a printer are the common devices that let you see the results in the computer.

**Central Processing Unit (CPU) :** Execution of programs is the main function of the computer. The program is a set of instructions that is stored in the computer's memory. A task becomes completed when the instructions of the program are executed by the central processing unit. All the major calculations and comparisions are carried out inside the CPU. The CPU is responsible for activating and controlling the operations of various units (input & output) of the computer system.

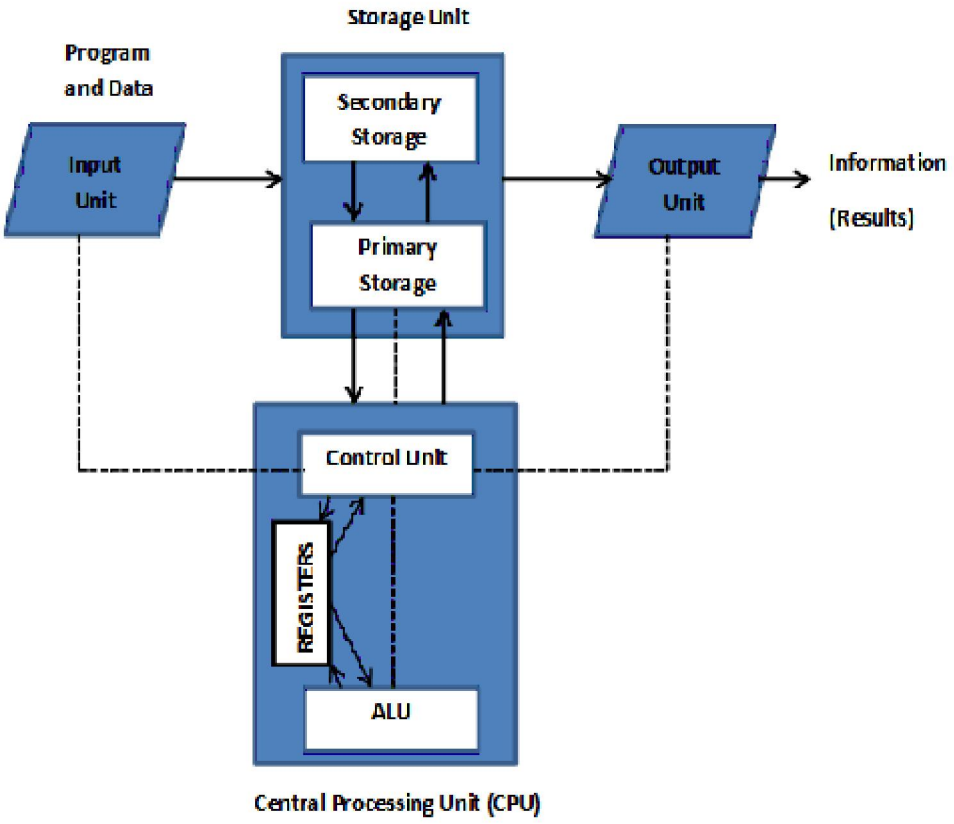



**Figure 3.2: Central Processing Unit**

The CPU is made up of three major components : the **registers,** the a**rithmetic and logic unit (ALU)** and the **control unit**. The registers are responsible for storing the intermediate data during the execution of program. The control unit supervises the transfer of information between the registers and instructs the ALU to perform the required operation.

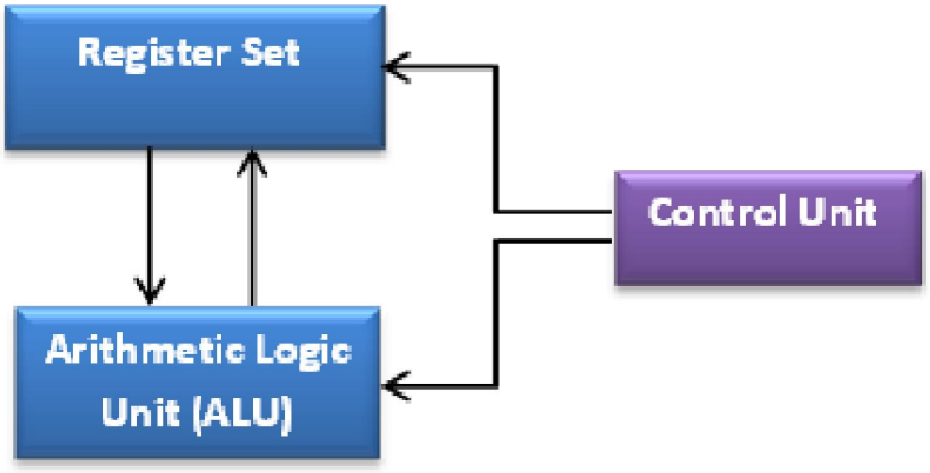



**Figure 3.3 : Components of CPU**

**Control Unit (CU) :** The control unit controls and guides the interpretation, flow and manipulation of all the data and information. It does not perform the actual processing of data, but manages and coordinates the entire computer system, including the input and output (I/O) devices. Control unit retrieves and interprets the instructions from the main memory and send signals to the other units to execute them one after the other. Some special purpose registers found inside the CPU like *instruction register, program counter* etc. help the CU to perform its function smoothly.

**Arithmetic Logic Unit (ALU) :** The ALU performs all the arithmetical functions +, -, *, / and some logical functions like <, >, =, <=, >=, <> etc. When two numbers are required to be added, these numbers are sent from memory to ALU where addition takes place and the result is sent back to memory. ALU has special circuits to carry out the logical operations.

**Storage Unit :** The storage unit allows a computer to permanently store large amount of data. The storage unit can be categorised into two types namely *primary storage* and *secondary storage,* which we will discuss in the next section. Common mass storage devices include disk drives and tape drives etc.

## 3.5 COMPUTER MEMORY

The term ***memory*** usually refers to a form of semiconductor storage and sometimes other forms of fast but temporary storage. In a computer, the data and instructions are stored and subsequently retrieved from the memory. We know that the CPU has some storage elements known as registers for storing data and instructions during the program execution. Every computer requires storage space for storing programs and data temporarily during the time of program execution or storing the data permanently for future use. Generally, a computer has three set of memories:

a) **Primary storage or main memory :** Primary memory, also known as *memory*, is the only one *directly accessible to the CPU*. The CPU continuously reads instructions stored there and executes them. Any data actively operated on is also stored there in uniform manner. It is a form of semiconductor storage known

as random access memory (**RAM**) and sometimes other forms of fast but temporary storage. It is small-sized, light, but quite expensive. This type of memory is divided into the following two types : *RAM (Random Accress Memory) & ROM (Read Only Memory).*

b) **Secondary storage or auxiliary memory :** Secondary memory or *storage* provides the facility of storing information and programs permanently. It differs from primary storage in that it is *not directly accessible by the CPU*. The computer usually uses its input/output channels to access secondary storage and transfers the desired data using intermediate area in primary storage. Secondary storage does not lose the data when the device is powered down; it is non-volatile. It is less expensive than primary storage.

c) **Internal processor memory :** It consists of a small set of high-speed registers that are used as temoprary locations inside the processors during the execution of instructions.

Another type of memory, is the *cache memory*. Its logical position is between the main memory and the internal memory(registers). Its primary function is to store and cache part of the main memory's contents that the processor is currently using.

The computer system has a memory hierarchy consisting of the storage devices in it. A typical memory hierarchy is illustrated in the figure 3.4.

There are three key characteristics of the memory. They are cost, capacity and access time. On moving down the memory hierarchy, it is found that the cost of the storage devices decreases but their storage capacity as well as the memory access time increases. In other words, the smaller memories are more expensive and much faster. These are supplemented by the larger, cheaper and slower storage devices.

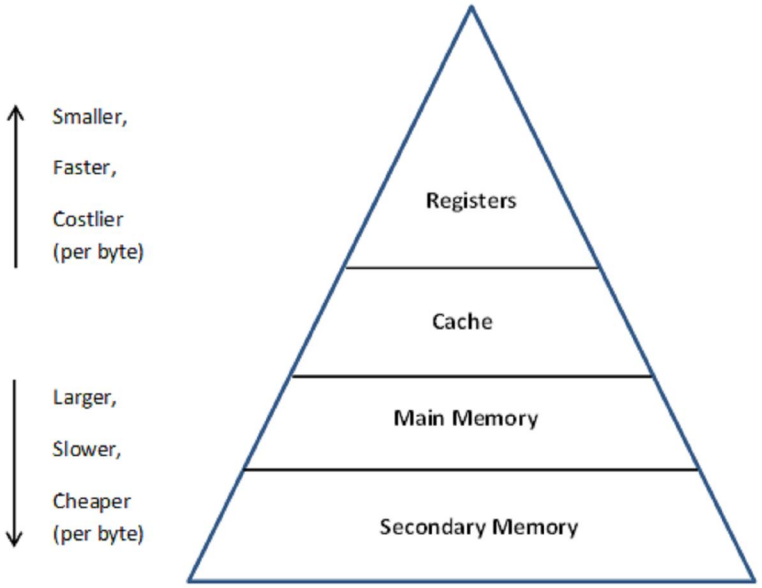



**Figure 3.4 : Memory hierarchy**

Thus, from the above figure it can be seen that the registers are at the top of the hierarchy and so provides the fastest, the smallest and the most expensive type of memory device for the CPU to access data.

**Memory Capacity :** Capacity in a computer system is defined in terms of the number of bytes that it can store in its main memory. This is usually stated in terms of kilobytes (KB) which is 1024 bytes or megabyte which is 1,048,576 bytes. The rapidly changing memory capacity of computer system has resulted in defining the capacity in terms of gigabytes (GB) which is 1,073,741,824 bytes. Thus, a computer system having a memory of 1GB is capable of storing (1024 X 1024 X 1024) bytes.

### 3.5.1 Primary Memory

Primary memory can be categorised into two types - RAM and ROM. We will now briefly describe RAM and ROM.

**Random Access Memory (RAM) :** A computer's **main memory** is often referred to as RAM - an area in the computer system unit that temporarily holds user data, operating system instructions and program instructions. Every time we turn on our computer, a set of operating system instructions is copied from hard disk into RAM.

These instructions, which help control basic computer functions, remain in RAM until we turn the computer off.

**RAM features :**

a) RAM is the place which holds the data that has to be processed by the computer's processor. Moreover, it holds the operating system and other application programs also.

b) RAM is made up of different ICs (Integreted Circuits). They are also called *semiconductor memory*.

c) Each element of RAM is a memory location in which data can be stored. Each location has a **unique address**. Using this address, data can be directly retrieved or stored.

d) Since RAM must hold both the data to be processed and the instructions for processing, its size or capacity is one of the measures of power of the computer.

e) RAM is a volatile memory. It loses its data when the computer is turned off.

There are generally two broad categories of random access memory :

**i)** **DRAM** memories (*Dynamic Random Access Memory*)

**ii)** **SRAM** memories (*Static Random Access Memory*)

**DRAM :** Dynamic RAM is a type of RAM in which data is stored in a storage cell, consisting of transistors and capacitors. A common property of a capacitor is its tendency to get discharge, it means the current goes down in the circuit and data cannot hold for long time. To overcome this effect, the DRAM needs to be continuously refreshed with power supply and thus it has one *refreshing circuit* which rewrites the data in certain time intervals. This circuit refreshes or rewrites the data several hundred times in a second.

**SRAM :** Static RAM is a type of RAM that holds its data as long as power is supplied to the circuit. The SRAM does not need any refreshing circuit. SRAMs are used for specific applications within the PC. The SRAM has the following advantages:

- **Simplicity :** SRAMs don't require external refresh circuits to keep their data intact.
- **Speed :** SRAM is faster than DRAM.

In contrast, SRAMs have the following weaknesses, compared to DRAMs:

- **Cost :** SRAM is more expensive than DRAM.
- **Size :** SRAMs take up much more space than DRAMs

**Read Only Memory (ROM) :** One major type of memory that is used in PCs is called *read-only memory*, (*ROM*). ROM is the memory that stores the data permanently i.e. the instructions in ROM are permanent whether the power is on or off. We have no way to change them, unless we remove the ROM chips from the main board and replace them with another set.

Read-only memory is most commonly used to store system-level programs that we want to be made available to the PC at all times. For example, the ROM-BIOS (ROM basic input and output services) programs are stored in ROM chips which are used to boot up (start up) the computer.

The following are the different types of ROMs:

**Programmable ROM (PROM) :** This is a type of ROM that can be programmed using special equipment; it can be written to, but only once.

**Erasable Programmable ROM (EPROM) :** *EPROM* is a ROM that can be erased and reprogrammed. Ultraviolet light of a specific frequency is used for erasing the EPROM and for allowing it to be reprogrammed again.

**Electrically Erasable Programmable ROM (EEPROM) :** The next level of erasability is the *EEPROM*, which can be erased under software control. This is the most flexible type of ROM, and is now commonly used for holding BIOS programs.

### 3.5.2 Secondary Memory

Secondary memory or *storage* provides the facility of storing information and programs permanently. It differs from primary storage in that it is not directly accessible by the CPU. The computer usually uses its input/output channels to access secondary storage and transfers the desired data using intermediate area in primary storage. Secondary storage does not lose the data when the device is powered down; it is non-volatile. It is also typically less expensive than primary storage. Consequently, modern computer systems typically have an order of magnitude more secondary storage than primary storage and the data is kept for a longer time there. The figure 3.5 shows the commonly used secondary storage devices and their classification.

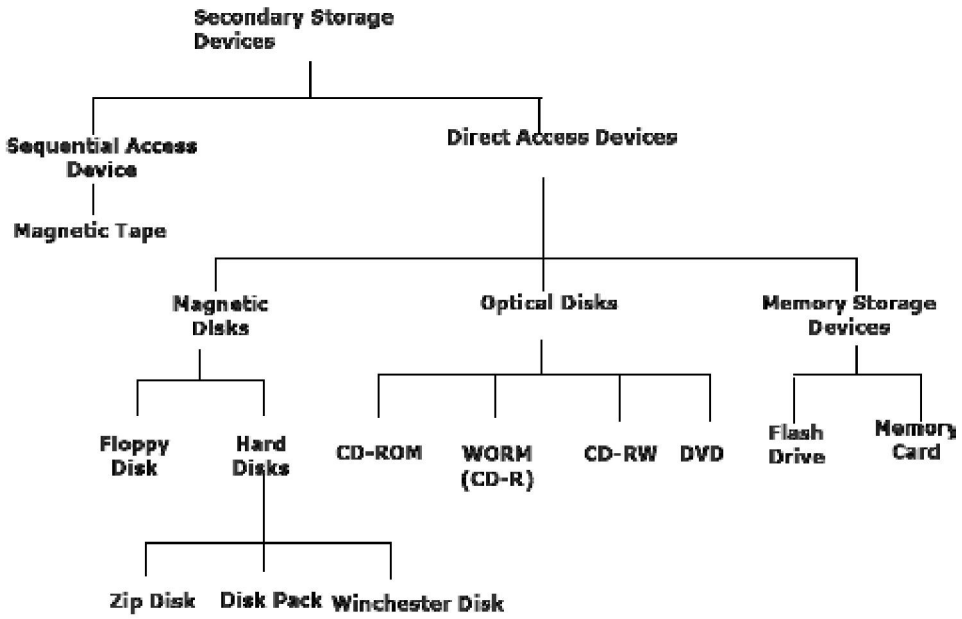
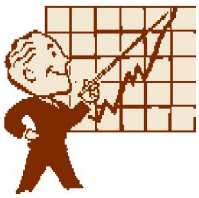



**Figure 3.5 : Secondary storage devices and their classification**

In modern computers, hard disks are usually used as secondary storage. The time taken to access a given byte of information stored on a hard disk is typically a few thousandths of a second, or milliseconds. By contrast, the time taken to access a given byte of information stored in random access memory is measured in

thousand-millionths of a second, or nanoseconds. Some other examples of secondary storage technologies are: Flash Memory (e.g. USB sticks or keys), Floppy Disks, Magnetic tape, Paper tape, Punch Cards, standalone RAM disks, and Zip drives.



**CHECK YOUR PRPOGRESS**

1. State True or False:
   i) The secondary memory is slower than the main memory but has a large capacity.
   ii) In random access memory any memory location can be accessed independently.
   iii) Cache memory increases load on main memory.
   iv) Flash memory is one kind of ROM.
   v) High speed memories are needed to bridge the gap of speed between I/O device and memory.
   vi) Registers are the fastest memory element in computer system.
   vii) Main memory of a computer system cannot store very large data.
2. Which memory is known as the main memory of the computer system ?

   .....

   .....
3. What are the differences in :
   a) Volatile versus Non-volatile memory

      .....

      .....

      .....
   b) Static RAM versus dynamic RAM

      .....

.....

.....

.....

4. What is the similarity between ROM and PROM?

.....

.....

## 3.6 INPUT DEVICES

The main function of the input unit of a computer system is to provide information for execution. Programs and data must be entered into the computer memory for processing through the input devices, and the results obtained from the execution by the CPU must be displayed or recorded for the user's. The most commonly used input devices can be classified into the following categories :

- **Keyboard devices**
- **Point and draw devices** (mouse, track ball, joystick, light pen, touch screen)
- **Scanning devices** (optical mark recognition, magnetic ink ch aracter recognition, optical bar code reader, digitizer, electronic card reader)
- **Voice recognition devices**
- **Vision-input devices** (Webcam, video camera etc)

### 3.6.1 Keyboard

It is the main input device used in most of the computer systems. It has letter and number (alphanumeric) keys, function keys, computer specific task keys, that allow the user to use an English-like language to issue instructions to an electronic environment. It uses a cursor to keep your place on the screen and to let you know where to begin typing. You are able to input commands, type data into documents, compose documents, draw pictures with use of certain keys, pull down menus, and respond to prompts issued by

the computer. The keyboard contains s*pecial function keys* labelled F1, F2, ....., F12 to manipulate the user interface. When a key is touched, an electrical impulse is sent through the device which is picked up by the operating system software, and sent through the computer to be processed.

The keyboard operates as a typical typewriter and uses a standard “QWERTY” keyboard. QWERTY is the way the keyboard is set up for typing. If you look at the keyboard under the top number row, you will see that the alphabet top row begins with QWERTY.

Some special purpose keyboards are also found which are used for specific applications. An example of such kind of keyboards can be seen at the Automatic Teller Machines or the ATMs where the keyboard is required for limited functionality by the customers.

### 3.6.2 Mouse

The mouse is a hand held pointing device that lets you to point and select items on your screen. In any mouse there are mostly 2-3 buttons and on a Mac there is one. A ball under the mouse senses movement. The mouse is included in almost every computer that is sold today. Besides becoming an important input tool, it has provided access to the computer for many individuals with disabilities that might not otherwise have the opportunity to use the computer.

**Variants of a Mouse :**

**Touchpad :** A touchpad is a touch sensitive input device which takes user input to control the onscreen pointer and perform other functions similar to that of a mouse. Instead of having an external peripheral device such as a mouse, the touchpad enables the user to interact with the device through the use of one or multiple fingers being dragged across the relative positions on a sensitive pad. These touch pads are mostly found in Notebook and Laptops.Touchpads are pressure and touch sensitive.



**Figure 3.6 : Touchpad of a Laptop**

### 3.6.3 Hand-held Devices

**Trackball :** The trackball is an upside-down mouse. It uses the same principle as the mouse except that the rollers are reversed and the ball is on top. This ball does not need as much attention as the normal mouse because the only thing that touches it is your hand as the normal mouse touches a surface.

**Joystick :** The joystick is a vertical stick that moves the graphic cursor in the direction the stick is moved. It consists of a spherical ball, which moves within a socket, and has a stick mounted on it.The user can move the ball with the help of the stick in any direction. Video games, training simulators and control panel of robots are some common uses of a joystick.



**Figure 3.7 : Trackball**



**Figure 3.8 : Joystick**

**Light pen :** The light pen is a pen shaped tool that allows the user to touch the computer screen with a lighted pen to activate commands and make selections. Light pens are typically used in CAD (Computer Aided Design) applications to directly draw on

screen.

**Touch Screen :** A touch screen is probably one of the simplest and most intuitive of all input devices. It uses optical sensors in, or near, the computer screen that can detect the touch of a finger on the screen.

### 3.6.4 Optical Input Devices

**Scanner :** Scanning devices are input devices used for direct data entry from the source document into the computer system. Scanners capture and store information in a graphical format, and then display it on the graphical screen. A scanner consists of two parts, one that illuminates the page for capturing the optical image, and the other that converts and stores the graphical image in a digital format. Once this is done, the computer can then see and directly process this scanned graphical image. A scanner's sophistication is the ability to translate an unlimited number of analog voltage levels to digital values. The scanner takes the information it sees on a page and converts into code that the computer can use. A picture once scanned can be edited, printed, or used in an application. Capturing information by using scanners reduces the possibility of human error typically seen during large data entry.

**Optical Mark Recognizer (OMR) :** Optical mark recognization devices sense the marks on computer readable paper. They are usually used by academic institutions for grading aptitude tests where the correct option is marked from multiple options given on special kinds of answer sheets. The OMR device directly reads this paper, and the computer can then use it for further processing.




**Figure 3.9: Magnetic Ink Character Recognizer**

**Magnetic Ink Character Recognition (MICR) :** MICR is similar to optical mark recognition and is used exclusively by the banking industry. The banking industry makes use of MICR devices for directly reading the account numbers written on cheques and for processing them further as required. MICR characters are printed in special typefaces with a magnetic ink or toner, usually containing iron oxide.

**Optical Barcode Reader (OBR) :** Data coded in the form of small vertical lines forms the basis of barcoding. Alphanumeric data is represented using adjacent vertical lines called barcodes. These are of varying width and the spacing between them is used to uniquely identify books, merchandise in stores, postal packages etc. A barcode reader uses laser beam technology. The laser beam is moved across the patterns of bars in a barcode. These bars reflect the beams in different ways. The reflected beam is then sensed by a light-sensitive detector, which then converts the light patterns into electrical pulses, thereby transmitting them to logic circuits for further conversion to alphanumeric value.

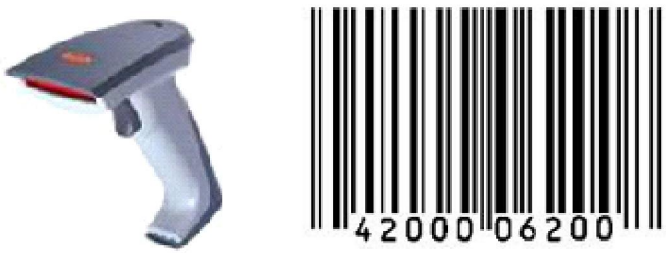



**Figure 3.10: Optical Bar Code**

**Digitizer :** The digitizer is another kind of input device used for converting (digitizing) picture,maps and drawings into digital form for storage in computers. These devices are commonly used in the

area of Computer Aided Design (CAD) by architects and engineers to design car, buildings, medical devices, robots and mechanical devices.

**Electronic Card Reader :** Card readers are devices that allow direct data input into computer system. The electronic-card reader is connected to a computer system and reads the data encoded on an electronic card and transfers it to the computer system for further processing. Typical example of electronic cards are the plastic coated cards provided by the banks to its customers for use in Automatic Teller Machines or ATMs.

## 3.7 OUTPUT DEVICES

The outputs produced by a computer system can be in two forms : *hard copy and soft copy*.

**Hard copy :** The output produced in a physical form is called hard copy output. This type of output is permanent and a relatively stable form of output. Paper is one of the most commonly used hard copy output media. The most widely used hard copy output device is the printer.

**Soft copy :** The output that remains in electronic form, stored in computer memory or on disk are called soft copy outputs. This kind output is not permanent and is usually displayed on monitor or screen. It includes both audio and visual forms of output.

A wide range of output devices are available today which are :

- Display device ( monitors, multimedia projectors, terminals)
- Plotters (flatbed, drum)
- Voice response system (voice response system, speech synthesizer)
- Printers

### 3.7.1 Display Devices

The display device shows the processed output from a computer system. The increasing demand for displaying the graphics and

pictures for presenting information in a visual form has led to the popularity of graphics display device. Display screen technology may belong to one of the following categories :

a) **Cathod Ray Tube(CRT) :** The CRT is a vacuum tube containing an electron gun (a source of electrons) and a fluorescent screen, with internal or external means to accelerate and deflect the electron beam. It is used for creating images in the form of light emitted from the fluorescent screen. A CRT display can be either of the following two types : *Raster scan display and Vector display*.

b) **Liquid Crystal Display(LCD) :** The LCD technology is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. LCDs have replaced cathode ray tube (CRT) displays in most applications. They are usually more compact, less energy consuming, lightweight, portable, less expensive, more reliable, and easier on the eyes.

**Monitor :** The monitor is one of the most commonly by used output devices. It can be thought of as a high resolution TV set. The monitor displays text and images (pictures) converted to output from the video adapter. The video adapter is an expansion card that plugs into the motherboard. The adapter changes the instructions from the central processing unit (CPU) into a way that the monitor can understand it.

Most computer monitors are based on Cathode Ray Tube (CRT) technology. The basic operation of these tubes is similar to that in television sets. With the widespread use of smaller computers like PDAs and laptops now-a-days, a new type of display screen Liquid Crystal Display (LCD) has been used.

### 3.7.2 Printers

It is a widely used output device. A printer prints information and data from the computer onto a paper. Some printers can produce only textual information but some others can produce graphics also.

Printers can be classified into categories based on : *printing technology, printing speed, printing quality.*

Printing technology : Printers can be divided into two types - *(i)impact printers* and *(ii)non impact printers*.

**(I) Impact printers :** The printers that work by physically striking a head or needle against an ink ribbon to make mark. Impact printers are divided into *Dot matrix printers , Daisy-Wheel printers* and *Drum printers.*

**Dot Matrix Printer :** This printer is the cheapest but loudest of all the printers. This printer prints one character at a time. The printer uses a fine stripe of carbon and depending on what pin it is, will determine the quality of the printing. The pin sizes range from 9-24. The print head hits the ink ribbon with one of its many pins causing it to form a letter number or character.



**Figure 3.11 : A Dot-Matrix Printer**

With the pins hitting the ribbon this printer becomes quite loud. The ppm (page per minute) ranges from 1 to 3. But with new changes in the technology it is being more and more used in offices today and it can also print 3 - 6 ppm. The drawback in most dot matrix printers is the on-roll paper which has a track which feeds it through

the printer. Also, in most new dot matrix printers there is a paper feed which allows most forms of paper.

**Daisy Wheel Printer :** Daisy-wheel printers operate in much the same fashion as a typewriter. A hammer strikes a wheel with petals (the daisy wheel), each petal containing a letter form at its tip. The letter form strikes a ribbon of ink, depositing the ink on the page and thus printing a character. By rotating the daisy wheel, different characters are selected for printing.You can change the daisy wheel to print different fonts. This printer is also called the letter quality printer.

**Drum printer :** Drum printer is one of the most commonly used line printers.

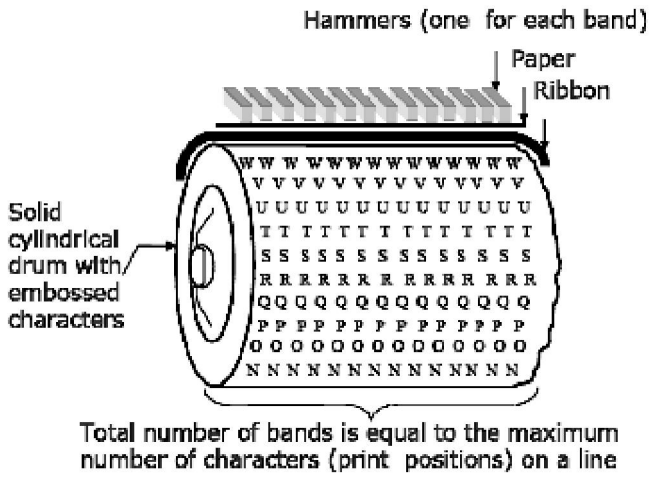



**Figure 3.12 : Printing Mechanism of a Drum Printer**

In a typical drum printer design, a fixed font character set is engraved onto the periphery of a number of print wheels, the number matching the number of columns (letters in a line) the printer could print. The wheels, joined to form a large drum (cylinder), spin at high speed and the paper and an inked ribbon are stepped (moved) past the print position. As the desired character for each column passes the print position, a hammer strikes the paper from the rear and presses the paper against the ribbon and the drum, causing the desired character to be recorded on the continuous paper. Because the drum

carrying the letterforms (characters) remains in constant motion, the strike-and-retreat action of the hammers has to be very fast. Typically, they are driven by voice coils mounted on the moving part of the hammer.

**(II) Non impact printers :** These printers work by not physically striking a head or needle against an ink ribbon to make a mark. Inkjet, Laser and thermal printers fall under this category of printers.

The ***non impact printers*** commonly used are :

**Inkjet Printer :** This printer is generally used in homes. It is a non impact printer and it does not touch the paper while printing. Instead, the print head sprays ink onto paper forming an image or text.

For business letters, a injet printer is the most common as it is used for its high quality printing. The common speed on an ink jet printer is about 3 ppm and 300 dpi (dots per inch).

**Laser Printer :** Among the different types of printers, laser printers remain the fastest, and the most efficient way to reproduce text and images, offering high resolution and quick speeds at a relatively low cost. A laser printer uses an electrostatic process similar to a photocopier. The laser charges the areas of a photosensitive image drum. Toner particles are then attracted to these areas of the drum. By rolling this drum against a piece of paper, the printer creates an image on a page.In the final stage, heat is used to fuse the toner to the paper.



**Figure 3.13 : Inkjet printer and Laser Printer**

**Plotter :** A plotter is a hard copy output device which is used to

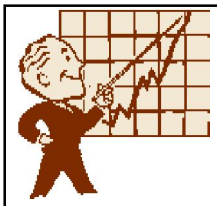
draw high-resolution charts, graphs, maps, and other line based diagrams. It is a pen based output device, attached to a computer for making vector graphics, that is, images created by a series of many straight lines. A plotter is a very slow and expensive output device. It is mainly used for Computer Aided Design(CAD) and Computer Aided Manufacturing applications. Plotters are classified as Drum plotters and Flatbed plotters.



**Figure 3.14 : Plotter**

**Audio Output :** Voice response systems enable the computer to talk to its users. It consists of an audio-response device that produces the audio output. Voice response systems are of *two* types : *voice reproduction system* and *speech synthesiser.*

Voice reproduction system produce an audio output by selecting the appropriate response from a predefined set of responses. These responses may be in the form of speech (words or phrases spoken by human beings), musical sounds, alarms, or other sounds. Text is converted into spoken words by speech access systems.



**CHECK YOUR PROGRESS**

5. State true or false
   a) One of the most common input device is keyboard.
   b) Plotters are devices used for outputting pictures, drawings.
   c) Digitizers are used as output devices.
   d) In case where graphical user interfaces are common mouse should not be used.
   e) Speech recognition devices are input devices.
6. Answer the followings :
   a) What are electronic card readers?
   b) Compare and contrast the Laser and Dot Matrix Printers.
   c) What is an OMR device?
   d) On what basis are the printers classified?

## 3.8 COMPUTER BUS

Bus is an electrical pathway through which the processor communicates with the internal and external devices that are assembled with the computer. Buses resposible to carry memory address as well as data to the control location in memory. Computer system contains a number of different buses that provide pathways between components at various levels of the computer system hierarchy. The name of the bus is determined by the type of the signals it carries and the operations it performs. A bus that connects major computer components (CPU, memory, I/O) is called a *system bus*.

The interaction between the CPU and memory and CPU and I/O takes place very frequently. To enable this interaction, some type of connectivity is needed between the units of a computer system. This connectivity channel is known as *bus*. A key characteristic of a bus is that it

is a shared transmission medium. Physically, a bus is set of wires, which carries a group of bits in parallel and has an associated control scheme. The bus width is defined as the number of parallel lines in the bus. Every computer has three types of buses for interconnecting the CPU and memory and CPU and I/O. The functions performed by bus are as follows :

- Bus transfers data between the computer subsystem. It sends instructions and commands to and from the processors.
- It connects all internal computer components to the main memory and the CPU.
- It logically connects various peripheral devices which can easily communicate with the CPU.
- It has clock speed which is measured in MHz.

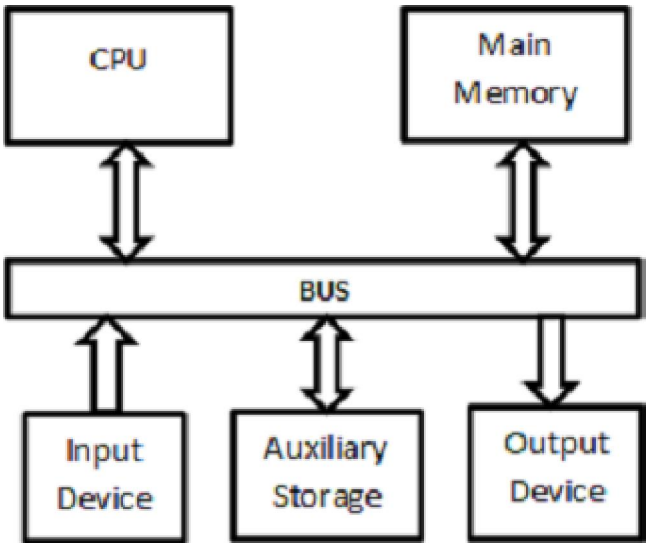



**Figure 3.15: Computer Bus**

**Data Bus :** The data bus is used to transfer data between the CPU and memory and CPU and I/O. The one that you hear most about is the data bus. The bus width of the data bus is an important parameter that affects the overall speed of a computer system. This is because each wire of a bus can transfer one bit at a time. Hence, a 8-bit bus can move 8 bits data time, a 16 bit bus can transfer two bytes, and 32 bit bus can transfer four bytes at a time. This is similar to a multi-lane highway. The wider the highway, the more traffic can flow simultaneously. Similarly the wider the bus enables more bits of data to travel, simultaneously resulting in faster

exchange of data. The data bus is also referred to as a *memory bus* which is often called *system bus.*

**Address Bus :** Every location in the memory has a unique address. The address of a location does not change, but the data stored in it can change. In order to retrieve some data from memory, it is necessary to specify the address of the location where the data is stored. The address bus is used to carry the address of a memory location whenever data is to be transferred to or from memory.

Again, a computer system normally has multiple I/O devices like disk, tape, network etc simultaneously connected to it. Each I/O device has a unique identifier associated to it. The address bus is used to carry the address of the I/O device to be accessed by the CPU.

**Control Bus :** In addition to sending address and exchanging data with the memory, the CPU also needs to send control signals to the memory to specify whether the data is to be read from or written to the specified address location. The control bus carries such signals, which are in the form of READ/WRITE commands. A typical bus structue is shown in the figure 3.16.

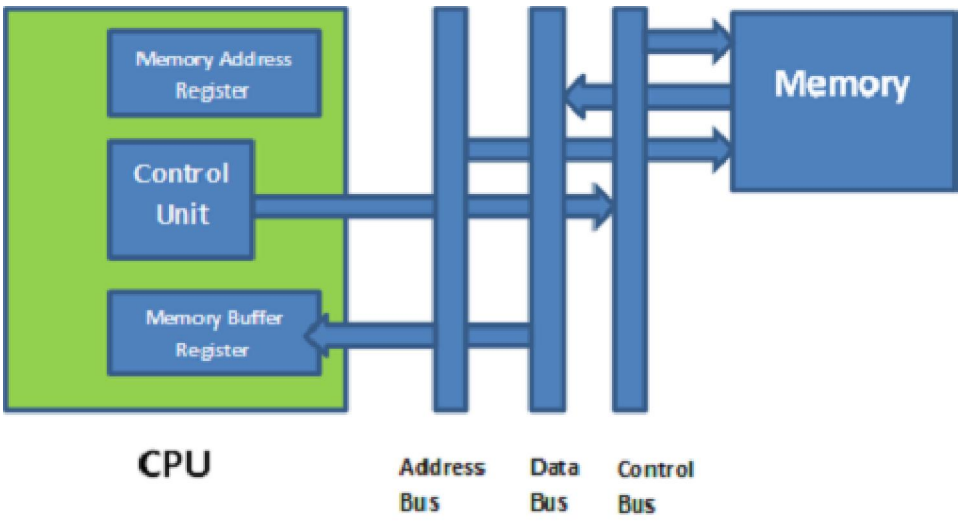



**Figure 3.16: Different types of Bus**



**ACTIVITY**

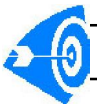
- Find out the capacity and structure of the memory types used in a computer system.
- Prepare a list of all old and new input and output devices with illustrations.



## 3.9 LET US SUM UP

- Data inside a computer is stored in the form of 0s and 1s. These 0 and 1s are called bit. 4 bit constitute a nibble and 8 bit constitute a byte.
- The ***memory*** usually refers to a form of semiconductor storage i.e. primary memory and ***storage*** refers to mass storag i.e. secondary memory.
- Random access memories are the semiconductor memory. They are volatile in nature. RAMs are of two types - dynamic RAM and static RAM.
- ROMs are also the semiconductor memory. The instructions in ROMs are permanent whether the power is on or off. PROM, EPROM, EEPROM are the types of ROMs.
- Cache memory is a special type of RAM which is the faster memory used in a computer system in between the CPU and main memory.
- Secondary memory also called secondary storage stores information and programs permanently. In personal computer, secondary memory typically consists of hard disk or any removable media, if present, such as a CD or DVD etc.
- Magnetic tapes are the magnetic-coated plastic tapes, which are used for storing data and audio or video files.
- Input device is an electromechanical device that accepts data or information from the user in user readable form, and translates them into computer readable form.

- An output device is an electromechanical device, which produces the output of processing by the computer to the user. Computer produces the output in a machine readable form, and the output device converts it to a human readable form.
- Bus is an electrical pathway through which the processor communicates with the internal and external devices that are assembled with the computer. Basically ,the buses are of three types : data bus, address bus and control bus.



## 3.10 ANSWERS TO CHECK YOUR PROGRESS

**Ans. to Q. No. 1 :** i) True, ii) True, iii) False, iv) True, v)True, vi)True, vii) True

**Ans. to Q. No. 2 :** Random Access Memory is known as the main memory of the computer system.

**Ans. to Q. No. 3 :**

| | | |
|---|---|---|
| a) | **Volatile Memory** | **Non-volatile memory** |
| i) | Power is required all the time | i) Power is not required once data is stored |
| ii) | Temporary storage | ii) Permanent storage |
| iii) | Normally faster than non-volatile types | iii) Slower than volatile memories. |
| b) | **Static memory** | **Dynamic memory** |
| i) | Loses its signal | i) Doesnot lose signal strength |
| ii) | Periodic refreshing of memory is needed | ii) No refreshing |
| iii) | Expensive | iii) Cheap |
| iv) | Used as Cache | iv) Used as main memory |

**Ans. to Q. No. 4 :** The similarity in ROM and PROM is that both write operations which can be performed only once and whatever has been written cannot be changed.

**Ans. to Q. No. 5 :** a) True, b) True, c) False, d) False, e) True

**Ans. to Q. No. 6 :** a) Card readers are devices that allow direct data input into a computer system. The electronic-card reader is connected to a computer system and reads the data encoded on an electronic card and transfers it to the computer system for further processing.

b)

| | **Laser Printer** | | **Dot Matrix Printer** |
|---|---|---|---|
| i) | High cost | i) | Low cost |
| ii) | Forms character using laser beam | ii) | Use Dot Matrix to print character |
| iii) | Non-impact printer | iii) | Impact printer |
| iiv) | High quality output | iv) | Output is of low quality |
| v) | Noiseless operation | v) | Noisy |
| vi) | Cannot produce multiple copies of a single print | vi) | Can produce multiple copies in a single print with the help of carbon paper. |

c) An input device (a scanner) is capable of recognizing a pre-specified type of mark made by pencil or pen. Any input data that is of a choice or selection nature can be recorded for OMR input.

d) Printers can be classified into categories based on : printing technology, printing speed, printing quality. Printing technology : Printers can be divided into two types - *impact printers* and *non impact printers*.



## 3.11 FURTHER READING


- Ram, B. (2000). *Computer Fundamentals: Architecture and Organization*. New Age International.
- ITL Education Solutions Limited, & Sargunar, J. (2011). *Introduction to Computer Science*. Pearson Education India.
- Morris, M. M. (1987). Digital Logic and Computer Design.
- Sinha, P. K., & Sinha, P. (2010). *Computer Fundamentals* (Vol. 4). BPB publications.



## 3.12 MODEL QUESTIONS

Q1. Differentiate between a bit and a byte.

Q2. What is computer memory? List the two different categories of memory.

Q3. What is a RAM? What are its two types? Differentiate between them.

Q4. What is a ROM? Why is it called so? List the differenet types of ROMs and their key features.

Q5. What is a cache memory? How is it different from a primary memory?

Q6. Differentiate between

a) PROM and EPROM.

b) Static RAM and Dynamic RAM

Q7. Why are input and output devices necessary for a computer system?

Q8. What are pointing devices? Discuss some of the commonly used pointing devices.

Q9. Explain the different types of printers. Make a clear difference among them in terms of speed, cost, and method of operation.

Q10. What is a bus? List out the main functions performed by buses in a computer system.

Q11. Write short note :

a) RAM b) Light pen

c) MICR d) Scanner

e) Computer Bus

*** ** ***

# UNIT 4 : COMPUTER MEMORY AND STORAGE

## UNIT STRUCTURE


4.1 Learning Objectives

4.2 Introduction

4.3 Memory Representations

4.4 Memory Hierarchy

4.5 CPU Registers

4.6 Primary Memory

4.6.1 Random Access Memory

4.6.2 Read Only Memory

4.7 Secondary Memory

4.8 Cache Memory

4.9 Virtual Memory

4.10 Let Us Sum Up

4.11 Answers to Check Your Progress

4.12 Further Reading

4.13 Model Questions


## 4.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define how memory is represented in computers
- learn about memory hierarchy
- describe the role of CPU registers
- state usefulness of cache memory and virtual memory
- learn about primary memory and secondary memory
- describe RAM and ROM.

## 4.2 INTRODUCTION

In the previous unit we discussed some hardware components that are essential for a computer system. In this unit we will discuss representation of memory in a computer system and memory hierarchy. Here, we will also discuss primary memory elaborately.

A memory system is a hierarchy of storage devices with different capacities, costs, and access times. Memory hierarchies work because well-written programs tend to access the storage at any particular level more frequently than they access the storage at the next lower level. So the storage at the next level can be slower, and thus larger and cheaper per bit. The overall effect is a large pool of memory that costs as much as the cheap storage near the bottom of the hierarchy, but that serves data to programs at the rate of the fast storage near the top of the hierarchy.

## 4.3 MEMORY REPRESENTATIONS

Binary digit (or bit) is the smallest unit of memory. A bit is the basic unit of representation of data in a computer. A bit can have only two possible states: 1 or 0. As humans, we may find it useful to think of this in terms of "yes or no", "true or false", "on or off", and so on.

Most computers do not work with bit individually, but instead group 8 bits together to form a byte. One byte can store $2^8$, i.e., 256 different combinations of bits, and thus can be used to represent 256 different symbols. In a byte, the different combinations of bits fall in the range 00000000 to 11111111. A group of bytes can be further combined to form a word. A word can be a group of 2, 4 or 8 bytes.

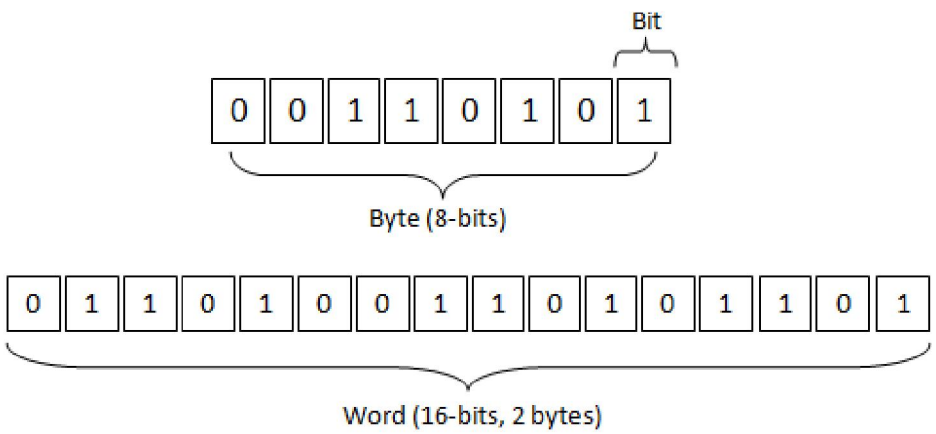



**Fig. 4.1: Bit and bytes**

One byte = grouping of 8 bits.

For example, 0 1 0 0 0 0 0 1. This one byte can store one letter, e.g., 'A'. The relationship between bit and byte is given below:

1 bit = 0 or 1

1 Byte = 8 bits

1 Kilobyte (KB) = $2^{10}$ = 1024 Bytes

1 Megabyte (MB) = $2^{20}$ = 1024 KB

1 Gigabyte (GB) = $2^{30}$ = 1024 MB = 1024 *1024 KB

1 Terabyte (TB) = $2^{40}$= 1024 GB = 1024 * 1024 *1024 KB

1 Petabyte (PB) =$2^{50}$=1024 TB =1024 * 1024 * 1024 * 1024 KB

The main memory consists of many memory locations, each having a physical address, a code, which the CPU (or other device) can use to access it. For a processor, the range of the memory address is 0 to the maximum size of memory. Figure. 4.2 shows the organization of a 16 MB block of memory for a processor with a 32-bit word length.

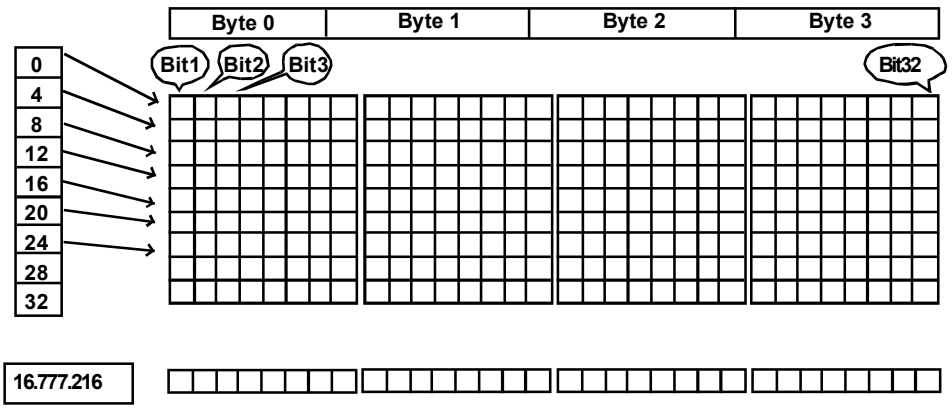



**Fig. 4.2: Organization of a 16 MB Block Memory**

## 4.4 MEMORY HIERARCHY

Memory is characterized on the basis of two key factors—storage capacity and access time. Storage capacity is the amount of information (in bits) that a memory can store. Access time is the time required to locate and retrieve stored data from the memory unit in response to a program instruction. The lesser the access time, the faster is the speed of memory. Ideally, the memory with fast access time and large capacity is preferred. However, the cost of fast memory is very high.

The computer uses a hierarchy of memory that is organized in a manner to enable the fastest speed and largest capacity of memory. The hierarchy of the different memory types is shown in Fig.4.3. A memory

hierarchy in computer storage distinguishes each level in the hierarchy by response time.

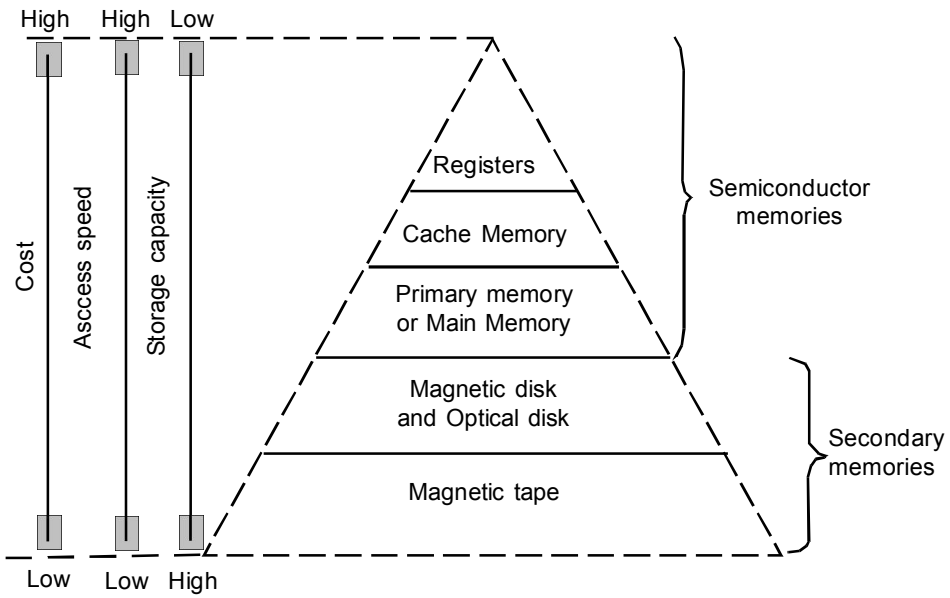



**Fig. 4.3: Memory Hierarchy**

We can categorize the memory used in a computer as internal and external memory. The internal memory consists of the CPU registers, cache memory and primary memory. The internal memory is used by the CPU to perform the computing tasks.

## 4.5 CPU REGISTERS

A register is a very fast computer memory used to speed up the execution of computer programs by providing quick access to commonly used values inside the CPU. CPU registers are the top of the memory hierarchy, and are the fastest way for the system to manipulate data. In a very simple microprocessor, it consists of a single memory location, usually called an accumulator. Registers are built from fast multi-ported memory cell. The result of ALU operation is stored in registers and could be re-used in a subsequent operation or saved into memory. We have already learnt that registers are usually measured by the number of bits that they can hold. For example, 8-bit register, 32-bit register etc.

Although, the number of registers varies from computer to computer, there are some registers common to all computers. There registers with their role are described below:

a) **Accumulator (A):** It is the most frequently used register. It holds the data to be operated upon, the intermediate results, and the results of processing. It is used during execution of most instructions. Results of arithmetic operations are returned to accumulator register for transfer to main memory through the memory buffer register (MBR). In some computers, there is more than one accumulator.

b) **General Purpose Registers:** General purpose registers are used to store data and intermediate results during program execution. Its contents can be accessed through assembly language programming.

c) **Special Purpose Registers:** Users do not access these registers. These are used by the computer system at the time of program execution. Some types of special purpose registers are given below:

   1) **Memory Address Register (MAR):** It holds the address of the active memory location.

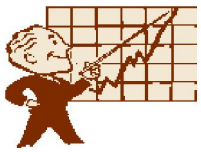
   2) **Memory Buffer Register (MBR):** It holds the contents of the accessed (read/written) memory word. An instruction word placed in this register is transferred to the instruction register. A data word placed in this register is accessible for operation with accumulator register or for transfer to I/O register. A word to be stored in a memory location must be transferred first to MBR from where it is written in memory.

   3) **Instruction Register (IR):** It holds the current instruction being executed. As soon as the instruction is stored in this register, the operation part and the address part of the instruction are separated. The address part of the instruction is sent to MAR while its operation part is sent to control unit. In control unit the operation part is decoded and interpreted. Finally, the CU generates command signals for execution of the task specified in the instruction.

   4) **Program Counter (PC):** It holds the address of the next instruction to be executed. Normally, the instructions of a program are stored

in consecutive memory locations, and are executed in sequence unless a branch instruction is encountered.

5) **Input/output Register (I/O):** It is used to communicate with input/output devices.



**CHECK YOUR PROGRESS**

**Q.1:** Fill in the blanks:

a) A group of 8 bits form a .....

b) Memory is organized as a linear ..... of locations.

c) A memory hierarchy in computer storage distinguishes each level in the hierarchy by .....

d) ..... is the amount of information that a memory can store.

e) ..... is the time interval between the read/write request and the availability of data.

f) A CPU ..... is a very fast computer memory used to speed up the execution of computer programs.

g) ..... registers are used to store data and intermediate results during program execution.

## 4.6 PRIMARY MEMORY

Primary memory (or main memory) is the area of a computer from which the processor can store and retrieve data very quickly. It is active only while the computer is switched on. Every computer should have a primary memory which is a temporary storage area built into the computer hardware. Instructions and data of a program reside mainly in this area when CPU is executing the program. The rate of data fetching from primary memory is about 100 times faster than that from a high speed secondary storage like disk.

Physically, primary memory consists of some integrated circuit (IC) chips either on the motherboard or on a small circuit board attached to the motherboard of a computer system. Primary memory is made up of several

small storage areas called locations or cells. Each of these locations can store a fixed number of bits called word length of the memory. Each word or location has a built-in and unique number assigned to it. This number is called the address of the location and is used to identify the location. For example, if a memory has 1024 locations, then the address ranges from 0 to 1023. We have also heard about 8-bit computers, 16-bit computers, 32-bit computers, 64-bit computers, etc. The numbers refer to the total numbers of bits per memory word. More bits mean more rapid flow of electronic signal and this implies a faster computer. Main memory capacity is defined in terms of number of bytes a computer system can store.

There are two main categories of primary memory. These are:

- **Random Access Memory** (RAM), and
- **Read Only Memory** (ROM)

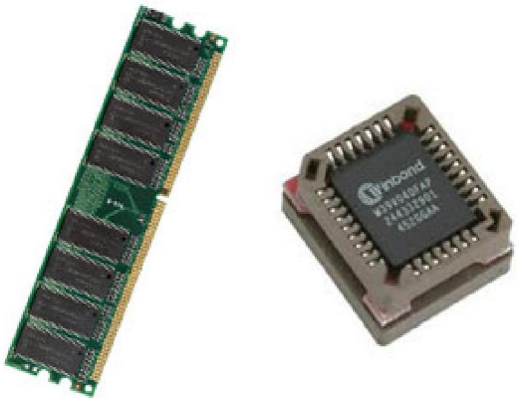


**Fig. 4.4: RAM and ROM**

### 4.6.1 Random Access Memory

**Random Access Memory** (RAM) is used to store data and instructions during the operation of a computer. The data and instructions that need to be operated upon by the CPU are first brought to RAM from the secondary storage devices like the hard disk. RAM loses its information when the computer is powered off. It is a type of volatile memory. When the power is turned on again, all the files that are required by the CPU are loaded from the hard disk to RAM. Since RAM is volatile memory, any information that needs to be saved for a longer duration of time must not be stored

in RAM. RAM provides random access to the stored bytes, words, or larger data units. This means that it requires the same amount of time to access information from RAM, irrespective of where it is located inside it. The size of RAM is limited due to its high cost. The size of RAM is measured in Megabytes or Gigabytes. The performance of RAM is affected by–

- Access speed (how quickly information can be retrieved). The speed of RAM is expressed in nanoseconds.
- Data transfer unit size (how much information can be retrieved in one request).

RAM typically contains portions of the operating system as well as applications and data in active or frequent use. A part of the operating system is loaded in the primary memory when the computer is turned on, and it stays there until the computer is turned off. RAM is also used for the temporary storage of input data, output data and intermediate results. The input data entered into the computer using the input device is stored in RAM for processing. After processing, the output data is stored in RAM before being sent to the output device. Any intermediate results generated during the processing of program are also stored in RAM.

RAM affects the speed and power of a computer. The more the amount of RAM available in a machine the better is its performance. Now a days computers with 1GB, 2GB, 4 GB or more are available in the market.

### 4.6.2 Read Only Memory

**Read Only Memory** (ROM) is a non-volatile memory chip in which data is stored permanently and cannot be altered by usual programs. Once data has been written onto a ROM chip, it cannot be removed/changed and can only be read. This is the reason why it is called read-only memory (ROM). ROM comes programmed by the manufacturer so that they cannot be modified by the users. ROM stores special micro-programs that permanently reside inside it.

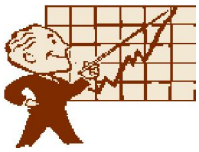
A good example of micro-program is "system boot program" which contains a set of start-up instructions to check if the system hardware like memory, I/O devices, etc. is functioning properly. It looks for an operating system and loads its core part in the volatile RAM of the system to produce the initial display-screen prompt. ROM stores the data needed for the start up of the computer.

ROM is categorized in the following two ways:

- **Manufacturer-programmed** and
- **User-programmed**

Manufacturer-programmed ROM chips are supplied by the manufacturers of electronic devices and it is not possible for a user to modify the programs or data stored in ROM chip.

On the other hand, a user-programmed ROM is one in which a user can load and store read-only programs and data. Such a ROM is commonly known as ***Programmable Read-Only Memory (PROM)*** because a user can program it. Once a user's programs are stored in a PROM chip, PROM becomes a ROM. Contents of ROM and PROM cannot be altered. In ***Erasable Programmable Read-Only Memory (EPROM),*** it is possible to erase information stored in an EPROM chip and the chip can be reprogrammed to store new information. A content of EPROM can be erased by exposing it to ultra violet light and reprogramming it.



## CHECK YOUR PROGRESS

**Q.2:** Fill in the blanks:

a) ..... memory transparently stores data so that future requests for that data can be served faster.

b) Hardware implements cache as a block of memory for ..... of data likely to be used again.

c) ..... loses its information when the computer is powered off.

d) The more the amount of RAM available in a machine the better is its .....

e) ..... is defined as the computer memory on which data has been prerecorded.

## 4.7 SECONDARY MEMORY

***Secondary Memory,*** also known as secondary storage, auxiliary memory or external memory is used primarily to store large volumes of data on permanent basis for a longer period of time in a computer system. Those data can be partially transferred to primary storage whenever required for processing. Secondary storage does not lose any data when the computer is powered down. It is non-volatile and has lower cost per bit stored as compared to primary storage. But it generally has an operating speed far slower than that of primary storage. Secondary storage differs from primary storage since it is not directly accessible by the CPU.

The most common form of auxiliary memory devices used in consumer systems is flash memory, optical discs, and magnetic disks.

## 4.8 CACHE MEMORY

Fetching of data by the CPU from the main memory is about 100 times faster than that from a secondary storage like disk. Main memory helps in minimizing the mismatched of processor-disk speed to a large extent. Even with the use of main memory, there is a mismatch of speed between the processor and memory. The rate at which the data can be fetched from memory is about 10 times slower than the rate at which CPU can process data.

Cache memory is used to overcome this problem. It minimizes the processor-memory speed mismatch. Cache memory is an extremely fast, small memory between CPU and main memory whose access time is closer to the processing speed of CPU. It is used to temporarily store very active data and instructions during processing. It is made up of static RAM and it acts as high-speed buffer between CPU and main memory.

## 4.9 VIRTUAL MEMORY

Virtual memory is a memory management technique that is implemented using both hardware and software. It maps memory addresses used by a program, called virtual addresses, into physical addresses in computer memory. Main storage as seen by a process or task appears as a contiguous address space or collection of contiguous segments. The operating system manages virtual address spaces and the assignment of real memory to virtual memory. Address translation hardware in the CPU, often referred to as a memory management unit or MMU, automatically translates virtual addresses to physical addresses. The primary benefits of virtual memory include freeing applications from having to manage a shared memory space, increased security due to memory isolation, and being able to conceptually use more memory than might be physically available, using the technique of paging.



## 4.10 LET US SUM UP

- ***Primary memory*** is the area of a computer from which the processor can access data quickly.
- ***Computer memory*** stores different kinds of data like input data, output data, intermediate results, etc., and the instructions.
- The ***internal memory*** and ***external memory*** are the two broad categories of memory used in the computer.
- ***Registers*** are built from fast multi-ported memory cell.
- ***RAM i***s used to store data and instructions during the operation of a computer.
- ***RAM*** can be read from and written to with the same speed.
- Once data has been written onto a ***ROM*** chip, it cannot be removed and can only be read.
- ***Cache memory*** is a very fast memory which is used to minimize the processor-memory speed mismatch.



## 4.11 ANSWERS TO CHECK YOUR PROGRESS

**Ans. to Q. No. 1:** a) byte, b) array, c) response time, d) Capacity, e) Access time, f) register, g) General purpose

**Ans. to Q. No. 2:** a) Cache, b) temporary storage, c) RAM, d) performance, e) ROM.



## 4.12 FURTHER READING


1) Rajaraman, V. & Adabala, N. (2014): *Fundamentals of Computers*; PHI Learning Pvt. Ltd.
2) Sinha, P. K. & Sinha, P. (2010): *Computer Fundamentals* (Vol. 4); BPB publications.
3) Thareja, R. (2012): *Computer Fundamentals & Programming in C*; OXFORD University Press.




## 4.13 MODEL QUESTIONS

**Q.1:** Write a note on memory representation in computers.

**Q.2:** Describe the memory hierarchy in computers.

**Q.3:** What are CPU registers? Describe the different classes of registers.

**Q.4:** What is cache memory? Describe its usefulness.

**Q.5:** What is Primary Memory in a computer? Describe its functionality.

**Q.6:** What is the use of Random Access Memory? What are its types?

**Q.7:** Differentiate between Static Ram and Dynamic Ram.

**Q.8:** What is Read Only Memory? What are its different types?

**Q.9:** What is the advantage of using virtual memory?

*** ***** ***

# UNIT 5: MICROSOFT WINDOWS OPERATING SYSTEM

**UNIT STRUCTURE**


5.1 Learning Objectives

5.2 Introduction

5.3 Windows Operating System

5.3.1 Features of Microsoft Windows

5.4 History of Windows

5.4.1. Windows 1.0 to Windows 3.1

5.4.2. Windows 95 to Windows ME

5.4.3. Windows XP to Windows 11

5.5 Desktop and Start Menu

5.5.1. Introduction to Desktop

5.5.2. Customizing Desktop

5.6 Let Us Sum Up

5.7 Answers to Check Your Progress

5.8 Further Reading

5.9 Model Questions


## 5.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- identify the key features of Microsoft Windows, including its user interface, software and hardware compatibility, and multitasking capabilities.
- describe the evolution of Microsoft Windows, from its early versions in the 1980s to the latest version, Windows 11.
- analyze the historical significance of Windows, including its impact on the personal computer industry and the ways in which it has transformed the way people interact with technology.
- evaluate the benefits and drawbacks of customizing the Windows desktop, including options for changing backgrounds, icons, and other settings.

- demonstrate proficiency in using the Windows Start menu, including the ability to navigate between different applications, search for files, and customize the layout of the menu.
- understand the basic functions of Windows File Explorer, including the ability to manage files and folders, navigate between different directories, and search for specific files.
- apply critical thinking skills to evaluate the usefulness of different Windows features for specific tasks or scenarios, such as creating documents, organizing files, or running specialized software applications.

## 5.2 INTRODUCTION

Windows is a popular operating system (OS) developed by Microsoft Corporation. It was first released in 1985 and has since undergone multiple updates and improvements. Windows OS is used by millions of people worldwide on personal computers, laptops, tablets, and other devices.

## 5.3 WINDOWS OPERATING SYSTEM

Windows is a popular operating system (OS) developed by Microsoft Corporation. It was first released in 1985 and has since undergone multiple updates and improvements. Windows OS is used by millions of people worldwide on personal computers, laptops, tablets, and other devices.

### 5.3.1 FEATURES OF MICROSOFT WINDOWS

Some of the important features of Windows operating system include:

- User-friendly interface: Windows has a user-friendly graphical user interface that makes it easy for users to navigate and access the features and functions they need.
- Compatibility with software and hardware: Windows is compatible with a wide range of software and hardware, making it easier for users to find and use the tools and applications they need.

- Customizability: Windows allows users to customize their desktops and applications to suit their personal preferences and work styles.
- Security: Windows includes built-in security features such as antivirus software and a firewall, helping to protect users from online threats.
- Productivity: Windows provides users with a range of productivity tools such as Microsoft Office, which helps users to create and manage documents, spreadsheets, and presentations.
- Gaming: Windows is widely considered the best platform for gaming, with a wide range of games available and support for advanced graphics and sound.

Overall, Windows has become an essential tool for businesses, individuals, and organizations of all sizes, providing a reliable and powerful platform for productivity, communication, and entertainment.

## 5.4 HISTORY OF WINDOWS OPERATING SYSTEM

Windows Operating System has come a long way since its initial release of Windows 1.0 in 1985. The evolution of Windows includes significant milestones, such as the introduction of the Start menu in Windows 95, the release of Windows XP with its updated graphical user interface, and the recent release of Windows 11 with its enhanced security features, improved performance, and redesigned user interface. With each new release, Windows continues to provide users with a reliable and user-friendly computing experience. In the following sections, we will briefly discuss various versions of Windows operating system with various features.

### 5.4.1 WINDOWS 1.0 TO WINDOWS 3.1

Windows 1.0 to Windows 3.1 was a series of operating systems released by Microsoft in the 1980s and early 1990s. Here are some notable points about this era of Windows:

- Windows 1.0 was released in 1985 and was the first version of Windows to be released. It was not a standalone operating system, but rather a graphical user interface (GUI) that ran on top of MS-DOS. It featured a tiled interface with a limited number of applications.
- Windows 2.0 was released in 1987 and featured improvements such as overlapping windows, support for keyboard shortcuts, and the ability to run multiple programs at once. It also introduced the control panel, which provided users with more customization options.
- Windows 3.0 was released in 1990 and was a major upgrade over Windows 2.0. It introduced the Program Manager and File Manager, which allowed users to easily manage their files and applications. It also included support for 16-bit applications and improved performance.
- Windows 3.1 was released in 1992 and was the final version of Windows to run on top of MS-DOS. It introduced features such as TrueType fonts, multimedia support, and support for network printing. It was also the first version of Windows to become widely popular among consumers.

## 5.4.2 WINDOWS 95 TO WINDOWS ME

Windows 95 to Windows ME was a series of Microsoft Windows operating systems released between 1995 and 2000. Here are some key points about this era of Windows:

- Windows 95 was released in 1995 and was a major upgrade from the previous Windows 3.1 operating system. It introduced the Start menu and Taskbar, and was the first version of Windows to feature built-in Internet support.
- Windows 98 was released in 1998 and included improved hardware support, USB support, and better integration with the Internet. It also introduced Internet Explorer 4.0.

- Windows 2000 was released in 2000 and was designed for business use. It was based on the Windows NT kernel and included improved security and stability features.

- Windows ME (Millennium Edition) was released in 2000 and was intended to be a more consumer-oriented version of Windows. It included features such as System Restore and Windows Media Player 7, but was criticized for its instability and poor performance.

## 5.4.3 WINDOWS XP TO WINDOWS 11

Here are some key points about the evolution of Windows from XP to 11:

- Windows XP was released in 2001 and was a major overhaul of the Windows operating system, with a redesigned user interface, improved networking and multimedia capabilities, and enhanced security features.

- Windows Vista was released in 2006 and introduced new features like Windows Aero, improved search functionality, and enhanced multimedia capabilities. However, it was also criticized for its heavy system requirements and compatibility issues with older hardware and software.

- Windows 7 was released in 2009 and was praised for its improved performance, streamlined interface, and enhanced security features. It also introduced the concept of libraries, which made it easier to manage files and folders.

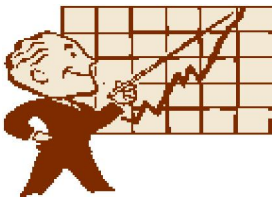
- Windows 8 was released in 2012 and introduced a new user interface called Metro, which was optimized for touchscreens and mobile devices. However, it was criticized for its steep learning curve and lack of backward compatibility with older software.

- Windows 8.1 was released in 2013 and addressed some of the criticisms of Windows 8, with improved performance, new features like the Start button, and better integration with cloud services.

- Windows 10 was released in 2015 and was designed to be a universal operating system that could run on desktops, laptops,

tablets, and smartphones. It introduced features like Cortana, Microsoft Edge, and virtual desktops, as well as a new update model that provided regular feature updates.

- Windows 11 was released in 2021 and features a refreshed user interface, with rounded corners and a new Start menu. It also introduces new features like Snap Layouts and Snap Groups, which make it easier to organize and multitask with multiple windows.



## CHECK YOUR PROGRESS

1. Choose the correct option:

(a) Which version of Windows was the first to introduce the Start menu?

(i) Windows 95 (ii) Windows XP

(iii) Windows Vista (iv) Windows 8

(b) Which version of Windows was designed for business use and based on the Windows NT kernel?

(i) Windows 95 (ii) Windows 2000

(iii) Windows XP (iv) Windows Vista

(c) Which version of Windows introduced the concept of libraries, making it easier to manage files and folders?

(i) Windows 7 (ii) Windows 8

(iii) Windows 8.1 (iv) Windows 10

(d) Which version of Windows was criticized for its instability and poor performance?

(i) Windows 98 (ii) Windows ME

(iii) Windows XP (iv) Windows Vista

(e) Which version of Windows introduced a new user interface called Metro, optimized for touchscreens and mobile devices?

(i) Windows 7 (ii) Windows 8

(iii) Windows 8.1 (iv) Windows 10

## 5.5 DESKTOP AND START MENU

In the remaining part of this unit, we will discuss the various features of the latest Windows operation system i.e. Windows 11. Windows 11 was released in October 2021, and it includes several changes and improvements to the desktop experience.

### 5.5.1 INTRODUCTION TO DESKTOP

In Windows 11, the desktop is the main graphical interface that appears when you log in to your computer (as shown in Figure 5.1). It's the area where you can see your wallpaper, icons, and various applications and folders that you have on your computer. The desktop is usually the first thing you see after logging in, and it's the starting point for most of your activities on the computer. It's a place where you can launch applications, organize files, and manage your computer's settings. The desktop in Windows 11 has a new design compared to previous versions of Windows, with new features like the centered Start menu and taskbar, snap layouts and groups, and widgets.

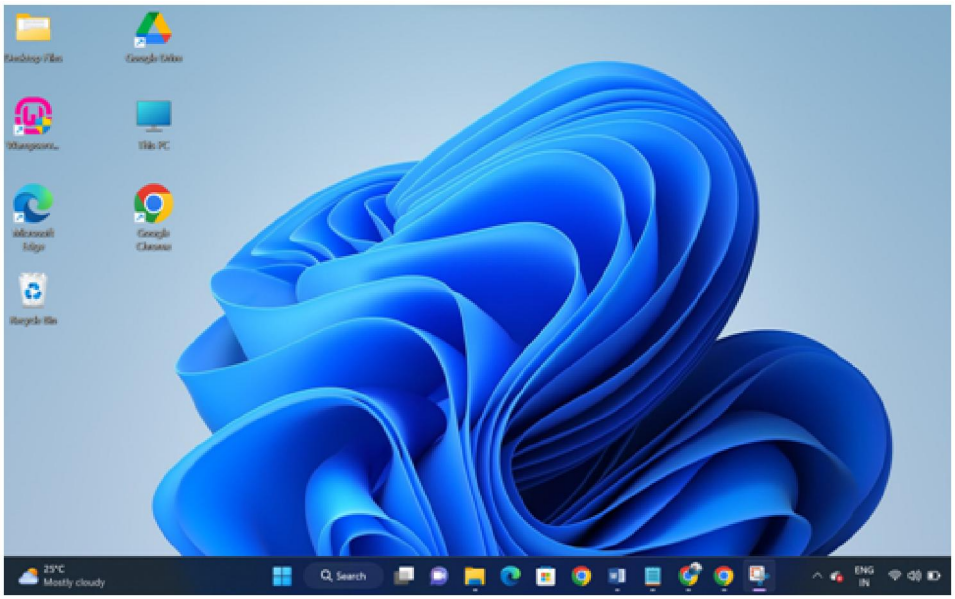


Figure 5.1: Windows 11 Desktop

Let us briefly discuss the various features of the desktop of Windows 11.

- **Start menu and taskbar:** The Start menu in Windows 11 is centered on the taskbar and has a simplified design compared to previous




Figure 5.2: Start menu and taskbar

- **New snap layouts and snap groups:** Windows 11 introduces new snap layouts and snap groups that allow you to quickly and easily arrange your open windows on the desktop. To open Snap layouts:

(a) With your keyboard: In the window you would like to snap,



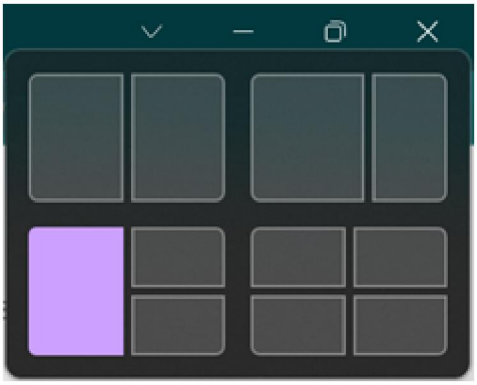
press Windows Logo Key + Z to launch the layout box.




(b) With your mouse: In the window you would like to snap, hover over the Minimize or Maximize button to launch the layout box.



Snap groups in Windows allow you to easily organize and access multiple windows related to a specific task or project. When you select a layout and snap every space with selected windows, it becomes a Snap group. If you get interrupted and open a new app, you can easily return to the Snap group by hovering over one of the open apps within the group.



Widgets: Windows 11 brings back widgets to the desktop, providing personalized news, weather, sports scores, and other information directly on the desktop. This can be done by hitting + W (Figure 5.3).

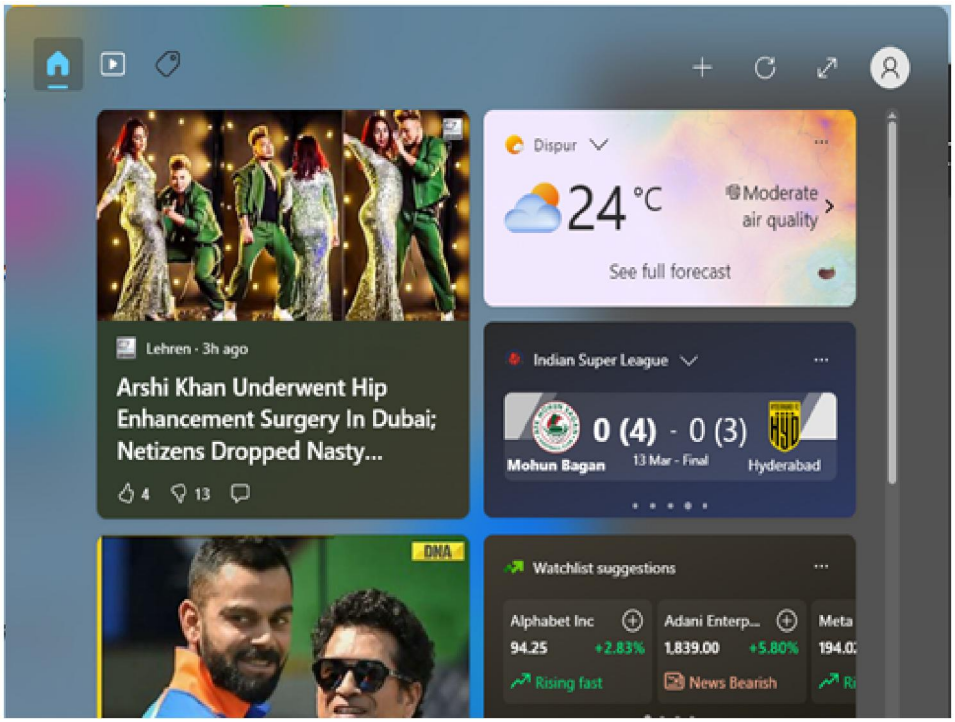



Figure 5.3

**Redesigned File Explorer:** The File Explorer in Windows 11 has a refreshed design that features rounded corners and new icons (Figure 5.4). It also includes new functionality, such as the ability to quickly access recent files.

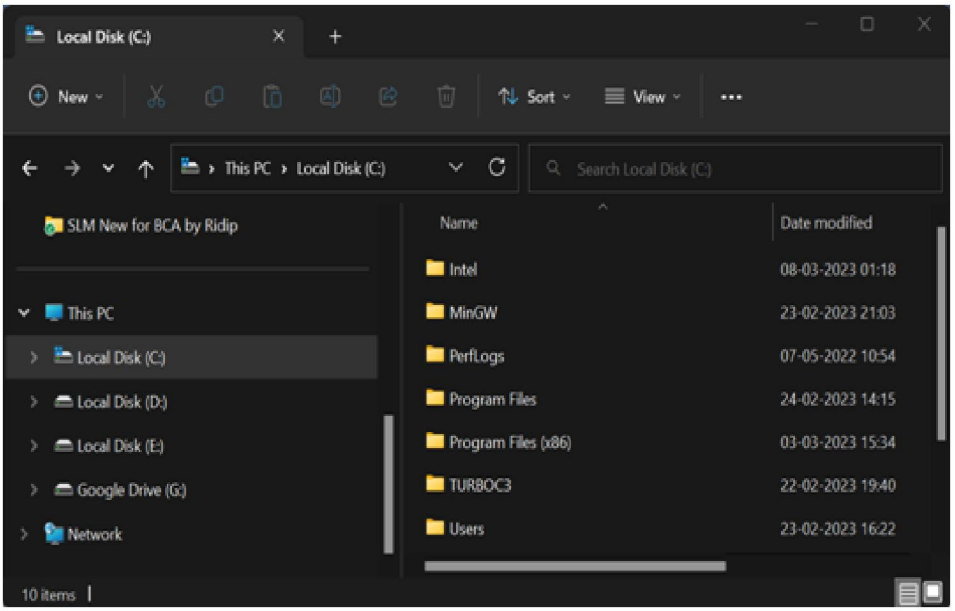



Figure 5.4: File Explorer

**Dark mode:** Windows 11 includes a system-wide dark mode that can be enabled from the settings menu. To enable the dark mode, go to Search option and type dark mode and click the open button. The following screen will appear (Figure 5.5).

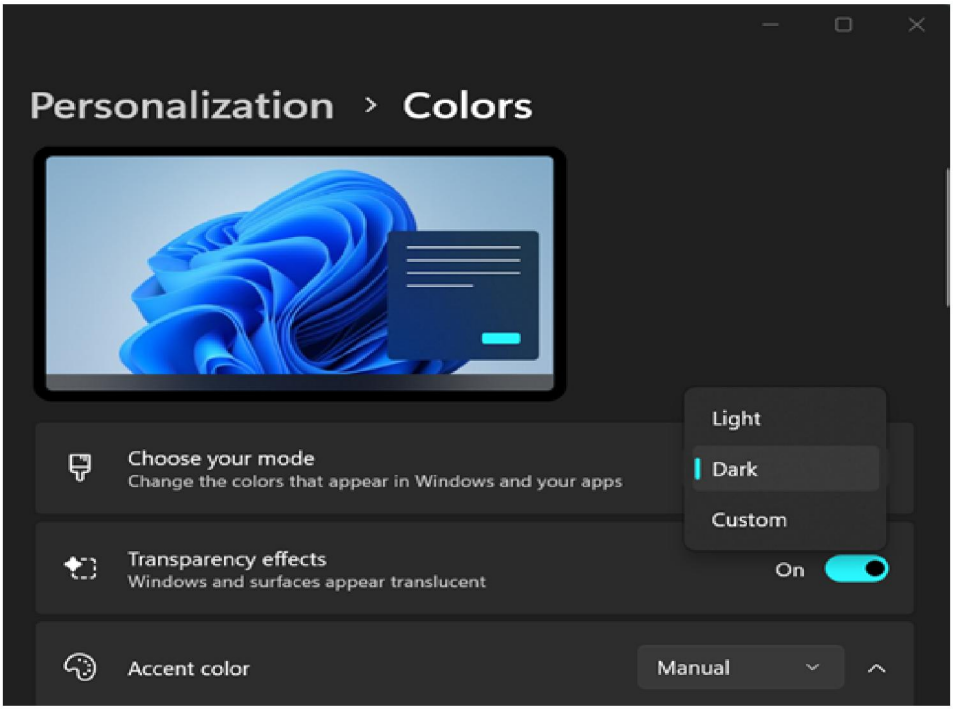



Figure 5.5: Dark Mode Settings

Touch-friendly design: Windows 11 includes a more touch-friendly design with larger touch targets and new touch gestures.

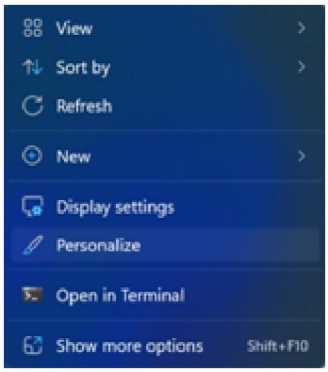
These are some of the important features of the desktop in Windows 11.

## 5.5.2 CUSTOMIZING DESKTOP

In Windows

You can customize your desktop in Windows 11 by following the steps below:

1. Right-click on your desktop and select "Personalize" from the menu.




In the Personalization settings, you can customize the following options (Figure 5.6):

- **Background:** You can choose a wallpaper or a solid color for your desktop background.
- **Colors**: You can choose a color scheme for your desktop, including the accent color and transparency effects.
- **Lock screen:** You can choose a background image for your lock screen and enable quick status updates.
- **Themes:** You can browse and download themes from the Microsoft Store to change your desktop's overall appearance.
- **Start:** You can choose whether to show recently opened items, full-screen start, and the number of recent items to display in the jump lists.

- **Taskbar:** You can choose where the taskbar appears on your desktop, whether to automatically hide it, and which apps appear in the taskbar.

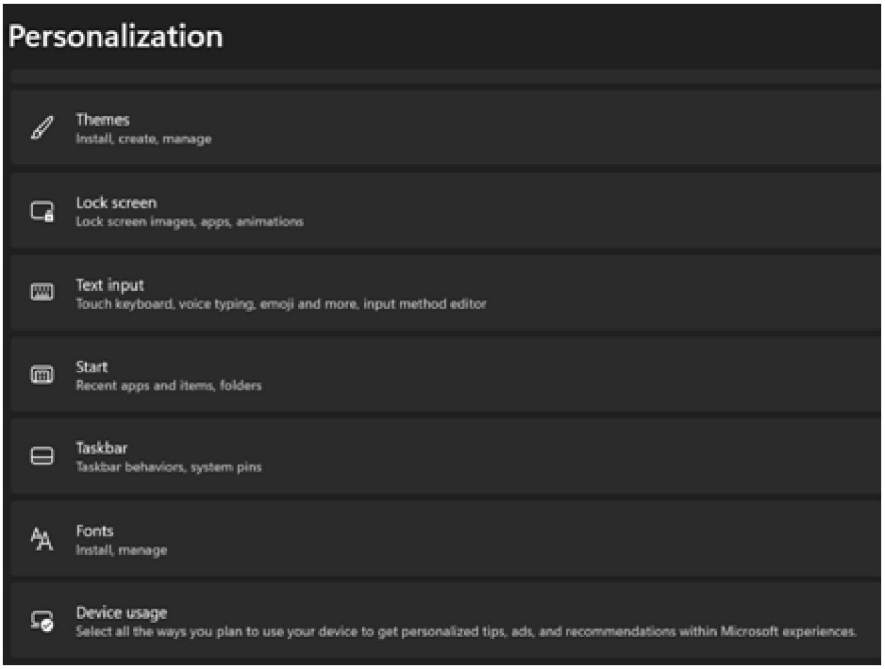



Figure 5.6: Personalization Settings of Desktop

2. To further customize your desktop, you can right-click on the taskbar and select "Taskbar settings" (Figure 5.7). Here, you can customize the following options:

- **Taskbar alignment:** You can choose whether the taskbar appears on the bottom, top, left, or right of your screen.
- **Taskbar behavior:** You can choose whether to automatically hide the taskbar, show taskbar buttons only when they're active, and group taskbar buttons.
- **Taskbar icons:** You can choose which icons appear on the taskbar, including system icons, notification area icons, and app icons.

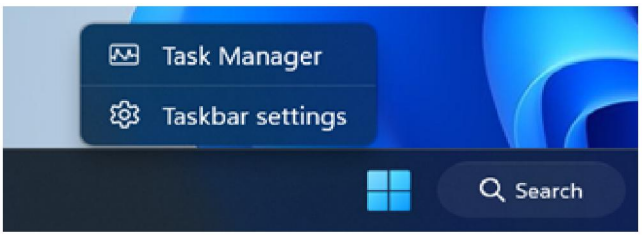



Figure 5.7: Taskbar Settings

To add shortcuts or widgets to your desktop, right-click on your desktop and select "New." Here, you can create shortcuts to files, folders, or programs, or add widgets such as weather, news, or a calendar (Figure 5.8).

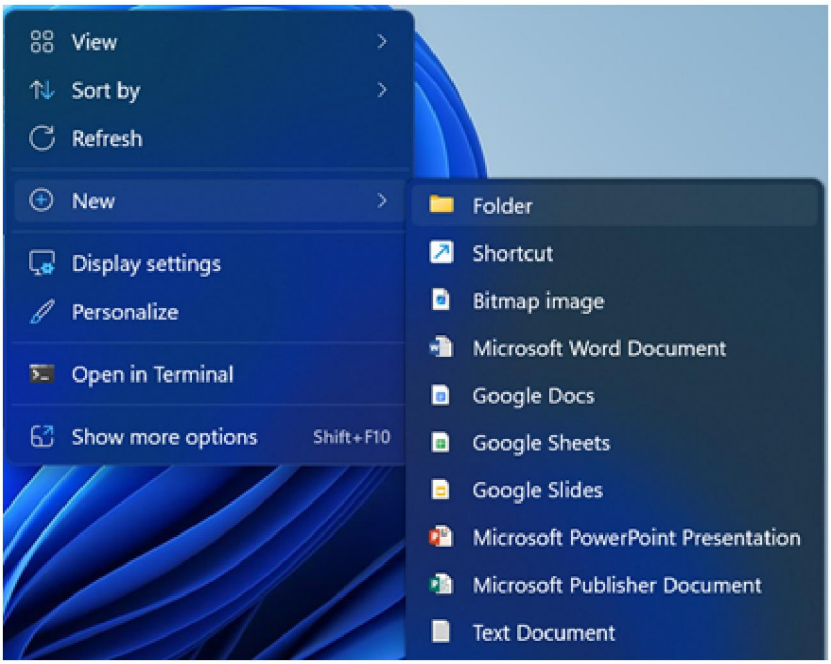



Figure 5.8

You can also customize the appearance of individual icons on your desktop by right-clicking on them and selecting "Properties." Here, you can change the icon's image, name, and other properties (Figure 5.9).

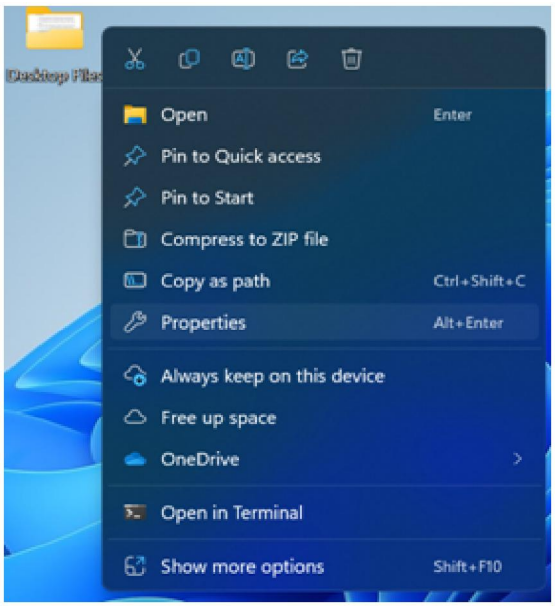



Figure 5.9



## 5.6 LET US SUM UP

- Windows is a popular operating system developed by Microsoft Corporation, used by millions of people worldwide on personal computers, laptops, tablets, and other devices.
- Some important features of Windows OS include a user-friendly interface, compatibility with software and hardware, customizability, security, productivity tools, and gaming support.
- Windows has evolved significantly since its initial release in 1985, with significant milestones including the introduction of the Start menu, updated graphical user interfaces, and enhanced security features.
- Windows 1.0 to 3.1 were early versions of Windows that ran on top of MS-DOS, introducing features such as tiled interfaces, overlapping windows, and support for 16-bit applications.
- Windows 95 to ME were versions of Windows that introduced significant upgrades such as the Start menu, USB support, improved security, and stability features.
- Windows XP to 11 are the latest versions of Windows that introduced a redesigned user interface, enhanced multimedia capabilities, improved performance, and better integration with cloud services.



## 5.8 ANSWERS TO CHECK YOUR PROGRESS

**Ans.to Q.No.1:** (a)(i) (b)(ii) (c)(i) (d)(ii) (e)(ii)



## 5.9 FURTHER READING

1) https://www.microsoft.com/en-in/windows/features?r=1



## 5.10 MODEL QUESTIONS

**Q.1:** When was the first version of Windows operating system released?

**Q.2:** What is the graphical user interface used in Windows called?

**Q.3:** What are some of the key features of Windows operating system?

**Q.4:** What is the significance of the Start menu in Windows 95?

**Q.5:** What was the primary purpose of Windows ME operating system?

**Q.6:** What were some of the criticisms of Windows Vista?

**Q.7:** What was the major change introduced in Windows 8 for touchscreens and mobile devices?

**Q.8:** What is the latest version of Windows operating system?

**Q.9:** What is the difference between Windows 8 and Windows 8.1?

**Q.10:** What are some of the improvements made in the recently released Windows 11 operating system?

**Q.11:** What are the new features of the desktop in Windows 11?

**Q.12:** How can you open snap layouts in Windows 11?

**Q.13:** How can you enable dark mode in Windows 11?

**Q.14:** What customization options are available in the Personalization settings for the Windows 11 desktop?

*** ***** ***

# UNIT 6 : LINUX OPERATING SYSTEM

## UNIT STRUCTURE


6.1 Learning Objectives

6.2 Introduction

6.3 Open Source and Free Software

6.4 Advantages of Linux

6.5 Disadvantages of Linux

6.6 Linux Booting Process

6.7 Linux Filesystem Hierarchy

6.8 Main Components of Linux Operating System

6.9 Concept of Path

6.10 Basic Linux Commmand

6.11 File Permission

6.12 Text Editor vi

6.13 Let Us Sum Up

6.14 Answers to Check Your Progress

6.15 Further Reading

6.16 Model Questions


## 6.1 LEARNING OBJECTIVES

After going through this unit, you will be able to :

- understand the advantages and disadvantages of Linux
- discuss the booting process of Linux
- describe about Linux file system hierarchy
- describe various Linux commands.

## 6.2 INTRODUCTION

In the previous unit, we have discussed the Windows operating system. In this unit we are going to discuss the Linux operating system. Windows operating system is not free and we need to buy it in order to use. In addition, Windows hides the detailed working of the Operating System

from the user and it will not allow the users to see or modify the source code. But in case of Linux Operating system it is completly free and the source code is available for free to use or modify. The advantages of linux operating system are: Better Security, Freedom to use, Multitasking, Flexibility, Stability etc.

In the following section we are going to discuss about the open source and free software as well as concepts on path and various Linux commands.

## 10.3 OPEN SOURCE AND FREE SOFTWARE

Free software is the software that can be used,modified or studied without restriction. It is generally available without charge, but it can also have a fee, such as in the form of distribution medium like CD or DVD etc.

The free software movement was conceived in 1983 by Richard Stallman to satisfy the need for and to give the benefit of software freedom to computer users.The definition, written by Richard Stallman, is still maintained today and it states that software is free software if the software have the following four freedoms:

- To run the program for any purpose.
- To study how the program works, and change it to make it do what you wish.
- To redistribute copies so you can help your neighbor.
- To improve the program, and release modified versions to the public, so that the whole community benefits.

Free Software and Open Source have more or less the same aims but differ in their philosophy and values. The fundamental difference between the two movements is in their values, their ways of looking at the world as mentioned by GNU Foundations.

For the Open Source movement, non-free software is a suboptimal solution. For the Free Software movement, non-free software is a social problem and free software is the solution.

Open-source software is computer software that is available in source code form provided under a software license that permits users to study, change, improve and also to distribute the software.

## 6.4 ADVANTAGES OF LINUX

There are various advantage of Linux operating system as described below:

**Cost :** Linux is completely free Operating System and we can modify or re-disrtibute the source code without any restrictions. Windows on the other hand, is not free and we have to pay for using it.

**Multi User interface :** Linux is multi user system i.e. more than one user can interact with the Linux system.

**Security :** The security aspect of Linux is much stronger than that of Windows.

## 6.5 DISADVANTAGES OF LINUX

**Understanding :** It is not so easy to understand the Linux operating clearly. We have to give much care while learning the Linux system.

**Alternative Software :** There are still some applications that exist on Windows that have no equivalent Linux application.

**Compatibility :** Though the kernel contributors and maintainers work hard at keeping the kernel up to date to make it compatable with all hardware, sometimes we can not find third party applications.

## 6.6 LINUX BOOTING PROCESS

Booting is a bootstrapping process that starts operating systems when the user turns on a computer system. Before going to the booting process of linux lets take a look at the general booting process of a machine.

Booting Sequence :

a. Turn On the PC
b. CPU jump to address of BIOS
c. BIOS runs POST (Power-On Self Test)

d. Find bootable devices

e. Loads and execute boot sector from MBR(Master Boot Record)

f. Load the OS to RAM

BIOS (Basic Input Output System) refers to the software code run by a computer when first powered on. Master Boot Record, a small program that is executed when a computer boots up and typically, the MBR resides on the first sector of the hard disk.The main function of POST is to check whether all the hardware component are working properly or not and report the errors if any to the users.

After the POST operation as described above, BIOS loads and execute the partition boot code from the designated boot device which contains phase 1 of a Linux boot loader. Phase 1 loads Phase 2 boot loader. The boot loader often presents the user with a menu of possible boot options. It then loads the operating system. Then it calls the start_kernel() which performs the memory management, device initialization etc and start the init process. The init process starts all the non-operating system services and provides the user with a login screen.

In summary,

– BIOS loads the Phase1 boot loader
– Phase 1 boot loader start Phase 2 boot loader
– Then start-kernel() function is called
– Init process starts
– Init starts all non-operating system services and presents users with login screen.

## 6.7 LINUX FILESYSTEM HIERARCHY

An interesting thing about Linux is that everything is treated as either a file or directory. Even the hardware is considered as a file which is stored in the /dev directory. Linux dosen't use drive letters to distinguish between different partitions and devices. The "root" is denoted as.

Drives in linux are “mounted” to the specific directories(e.g /mnt/ pen_drive, you need to create **pen_drive** directory) where their data can then be accessed. So, for instance, if you need to use your thumbdrive, you would plug it into your computer and then mount it using the “mount” command, which specifies the path to the device.

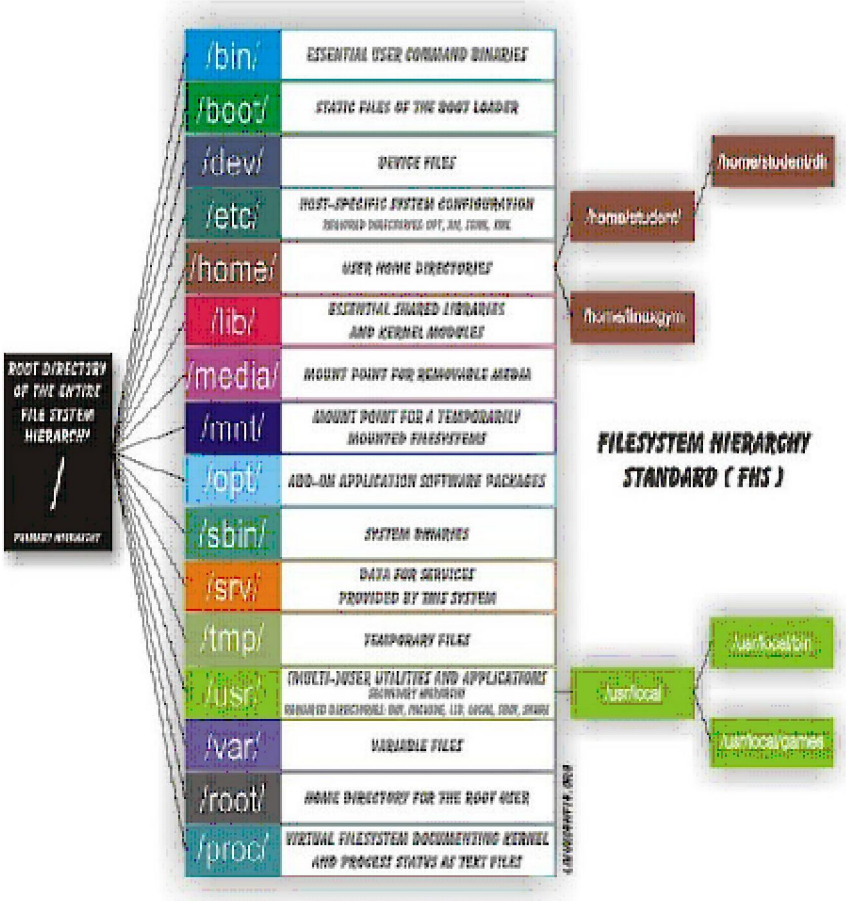



**Figure 6.1: Root directory**

The image above shows the linux filesystem hierarchy and is described in brief below:

/

this is the root folder, all other folders come under root. We can consider it as C: drive in Windows context.

**/bin**

this folder contains all the user-essential binaries programs .e.g cp, ls etc.

**/boot**

It contains configuration files and other necessary files that are needed by the bootloader

**/dev**

This folder contains device files.

**/etc**

This folder contains all the configuration files used by the system.

/home

This contains the home folders of all the normal users on the system.

**/lib**

It contains software libraries

**/media**

This is a mount point for removable devices

**/mnt**

This is a temporary mount point

**/opt**

This folder contains add on software

**/sbin**

This folder contains binaries that can only be run as the root user

**/tmp**

This folder contains temporary files that are erased upon reboot

**/usr**

This folder and its subfolders contains user installed programs and utilities and libraries

**/var**

This folder contains files that change a lot. e.g contains log files.

**/root**

This folder contians the root user's files

**/proc**

This folder contains information about the Linux kernel and hardware that is updated in realtime.

Linux supports numerous file system types as described below in brief:

**Ext2 :** It uses the concepts of blocks, inodes and directories.

**Ext3 :** It is the enhanced version of ext2 file system with journalling capabilities. Journalling allows fast file system recovery.

**Sysfs :** It is a ram-based filesystem initially based on ramfs. It is used to exporting kernel objects so that end user can use it easily.

**Procfs :** The proc file system acts as an interface to internal data structures in the kernel. It can be used to obtain information about the system and to change certain kernel parameters at runtime using sysctl command.

## 6.8 MAIN COMPONENTS OF LINUX OPERATING SYSTEM

The Linux operating system is made up of three parts: the kernel, the shell and the programs.

**The kernel :** The kernel is the hub of Linux operating system. We can consider it as a bridge between applications and the actual data processing done at the hardware level.

The main function of kernel includes memory management, device management, process management etc.

**The Shell :** It acts as an interface between the user and the kernel. Shell is also known as command line interpreter. When the user types the command, shell executes the command according to the order of the command.

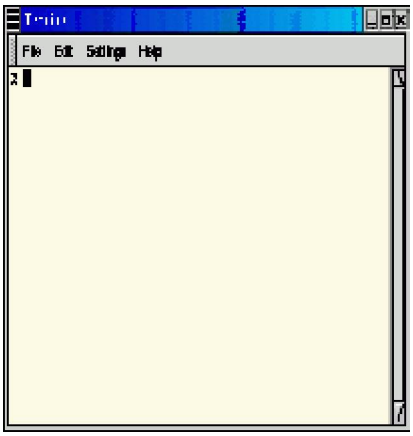


**Figure 6.2: The Terminal**

**Programs :** This are the program used for general application like copying file using **cp**,creating directory **mkdir.** The shell provides the interface for such program.

## 6.9 CONCEPT OF PATH

In Linux, all file systems (Hard Disks, CD-ROMs, Floppy Disks, ZIP drives, network mounts, etc…) are "mounted" onto one logical tree. The top of the hierarchy is traditionally called **root** which is represented by a **/** (**slash**). In Linux, everything is treated as a file. A directory is a file. It is a file that contains a list of files and information belonging to those files. This would include details like who "owns" (created) the file, how long it is, and who can use it. Since a directory is simply a list of files, it can contain any file in it, including other directories.

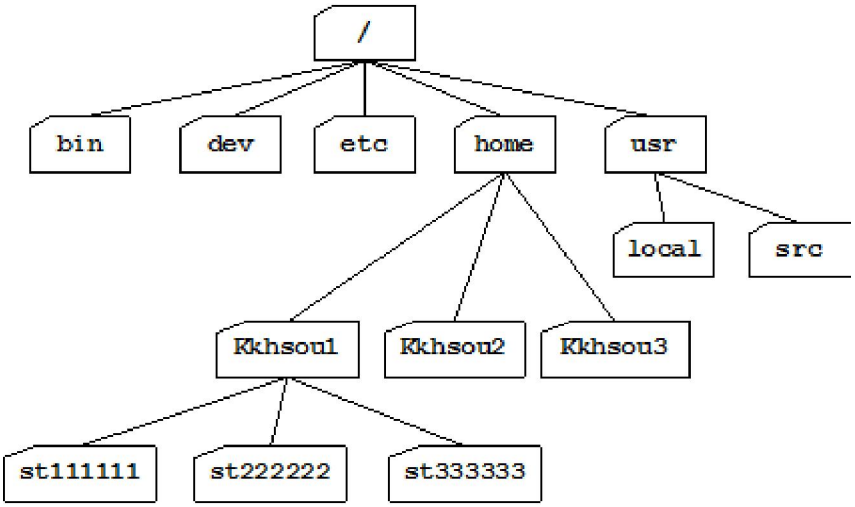



**Figure 6.3 : Part of file-system tree**

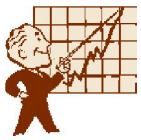
You can specify a file or directory by its path name. There are two ways of expressing the path name: Full (absolute) path name or Relative path name. The full path name starts with the root. /, and follows the branches of the file system, each separated by /, until you reach the desired file.

However, a relative path name specifies the path relative to your current working directory. Relative path names are more convenient because they are shorter, but must be used with care. They never begin with / (slash). There are two special directory entries:

- the current directory
- the parent directory

As an example, (Using figure 10.3) assume that your current working directory (your current position in the file system) is **kkhsou1**:

1. A file named "**test.txt**" is placed inside the directory "**st111111**".
   The absolute (full) name is : ***/home/kkhsou1/st111111/test.txt***
   The relative name is : ***st111111/test.txt*** OR ***./st111111/test.txt***
2. A directory named "**DEC**" is placed inside the directory "**kkhsou2**".
   The absolute (full) name is : **/home/kkhsou2/DEC**
   The relative name is : **../kkhsou2/DEC**
3. A file named "**csh**" is placed inside the directory "**bin**".
   The absolute (full) name is : **/bin/csh**
   The relative name is : **../../bin/csh**
4. A directory named "**st123456**" is placed inside the directory "**kkhsou1**".
   The absolute (full) name is : **/home/kkhsou1/st123456**
   The relative name is : **st123456** OR **./st123456**



**CHECK YOUR PROGRESS**

1. Write the purpose of the following directory in LINUX:
   /var
   /tmp
   /proc

2. Mention the main component of LINUX.

3. Write the two the advantage of Linux.

## 6.10 BASIC LINUX COMMANDS

**Directory Handling Command :**

**1. ls (list) :**

**ls** command is used to lists the contents of the current working directory. To list the hidden files we can use:

**ls -a**

The output of the above command will show all the files which name starts with dot(.). In Linux, hidden file names are prefixed with dots(.).

Some other options along with its functions are given below .

| Options | Purpose |
|---|---|
| ls -x | get multi-columnar output. |
| -r | list files and sub-directories in reverse order |
| -t | list files and sub-directories with time order. |
| -a | list all files, including the normally hidden files |
| -c | list files by inode modification time. |
| -i | list the inode for each file. |
| -l | display permission, owner, size, modification, time ect along with file and directory names. |
| -h | display names of hidden files |
| -q | display filenames having non-printable character. |

**2. mkdir (make directory) :**

This command is used to create the directory. For example, to create a directory **data** we can use as **:**

Syntax : **mkdir data**

**3. pwd (print working directory) :**

To find out the absolute pathname of the currently working directory use the following command:

Syntax : **pwd**

**4. cp (copy)**

Syntax : **cp file1 file2**

It makes a copy of file1 in the current working directory and calls it file 2**.**

**5. rm (remove), rmdir (remove directory) :**

Syntax : **rm test.c**

**rmdir software**

**rm** command is used to delete a file (here test.c) and rmdir is used to delete a directory (here software).

**6. cd :**

Syntax : **cd test** (where soft is a directory)

This command is used to change the directory.

**Other Commands :**

**1. cat (concatenate)**

Syntax : **cat hosts**

The command cat can be used to display the contents of a file on the screen.

**2. less :**

Syntax : **less text1.txt**

The command **less** writes the contents of a file onto the screen one page at a time.

**3. head :**

Syntax : **head -N kkhsou.txt**

The head command writes the first N lines of a file to the screen.

4. **tail :**

Syntax : **tail -N science.txt**

The tail command writes the last N lines of a file to the screen.

**5. grep :**

Syntax : **grep kkhsou text1.txt**

It searches files for specified words or patterns. For example the above command searches the word ‘kkhsou’ in ‘text1.txt’ files.

6. **wc (word count) :**

Syntax : **wc -w text1.txt**

**wc -l text1.txt**

wc command with -w is used to count number of words in a particular file. Also with –l option in wc can be used to count the number of lines in a particular file.

**7. who :**

Syntax : **who**

madhu tyy01 03:45

The **who** command can also tell you who is logged in at the terminal you're using.

**8. date :**

**date**

Tue Nov 4 13:39:24 EST 1997

This command is used to display the current date and time of the system.

**9. cal :**

This command is used to see the calendar of any specific month, or a complete year. If we wish to see the calendar for the month of December of the current year, we can provide this as applying the following cal command:

**cal dec**

December 2008

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 2 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

**10. echo :**

This command is used to display a message on the screen or to display the content of a variable. For example,

**echo “Well Come to KKHSOU”**

To display the content of a variable, we can also use echo command. time.

**x = 30**

**echo $x**

**11. passwd :**

The **passwd** command is used to change passwords. Changing password for sysadmin.

**passwd sysadmin**

(current) UNIX password:

Enter new UNIX password:

Retype new UNIX password:

**12. REDIRECTION :** We use the > symbol to redirect the output of a command. For example, to create a file **kkhsou.txt** with a list of student name we can use the following command:

**cat > kkhsou.txt**

(Then type the student name :)

Jitu

Gunajit

Sonabar

**^D (Control D to stop)**

The output of the above command is the successful creation of the file **kkhsou.txt** with contents having student name as typed above. If we use the **>>** as:

**cat >> kkhsou.txt**

(and then type the name)

mukalmua

nalbari

**^D (Control D to stop)**

Then the content typed later is appended to the file **kkhsou.txt**. So we can say >> appends standard output to a file.

In the previous section, we have described the redirection of the output of a command to file. We can use '<' to redirect the input to a command. For example, if the file **kkhsou.txt** contains the following content:

c

b

a

the output of the command: **sort < kkhsou.txt** will be:

a

b

c

## 6.11 FILE PERMISSION

There are three types of file access: Read, Write and Execute. Each file belongs to a specific user and group. Access to the files is controlled by User, Group, and Other. The term, 'other', is used to refer to someone who is not the user (owner) of the file, nor is the person a member of the group the file belongs to.

There are 10 characters that are shown on the left that indicate type and permissions of the file. File permissions are shown according to the following syntax example : **d rwe rwe rwe**

There are a total of 10 characters in all Linux files as seen in the above example. The first character indicates the type of file, and the next three indicate Read, Write, and Execute permission for each of the three user types, User, Group and Other.

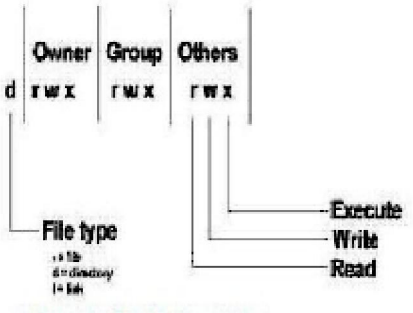



**Figure 6.4 File permission**

Type as '**ls -l**' in the terminal you can see like :

```
drwxrwxrwx  4  debajit  grp1  122   Dec  1  18:02  kkhsou
-rw-rw-rw-  1  debajit  grp1  1873  Aug 21 08:34   test
-rw-rw-rw-  1  debajit  grp1  1234  Sep 14 11:13   data
```

last modification date

Size in bytes

file name

File's Group

File's Owner

Links

Fie type and permission field

**Type** field : The first character in the field indicates a file type of one of the following:

d = directory

l = symbolic link

s = socket

p = named pipe

– = regular file

c = character (unbuffered) device file special

b = block (buffered) device file special

**Links :** The number of directory entries that refer to the file. In this example the number is 4.

Let us discuss **chmod** command which is used to change the permission of a file or directory.

**chmod :** In order to change these default permissions and set your own, **chmod** command is used. Only the owner of a file can change the permission on that file.

The syntax of chmod is:

**chmod category operation permission filename**

Here the argument *category* specifies the user's access. The argument *operation* specifies whether the permission is to be granted or denied. The argument *permission* specifies the type of permission.

The different values for these arguments are listed in the following table :

**Table 6.1 : Values of chmod argument**

| Category | Operation | Permission |
|---|---|---|
| u (owner) | + (assign) | r (read) |
| g (group) | – (deny) | w (write) |
| o (other) | = (absolute assignment) | x (execute) |
| a (all) | | |

In the first argument we supply one or more of a (all), u (owner), g (group) and o(other). Then we specify whether we are adding right (+) or taking them away (-). Finally we specify one or more od r (read), w (write) and x (execute) permissions.

The file permissions bits include an execute permission bit for file owner, group and other. When the execute bit for the owner is set to "s" the set user ID bit is set. This causes any persons or processes that run the file to have access to system resources as though they are the owner of the file.

**Changing Ownership :** There are two commands that can be used to change the ownership of a file or directory. These are:

(**a) chown**

**(b) chgrp**

For example, to grant the ownership of a file test1 to John, we can use:

**$ chown john test1**

The command **chgrp** changes the group ownership of the file. This command, like chown, can only used by the owner of the file, irrespective of whether the user belongs to the same group or not.

Examples :

**chmod +s kkhsou.txt**

sets the user ID bit on the file "kkhsou.txt". The command:

**chmod g+s kkhsou.txt**

sets the group ID bit on the file "kkhsou.txt".

**chmod u+x kkhsou.doc**

Gives the user execute permission on kkhsou.doc .

**chmod +x kkhsou.doc**

Gives everyone execute permission on kkhsou.doc.

**chmod ugo +x kkhsou.doc**

Gives execute permission to user, group and other.

**chmod 400 kkhsou.doc**

Gives the user read permission, and removes all other permission.

Permission can also be denoted by numbers as described below:

Read permission : 4

Write permission : 2

Execute permission :1

**chmod 764 kkhsou.doc**

Gives user full access(4+2+1=7), Group Read and Write access(4+2=6), and other Read access(4).

**chmod 751 kkhsou.doc**

Gives user full access(4+2+1=7), Group Read and Execute permission(4+1=5), and other, Execute permission(1).

## 6.12 TEXT EDITOR vi:

The **vi** editor is a screen-based editor and it is one of the most powerful text editor available in almost all UNIX and LINUX systems. The **vi** editor has powerful features to aid programmers, but many new users avoid using the different features that overwhelm them. Operating **vi** editor is entirely different from that of any modern simplified editor that you are familiar with. This editor has remarkable editing capabilities. It is rather a very simple editor, if all the elementary **vi** commands are at your finger tips.

LINUX features a number of vi editors, of which **vim** (vi improved) is the most common. Apart from vim, there are **xvi**, **nvi** and **elvis** which have certain exclusive functios not found in the Berkeley version.

**Three Modes :** The three modes of vi editor are:

(a) Command Mode

(b) Input Mode

(c) Ex Mode

**Command Mode :** Command Mode is the mode where you will be giving commands to the vi editor. When you invoke vi, this is the mode where you will be placed initially.

**Input Mode :** When you give the commands i, I, a , A, R, s, S, or O then you get shifted to the input mode of vi editor. It is also known as insert mode or editing mode. In this mode you can add text to the file. For example, when you want to insert text at the current cursor position, give i in the command mode, you will now get placed in the input mode and you can perform the intended mode. For example, if you type ‘a’ here it will not be interpreted as an ‘append’ command, but as character ‘a’ to be inserted in the file.To move back to command mode press Esc key.

**Ex Mode :** Ex mode of vi editor enable us to give commands at the command line. To move to the ex mode, press ':'(colon) if we are in command mode. If we are in the input mode, first press Esc key and then press':' to move to the Ex mode. The cursor moves to the bottom of the vi screen and we can provide the ex mode commands here. Some impotant and common ex mode commands are given below:

| Command | Used to |
|---|---|
| w | save the change we have made to the file |
| q | quit vi without saving changes |
| wq | save and quit |
| q! | force quit if'q' does nor work |

Ex mode is named after the ex line-editor of UNIX or LINUX. The commands we give the ex mode are actually the ex line-editor's commands.

**Invoking vi Editor :**

**$ vi test1**

The file 'test1" will get opened in vi editor. If the file does not exist, vi will create a new file with that name. In either case we will see a screen full of the tilde'~' which indicates empty lines.

Remember that vi editor opens in the command mode. That means we are now in the command mode. Let us started by inserting some text in our file "test1". For that we will have to switch to the 'input mode' . We can see that to insert text 'i' command is used. Press 'i' and type the text.

**Saving Text and Quitting *vi* Editor :** Having inserted the text, we now need to save these changes. To save the changes first press Esc key to move to command mode. Now press ':' to move to ex mode. Note that now the cursor has moved to the end of the screen. Type 'w' to save changes. If we want to quit vi type 'q'. We can also save and quit vi in one go by giving the command 'wq'.

**Note :** We can also save the file in the command mode by presenting Z (uppercase) twice, i.e ZZ.

When we quit vi, a note at the bottom of the screen indicates the name, number of lines and number of character in the file.

**Editing File in *vi* :** We can invoke the vi editor again, by typing vi test1 at the command prompt. We can see the text we have typed followed by multiple empty lines, each starting with a '~' sign. The cursor appears at the beginning of the first line of the file. Let us first learn how we can move this cursor to a particular line or character.

**Adding Text :** Let us now append some text to the file. For this, first move cursor to the last line of the file. Pressing 'G'(uppercase) will move the cursor to the beginning of the last line in the file. Additionally, you can precede 'G' with the line number where we want the cursor to move. For example, to move to 6th line then we type '6G'.

We can move to the beginning of a file by pressing '1G'. Now press 'o' to open a new line below this last line. By pressing 'o' we are in the 'input mode'.

**Inserting Text in The Middle :** If we missed any character(s) while typing, then move the cursor to that particular line or word. Press Esc key to move to the 'command mode'. Now press 'i' to insert the character(s) before the current cursor position or press 'a' to insert the character (s) after the current cursor position. 'A' will append text at the end of current line.

**Replacing Text :** Text character can be replaced with the 'r', 'R', 's' and 'S' commands. Before we use these commands, we need to switch to the command mode, if we are currently in the insert mode.

First move the cursor to the character which we want to replace. Pressing 'r' followed by a character replaces the existing character with the character given after 'r'.

To replace more than one character use 'R' followed by the characters. The existing text will get overwritten with these characters.The replacment of text with 'R' command is limited to the current line only.

To replace a character with multiple characters without overwriting the subsequent text, use 's' followed by the characters. 'S'(uppercase) replaces the entire line irrespective of the cursor position. That means, it deletes the current line completely and makes it ready for a new line of text. Pressing 'R', 's' and 'S' shifts you to the 'input mode'. Press Esc key to move back to the command mode.

**Deleting Text :** To delete a character, first move the cursor to that particular character position. Press 'x' to delete a single character. We can also precede 'x' with the number of characters we want to delete. For example, '4x' will delete four characters. Note that the rest of the line gets adjusted automatically.

If we go on deleting all the characters in the current line, the characters to the left of the current line starts getting deleted, instead of that in the next line.

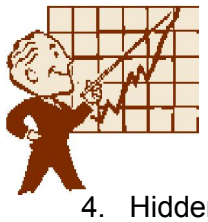
**Note :** To delete the current line press 'dd' . To delete more than one line use '#dd', where # represents the number of lines we want ot delete.

'X' (uppercase) is used to delete a character to the left of current cursor position. To understand it better, it can be said that 'x' functions like the delete key and 'X' functions like the backspace key.

**Undoing and Repeating Commands :** The repeat command (a dot(.)) can be used to repeat the most recent command. For example, if we have recently given the 'a' command and appended one character, we can repeat the whole process again by pressing a (.) dot. We will have the character inserted two times.

The undo (u) command can be used to recover from the most recently committed mistake. For example, press u and we will see that the second character we have inserted has disappeared.

You need to rememeber to press Esc key to switch to command mode if you are not in it already and then use :wq to save the file and quit vi.



**CHECK YOUR PROGRESS**

4. Hidden files in LINUX can be listed using

   a. ls -t  b. ls -h  c. ls -a  d. none of the above.

5. In LINUX, the command to delete all files started with sg and ending with hj is

   a. rm sg*hj  b. rm sg?hj

   c. rm -prefix sg -suffix hj  c. none of the above.

6. The LINUX command **rm -r project** will
   a. delete the file project from the current directory.
   b. delete all the files from the directory project and all its subdirectories.
   c. recursively delete the directory project and all its subdirectories.
   d. None of the above.
7. UNIX can have
   a. one file system only.
   b. n file systems, if it had n hard disks.
   c. any number of file systems depending upon the number of partitions.
   d. none of the above.
8. The UNIX command “ls | more” displays a list of
   a. files in the current directory one line at a time.
   b. files in the current directory one screen time
   c. all the files in the current directory and then wait for the next command
   d. none of the above.
9. The UNIX ,full pathname originates from
   a. your home directory b. the root directory
   c. your working directory d. none of the above.
10. The chmod command in UNIX
    a. change the current execution status from user mode to kernel.
    b. makes the file hidden so that it cannot be seen using the ls command.
    c. changes the access permissions of a fileor directory.
    d. none of the above.
11. Which out of the following commands would you use to change your password in UNIX system.
    a. pass b. passwd
    c. chpass d. setpass

12. The execute permission to a file allows a user to
    a. execute the file b. edit the file
    c. list the contents of the file d. none of the above.
13. The chown command in UNIX changes the
    a. home directory of a user
    b. access permissions of a file or directory
    c. priority of a process.
    d. none of the above.
14. Find out the TRUE and FALSE statements
    i. The command pwd shows the name of the current directory.
    ii. UNIX makes a distinction between the text files and the binary files.
    iii. The command mv file1 file2 renames file1 as file2.
    iv. The more command appends new lines to a file.
    v. A binary file is also known as an ASCII file.
    vi. The command rm * removes all files from the current directory.
    vii. A file having protection 466 cannot be used by anybody other than the owner.
    viii. Only the super user can view the passwordof a user in the file /etc/passwd file.
    ix. chmod u-x gives the user permission for execution.
    x. ls command is used to list the files and directories.



## 6.13 LET US SUM UP

- **Linux Command :** A command given to UNIX or LINUX is a series of characters that one type. These characters consist of words separated by white spaces. The first word is the command itself and the rest are the command's arguments. The arguments provide information that the command may need for its execution.

- **Internal commands :** Internal commands are such programs that are built-in into the operating system and reside in the memory along with the kernel.
- **External commands :** External commands are not built in into the operating system, but loaded from other program files.
- To create a new directory, use the mkdir command.
- You can change the working directory using the **cd** command
- The command **rmdir** followed by the directory name which is to be removed is used for deleting a directory.
- To list the names of the files and the sub -directories of the current directory, **ls** command is used. its function is equivalent to the **DIR** command in MS-DOS.
- To find which directory you're currently in, use the **pwd** (print work ing directory) command.
- To create a file, type the command **cat** at the shell prompt, followed by a > character and the filename.
- A file can be shifted or moved from one directory to another by using the **mv** command.
- The command **cp** is used to copy a file into another. MS-DOS equivalent for cp is ths COPY command.
- **more** command allows us to view the output one screen at a time.
- The **who** command can also tell you who is logged in at the terminal you're using.
- The **passwd** command is used to change passwords
- File and directory permissions fall into three main divisions. These are Read permission (r)**,** Write permission (w), Execute permission (x)
- In order to change these default permissions and set your own, **chmod** command is used.
- There are two commands that can be used to change the own -ership of a file or directory. These are:

  (**a) chown**

  **(b) chgrp**



## 6.15 ANSWERS TO CHECK YOUR PROGRESS

**Ans. to Q. No. 1 :** /var: this folder contains those file that change frequently.

/tmp : contains temporary files that are erased upon reboot.

/proc: This folder contains information about the Linux kernel and hardware that is updated in realtim

**Ans. to Q. No. 2 :** Main components are Kernel, Shell and programs

**Ans. to Q. No. 3 :** Free Cost, Multi User Interface Supported and Good Security,

**Ans. to Q. No. 4 :** (c)

**Ans. to Q. No. 5 :** (a)

**Ans. to Q. No. 6 :** (c)

**Ans. to Q. No. 7 :** (c)

**Ans. to Q. No. 8 :** (b)

**Ans. to Q. No. 9 :** (b)

**Ans. to Q. No. 10 :** (c)

**Ans. to Q. No. 11 :** (b)

**Ans. to Q. No. 12 :** (a)

**Ans. to Q. No. 13 :** (d)

**Ans. to Q. No. 14 :** i. (T), ii. (F), iii. (T), iv. (F), v. (F), vi. (T), vii. (F), viii. (F), ix. ( F), x. (T).



## 6.14 FURTHER READING


- Das, S. (1993). UNIX System V. 4: Concepts and Applications. Tata McGraw-Hill.
- Operating System Design and Implementation, Andrew S. Tanenbaum, Albert S. Woodhull, Prentice - Hall India.



## 6.16 MODEL QUESTIONS

Q1. What is the difference between **cp** and **mv** commands? Explain with an example.

Q2. Distinguish between:

(a) **cat** and **more** commands

(b) **tail** and **head** command

Q3. List out the different options and significance of **ls**.

Q4. A file has got a protection 756 (octal). What protections does it really have ?

Q5. Explain how you can implement the cut, copy and paste operations in vi .

Q6. Give the syntax for opening a file in vi editor. Also explain the different options.

Q7. How can you access ex commands in vi?

Q8. Explain the booting process of Linux?

Q9. What do you mean by Open Source and Free Software?

Q10. Write two advantages of Linux?

**********

# UNIT 7: INTRODUCTION TO LIBREOFFICE

**UNIT STRUCTURE**


7.1 Learning Objectives

7.2 Introduction

7.3 Overview of LibreOffice

7.3.1 Purpose of LibreOffice

7.3.2 Components of LibreOffice

7.3.3 Comparison with Other Office Suites

7.4 Advantages of Using LibreOffice

7.5 Installation of LibreOffice

7.6 Let Us Sum Up

7.7 Answers to Check Your Progress

7.8 Further Reading

7.9 Model Questions


## 7.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define LibreOffice and its purpose.
- define LibreOffice and its purpose.
- compare LibreOffice with other popular office suites, such as Microsoft Office and Google Docs.
- discuss the advantages of using LibreOffice, including cost savings, compatibility with different operating systems and devices, and the open-source nature of the software.
- outline the process of downloading, installing, and configuring LibreOffice on Windows operating system

## 7.2 INTRODUCTION

LibreOffice is a free, open-source office suite that provides a variety of powerful tools for creating, editing, and sharing documents, spreadsheets, and presentations. With components such as Writer, Calc, Impress and,

Base. LibreOffice offers a comprehensive set of features that can meet the needs of both individuals and businesses alike. In this unit, we will explore the definition, purpose, components, features, advantages, and installation and configuration of LibreOffice, as well as compare it with other office suites such as Microsoft Office and Google Docs. Whether you are a student, a professional, or just someone looking for a reliable and cost-effective solution for your office needs, LibreOffice is definitely worth considering.

## 7.3 OVERVIEW OF LIBREOFFICE

LibreOffice is a free, open-source office suite that provides users with a comprehensive set of tools for creating, editing, and sharing documents, spreadsheets, and presentations. It was initially released in 2010 as a fork of the OpenOffice.org project and has since become one of the most popular alternatives to proprietary office suites like Microsoft Office.

LibreOffice consists of several components, including Writer for word processing, Calc for spreadsheets, Impress for presentations, and Base for database management system (DBMS).

One of the key advantages of LibreOffice is its cost-effectiveness, as it is completely free to download and use. It is also compatible with a wide range of operating systems and devices, including Windows, Mac, and Linux. Additionally, the open-source nature of the software allows for community support and customization through extensions and add-ons.

Overall, LibreOffice is a powerful and versatile office suite that can meet the needs of individuals and businesses looking for a reliable and cost-effective solution for their office needs.

### 7.3.1 PURPOSE OF LIBREOFFICE

LibreOffice is a free and open-source office suite, designed to provide users with a powerful and flexible set of tools for creating, editing, and managing various types of documents, spreadsheets, presentations, and other digital content. The primary purpose of

LibreOffice is to provide users with an alternative to commercial office suites such as Microsoft Office, by offering a range of features and tools that can be used to create professional-grade documents and content without the need for expensive software licenses. Some of the key features of LibreOffice include word processing, spreadsheet creation and management, presentation design, graphic design, database management, and more. It also offers a variety of import and export options, allowing users to work with a wide range of file formats and collaborate with other users who may be using different software tools.

Overall, the purpose of LibreOffice is to provide a free and open-source office suite that is accessible to everyone, regardless of their budget or technical expertise. By providing users with a comprehensive set of tools and features, LibreOffice enables users to create and manage high-quality content for personal or professional use.

## 7.3.2 COMPONENTS OF LIBREOFFICE

LibreOffice is a comprehensive office suite that includes several components or applications that allow users to create and manage different types of digital content. The main components of LibreOffice are:

(a) **Writer:** A word processing application that allows users to create and edit text documents, such as letters, resumes, reports, and more.

(b) **Calc:** A spreadsheet application that allows users to create and manage complex spreadsheets, perform calculations, and analyze data.

(c) **Impress:** A presentation application that allows users to create multimedia presentations with animations, slide transitions, and more.

(d) **Draw:** A graphic design application that allows users to create and edit vector graphics, diagrams, and flowcharts.

(e) **Math:** A formula editor application that allows users to create and edit mathematical equations and formulas.

(f) **Base:** A database management application that allows users to create and manage databases, create forms, and generate reports.

In addition to these primary components, LibreOffice also includes a range of additional tools and features, such as spell-checking, document templates, mail merge, and more, that make it a powerful and versatile office suite.

## 7.3.3 COMPARISON WITH OTHER OFFICE SUITES

LibreOffice is a free and open-source office suite that is often compared with other popular office suites, such as Microsoft Office and Google Docs. Here are some of the key differences and similarities between these office suites:

**Cost:** LibreOffice is free to download and use, while Microsoft Office requires a paid subscription or a one-time purchase. Google Docs is free to use but requires a Google account.

**Features:** All three office suites offer similar features, such as word processing, spreadsheet creation, presentation design, and more. However, Microsoft Office tends to offer more advanced features and functionality compared to LibreOffice and Google Docs.

**Compatibility:** Microsoft Office is widely used in many organizations, and files created with Microsoft Office are often preferred for compatibility reasons. LibreOffice can open and save files in various file formats, including Microsoft Office formats, while Google Docs tends to work best with its own file formats.

**Collaboration:** Google Docs is known for its collaborative features, allowing multiple users to edit a document simultaneously in real-time. Microsoft Office also offers collaboration features, but LibreOffice has more limited collaboration options.

**Privacy:** Google Docs requires users to sign in to a Google account, which may raise privacy concerns. LibreOffice and Microsoft Office are both desktop applications that can be used offline, so

there are fewer privacy concerns with these office suites.

Overall, the choice of office suite depends on individual needs and preferences. LibreOffice is a great option for those looking for a free and open-source office suite with basic features, while Microsoft Office is the go-to option for more advanced features and compatibility with Microsoft Office files. Google Docs is a popular choice for collaboration and cloud-based accessibility.

## 7.4 ADVANTAGES OF USING LIBREOFFICE

One of the major advantages of using LibreOffice is its cost-effectiveness compared to proprietary software. LibreOffice is an open-source software suite that is free to download and use, without any licensing fees or subscription costs. This can result in significant cost savings for both individuals and organizations, especially those on a tight budget. Here are some of the ways LibreOffice can help save costs:

**(a)** **No licensing fees:** LibreOffice is licensed under the GNU Lesser General Public License, which means that it can be freely used, copied, modified, and distributed by anyone without any licensing fees.

**(b)** **No subscription costs:** Unlike proprietary software that often requires users to pay a recurring subscription fee, LibreOffice is completely free to use for as long as you want.

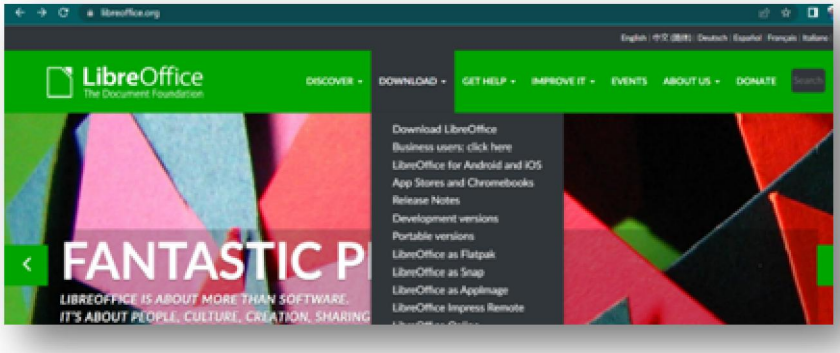
(**c)** **Compatible with multiple platforms:** LibreOffice is available for Windows, macOS, and Linux, so you don't have to purchase different versions for different platforms.

**(d)** **Support for multiple file formats:** LibreOffice supports a wide range of file formats, including Microsoft Office formats like .docx, .xlsx, and .pptx, so you don't have to purchase expensive proprietary software to be able to read and edit those files.

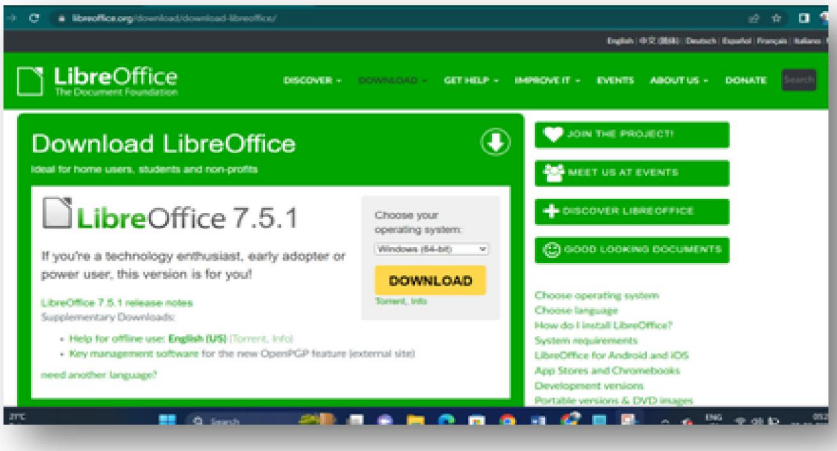
## 7.5 INSTALLATION OF LIBREOFFICE

Here's a step-by-step guide on how to install LibreOffice:

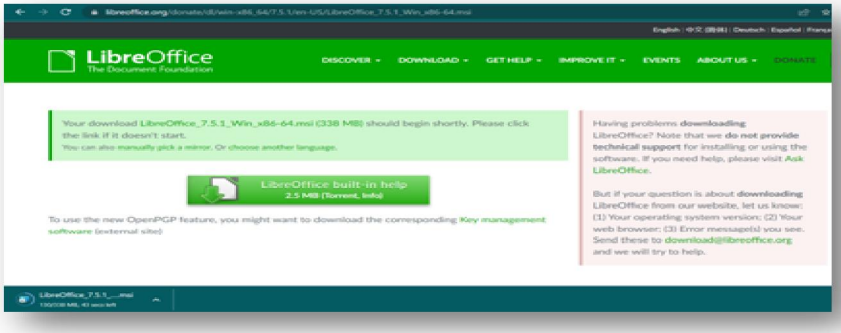
1. Go to the LibreOffice website (https://www.libreoffice.org/) and click on the "Download" button in the top menu.



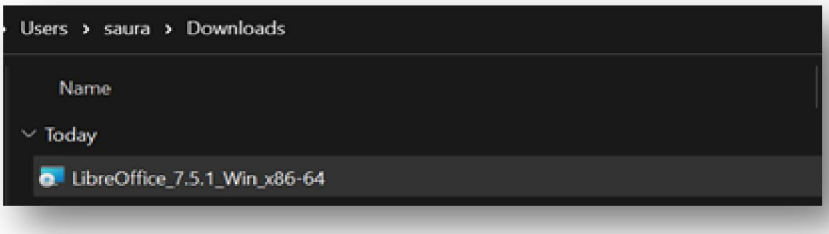

2. On the download page, you'll be prompted to choose your operating system. Select the appropriate option for your computer (e.g. Windows, Mac, Linux).



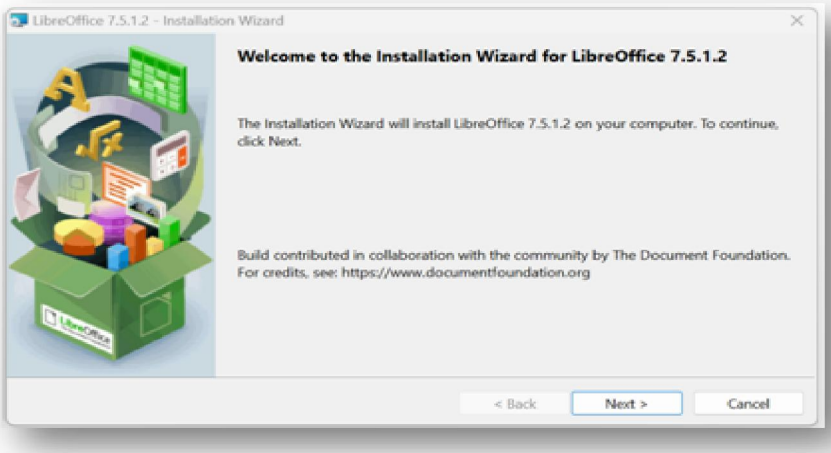

3. Once you've selected your operating system, you'll be taken to a page with download options. Choose the version you want to install (e.g. stable or beta), and click on the corresponding "Download" button.

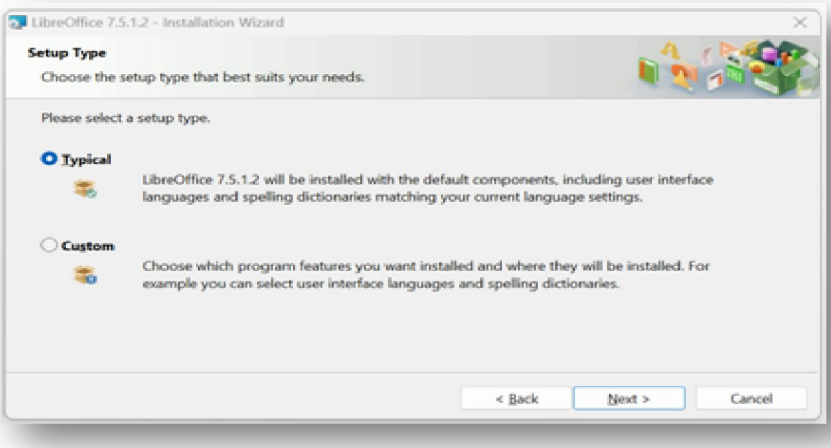


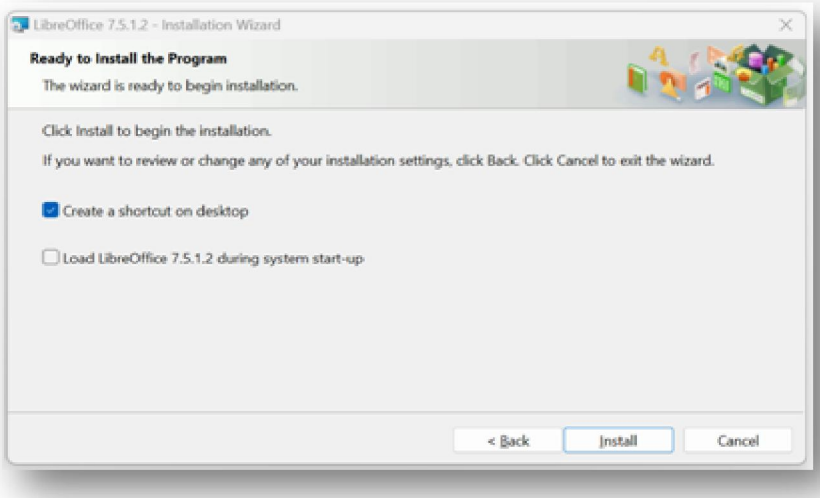
4. Once the download is complete, locate the downloaded file on your computer and double-click it to begin the installation process.

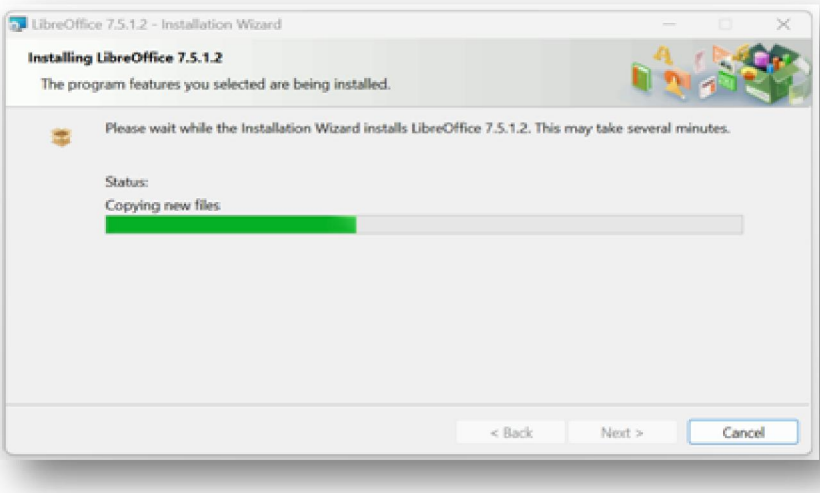


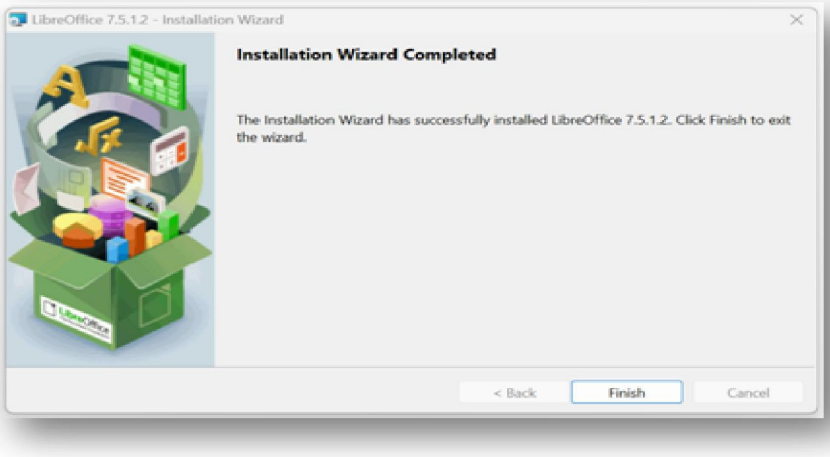

5. Follow the on-screen instructions to install LibreOffice. You may be asked to agree to the terms and conditions, select a location for the installation, and choose which components of the software to install.



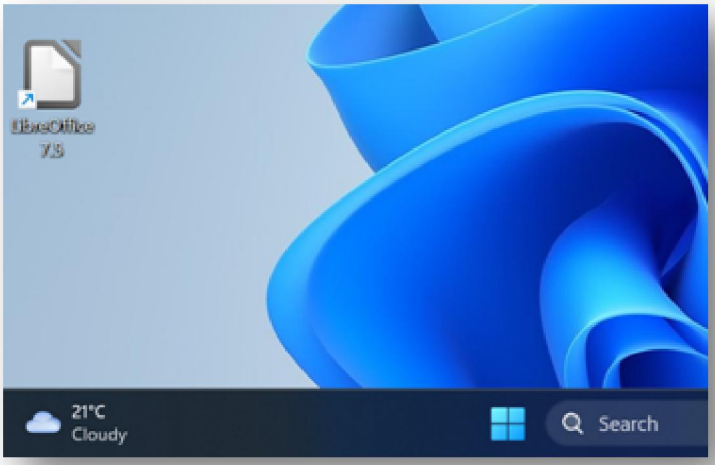



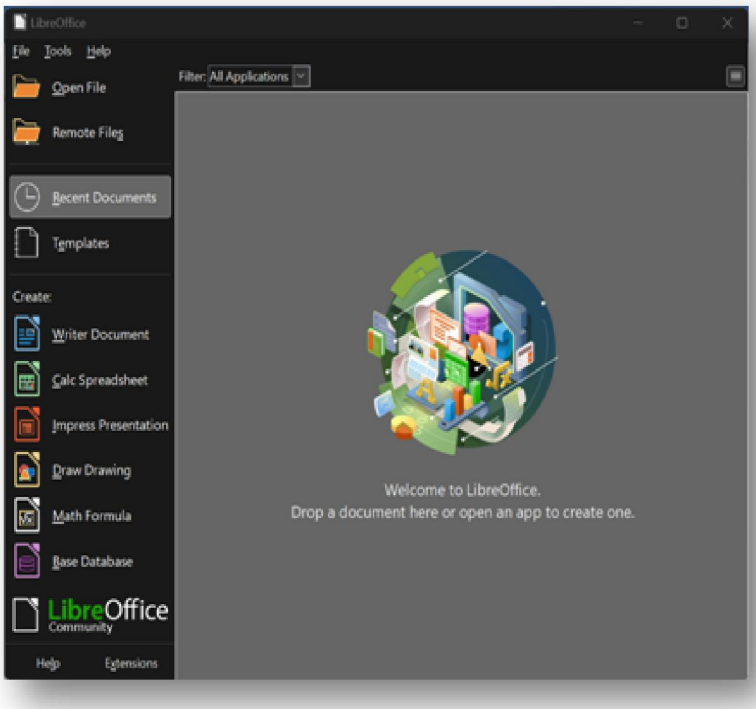

LibreOffice 7.5.1.2 - Installation Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
Create a shortcut on desktop
Load LibreOffice 7.5.1.2 during system start-up
< Back
Install
Cancel


LibreOffice 7.5.1.2 - Installation Wizard
Installing LibreOffice 7.5.1.2
The program features you selected are being installed.
Please wait while the Installation Wizard installs LibreOffice 7.5.1.2. This may take several minutes.
Status:
Copying new files
< Back
Next >
Cancel

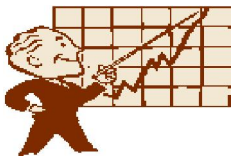

LibreOffice 7.5.1.2 - Installation Wizard
Installation Wizard Completed
The Installation Wizard has successfully installed LibreOffice 7.5.1.2. Click Finish to exit the wizard.
< Back
Finish
Cancel

6. Once the installation is complete, you should be able to launch LibreOffice from your computer's desktop or programs menu.




You can now run any application of the LibreOffice Suite.



## CHECK YOUR PROGRESS

1. Choose the correct option:

i) What is LibreOffice?

a) A proprietary office suite

b) A free, open-source office suite

c) A database management system

d) A graphic design application

ii) What is the purpose of LibreOffice?

a) To provide a free and open-source office suite

b) To provide an alternative to expensive software licenses

c) To provide a comprehensive set of tools for creating and managing digital content

d) All of the above

iii) Which of the following is a component of LibreOffice?

a) PowerPoint

b) Photoshop

c) Calc

d) Adobe Reader

iv) How does LibreOffice compare with Microsoft Office?

a) LibreOffice is more expensive than Microsoft Office

b) LibreOffice offers more advanced features than Microsoft Office

c) LibreOffice has more limited collaboration options than Microsoft Office

d) LibreOffice can open and save files in various file formats, including Microsoft Office formats

v) What is one of the advantages of using LibreOffice?

a) It has more advanced features than proprietary software

b) It is a cloud-based office suite

c) It is more privacy-oriented than other office suites

d) It is cost-effective compared to proprietary software



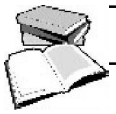
## 7.6 LET US SUM UP

- LibreOffice is a free and open-source office suite that provides users with a comprehensive set of tools for creating, editing, and sharing documents, spreadsheets, and presentations.
- It is compatible with a wide range of operating systems and devices, including Windows, Mac, and Linux.
- LibreOffice consists of several components, including Writer for word processing, Calc for spreadsheets, Impress for presentations, and Base for database management system (DBMS).
- Its primary purpose is to provide users with an alternative to commercial office suites such as Microsoft Office, by offering a range of features and tools that can be used to create professional-grade documents and content without the need for expensive software licenses.
- LibreOffice is a powerful and versatile office suite that can meet the needs of individuals and businesses looking for a reliable and cost-effective solution for their office needs.
- It is often compared with other popular office suites, such as Microsoft Office and Google Docs, and the choice of office suite depends on individual needs and preferences.
- One of the major advantages of using LibreOffice is its cost-effectiveness compared to proprietary software, as it is completely free to use and has no licensing fees or subscription costs.
- Other advantages of using LibreOffice include its compatibility with a wide range of file formats, its community support and customization options through extensions and add-ons, and its privacy and security features as a desktop application.



## 7.7 ANSWERS TO CHECK YOUR PROGRESS

**Ans.to.Q.No.1:** i) (b) ii) (d) iii) (c) iv) (d) v) (d)



## 7.8 FURTHER READING

1) https://documentation.libreoffice.org/en/english-documentation/



## 7.9 MODEL QUESTIONS

**Q.1:** What is LibreOffice, and how does it differ from other office suites like Microsoft Office?

**Q.2:** What are the primary components of LibreOffice, and how can they be used to create and manage digital content?

**Q.3:** How does the cost of LibreOffice compare to other office suites, and what are the potential cost savings for individuals and organizations?

**Q.4:** What are some of the key advantages of using LibreOffice, and how can they benefit users in different contexts?

**Q.5:** What types of files can be imported and exported using LibreOffice, and how can this help users work with other software tools and collaborators?

**Q.6:** What role does community support play in the development of LibreOffice, and how can users contribute to the project?

**Q.7:** What are some of the limitations of LibreOffice, and how can users work around these to achieve their desired outcomes?

**Q.8:** How does LibreOffice compare with other open-source software projects, and what are some of the unique challenges and opportunities it presents?

**Q.9:** What are some of the key features of LibreOffice that make it a popular choice for individuals and organizations looking for a free and open-source office suite?

**Q.10:** How can users get started with LibreOffice, and what resources are available to help them learn and master its various components and features?

*** ***** ***

# UNIT 8: GETTING STARTED WITH WRITER

## UNIT STRUCTURE


8.1 Learning Objectives

8.2 Introduction

8.3 Launch Writer and Create a New Document

8.4 Understand the Writer Interface

6.5 Working with Writer

- 8.5.1 Entering and Formatting Text
- 8.5.2 Applying Font Styles
- 8.5.3 Working with Paragraphs
- 8.5.4 Find and Replace
- 8.5.5 Saving, Closing and Opening Existing Document

8.6 Let Us Sum Up

8.7 Answer to Check Your Progress

8.8 Further Reading

8.9 Model Questions


## 8.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- launch Writer and create a new document.
- describe the Writer interface and its different components.
- enter and format text using Writer's tools and features.
- apply different font styles to their text.
- work with paragraphs, including changing alignment, indentation, and spacing.
- save, close, and open existing Writer documents.

## 8.2 INTRODUCTION

Writer is a word processing software that is part of the LibreOffice suite of productivity applications. It allows users to create, edit, and format text documents with ease. In this context, we will discuss some of the

essential features of Writer that will enable you to work effectively with the software. We will cover how to launch Writer and create a new document, understand the interface, and work with text and paragraphs. We will also discuss how to apply different font styles, save, close, and open existing documents. By the end of this unit, you will have gained a solid foundation in using Writer.

## 8.3 LAUNCH WRITER AND CREATE A NEW DOCUMENT

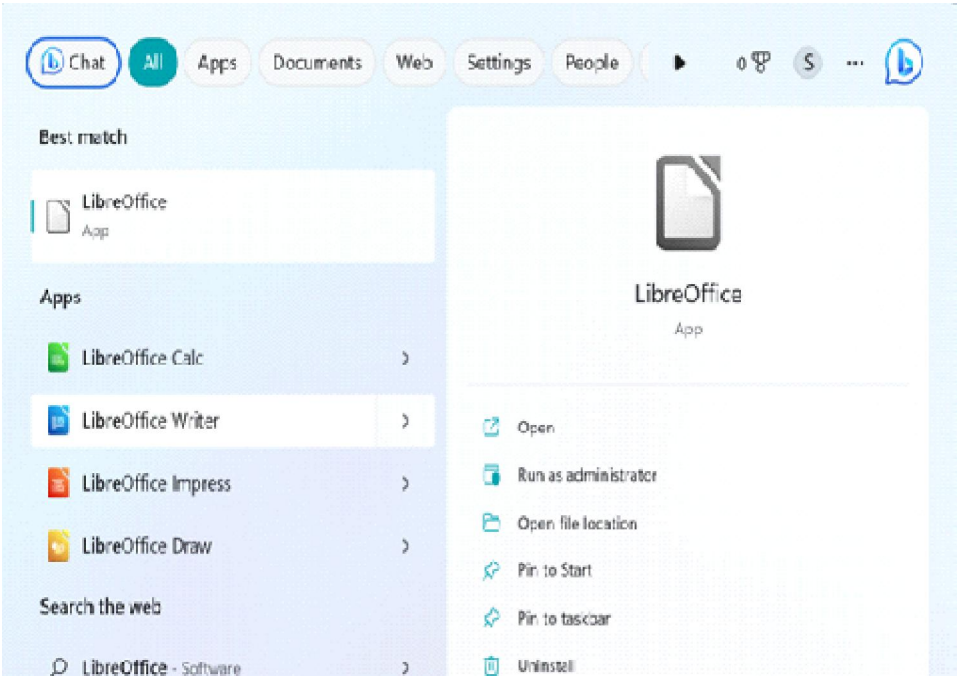
Following are step-by-step procedures to launch LibreOffice Writer and open a new document:

**Step 1:** Open your computer or laptop and ensure that LibreOffice is installed. If not, you can download it from the official website and install it on your computer.

**Step 2:** Click on the Start menu button on your desktop screen or press the Windows key on your keyboard to open the Start menu.

**Step 3:** Search for LibreOffice Writer in the search bar of the Start menu.

**Step 4:** Click on the LibreOffice Writer icon to launch the program.



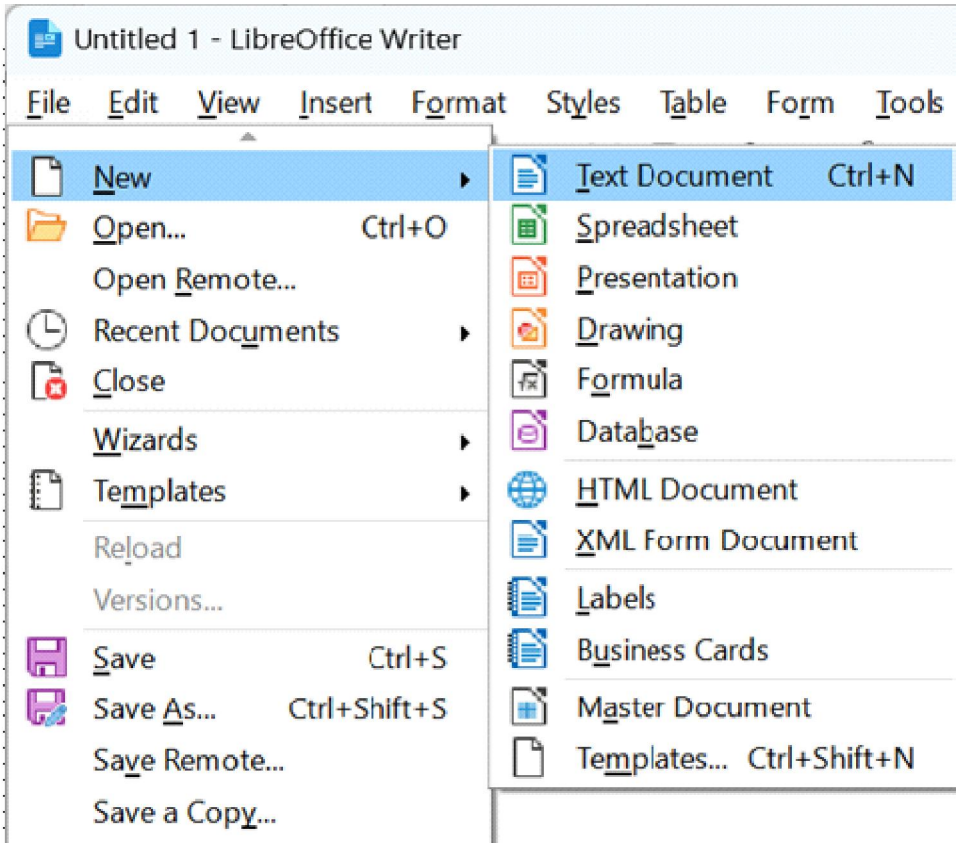
**Step 5:** Once Writer is launched, click on the File menu in the top left corner of the screen.

**Step 6:** Click on the New option from the File menu.

**Step 7:** A new window will appear with a list of different document types. Choose the type of document you want to create and click on it. You can now start typing your document and use the various formatting tools and features available in Writer to format your text as needed.

## 8.4 UNDERSTANDING THE WRITER INTERFACE

Followings are the components of LibreOffice Writer interface:




- **Menu Bar:** The Menu Bar is located at the top of the LibreOffice Writer window and contains various menus such as File, Edit, View, Insert, Format, Table, Tools, Window, and Help.
- **Standard Toolbar:** The Standard Toolbar is located directly below the Menu Bar and contains commonly used tools such as Save, Undo, Redo, Cut, Copy, and Paste.

- **Formatting Toolbar:** The Formatting Toolbar is located below the Standard Toolbar and contains tools for formatting text such as font style, size, color, alignment, and highlighting.
- **Ruler:** The Ruler is located at the top of the document window and provides visual aids for adjusting margins, tabs, and indentation.
- **Status Bar:** The Status Bar is located at the bottom of the LibreOffice Writer window and displays information about the current document such as page number, word count, and zoom level.
- **Scroll Bar:** The Scroll Bar is located on the right-hand side of the document window and allows you to scroll up and down the document.
- **Document Area:** The Document Area is the main area where you can create and edit your document. This is where you will enter and format your text.
- **Sidebar:** The Sidebar is located on the right-hand side of the LibreOffice Writer window and contains various options and features such as styles, formatting, and properties.

The LibreOffice Writer interface is designed to be user-friendly and intuitive, with various tools and features readily accessible through the Menu Bar and toolbars. The Ruler, Status Bar, and Sidebar provide additional functionality and customization options, making it easy to create professional-looking documents with LibreOffice Writer.

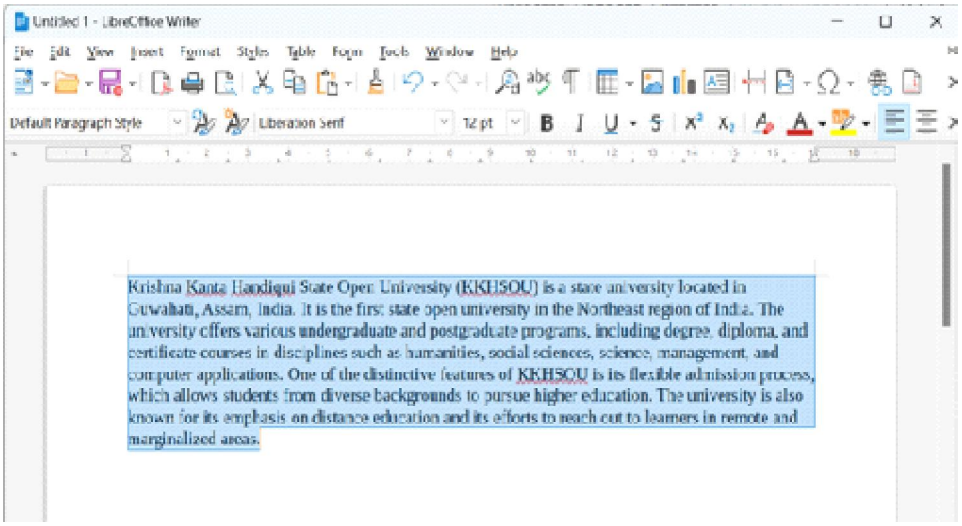
## 8.5 WORKING WITH WRITER

### 8.5.1 Entering and Formatting Text

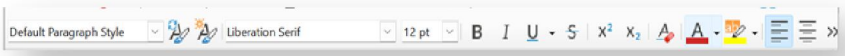
here's a step-by-step procedure to enter and format text in a LibreOffice Writer document:

1. Launch LibreOffice Writer and create a new document by clicking on the File menu and selecting New, or by pressing Ctrl+N on your keyboard.
2. Type in the text that you want to include in your document.

3. To format your text, select the text by clicking and dragging your mouse over the text that you want to format.



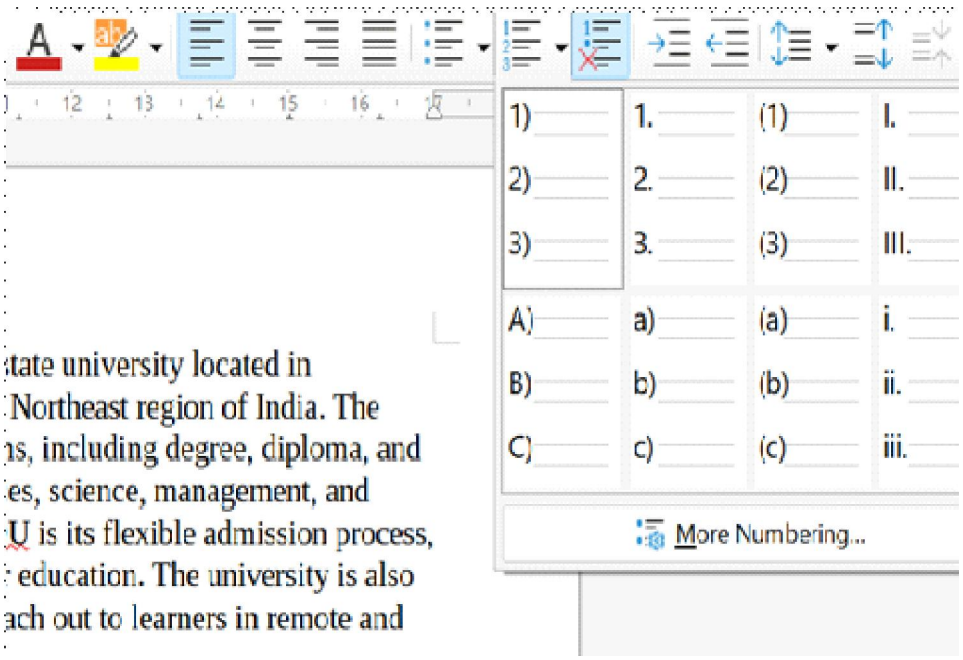

4. Use the formatting tools available in the Formatting Toolbar to apply formatting options such as font style, font size, bold, italic, underline, strikethrough, and color.



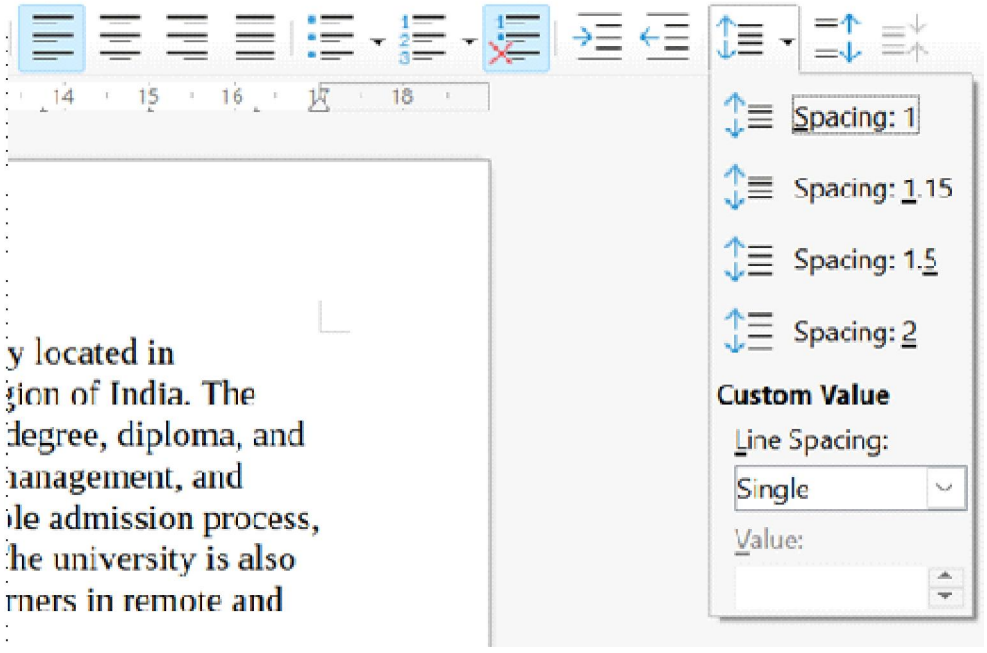

5. To change the alignment of your text, use the Alignment buttons available in the Formatting Toolbar. You can align your text to the left, center, right, or justified.



6. To add bulleted or numbered lists, click on the Bullets or Numbering buttons available in the Formatting Toolbar. This will automatically add bullet points or numbers to your text.

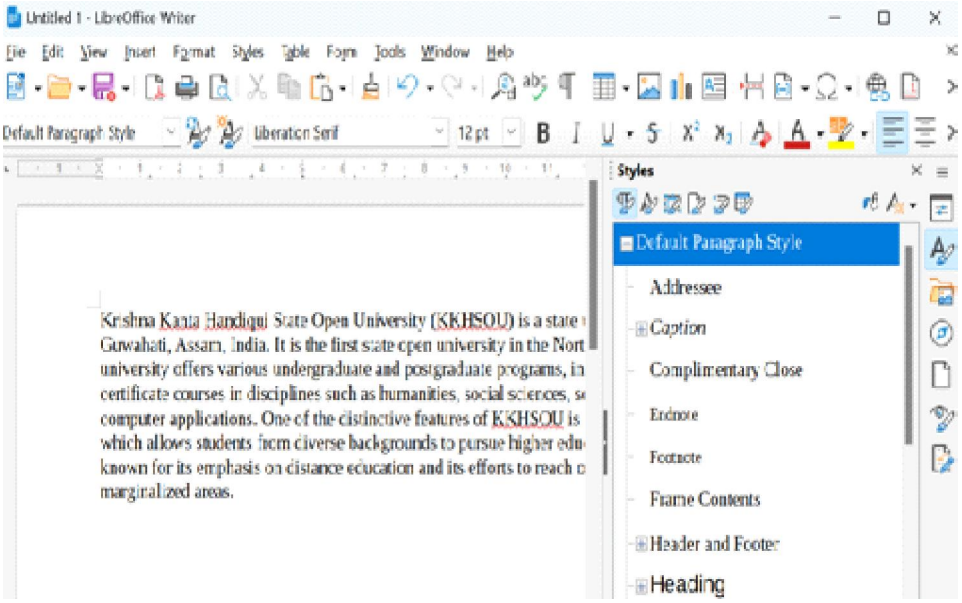



7. To adjust the spacing between lines or paragraphs, use the Line Spacing or Paragraph Spacing options available in the Formatting Toolbar.




8. To change the indentation of your text, use the Indent buttons available in the Formatting Toolbar. You can indent your text to the left or right.

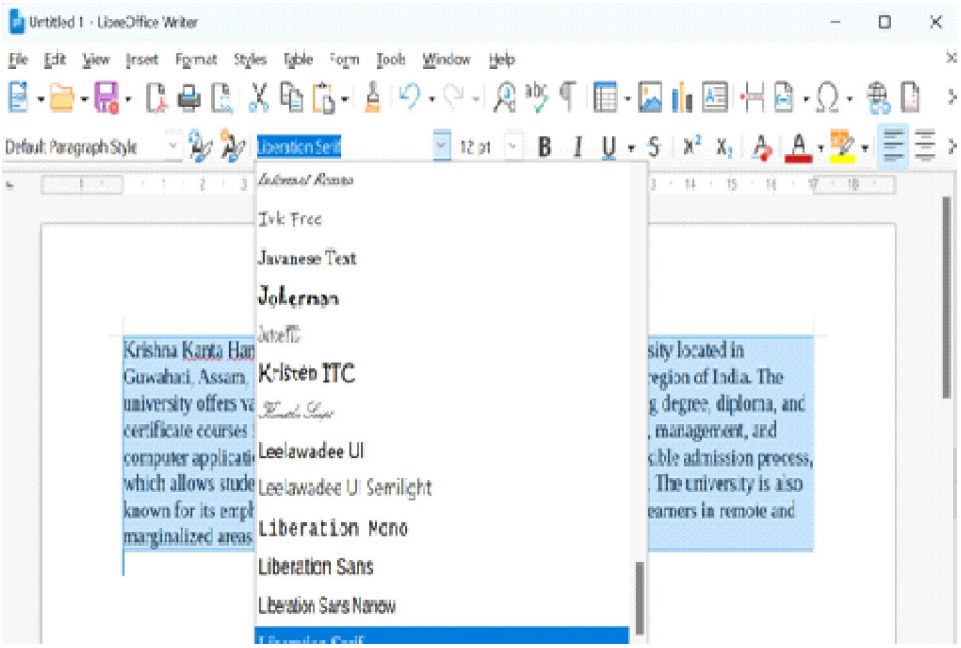
9. To apply a specific style to your text, use the Styles and Formatting feature available in the Sidebar. Click on the Styles and Formatting button in the Sidebar, select the style that you want to apply, and click on the Apply button.



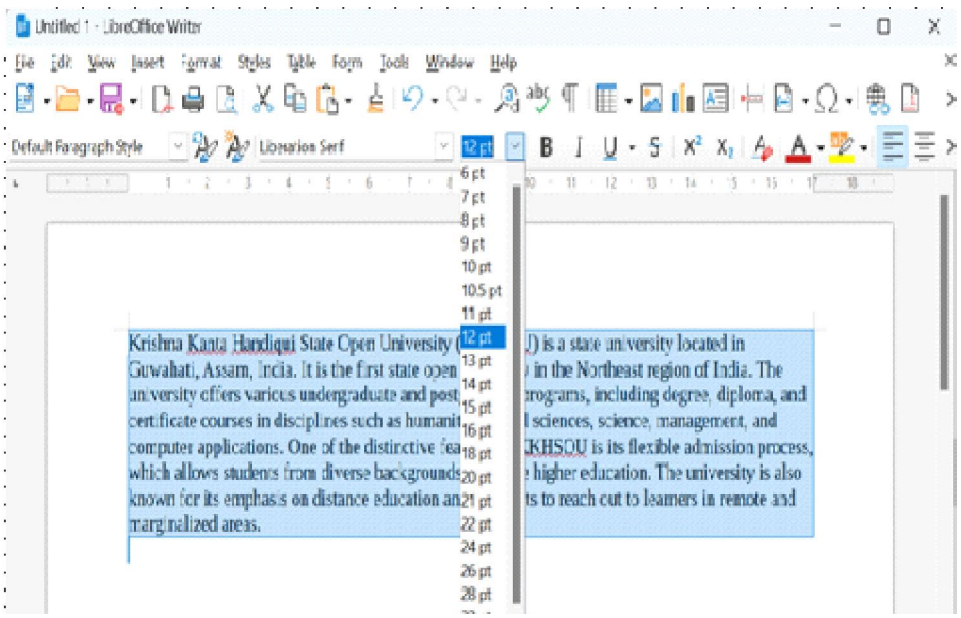

## 8.5.2 Applying Font Styles

Here's a step-by-step procedure to apply font styles in LibreOffice Writer:

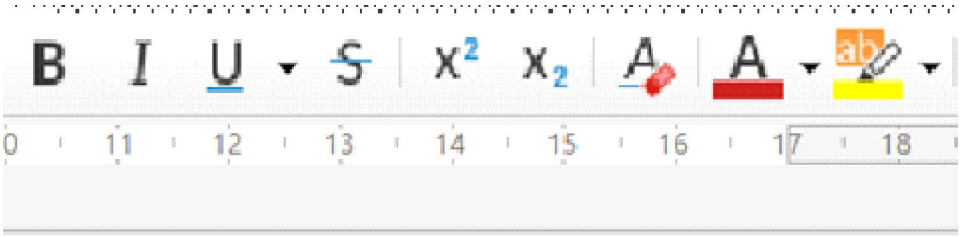
1. Launch LibreOffice Writer and create a new document.
2. Type in the text that you want to format.
3. Select the text that you want to apply the font style to.
4. Go to the Formatting Toolbar located at the top of the LibreOffice Writer window.
5. In the Formatting Toolbar, locate the Font Name dropdown menu. This dropdown menu displays the font styles that are currently available.

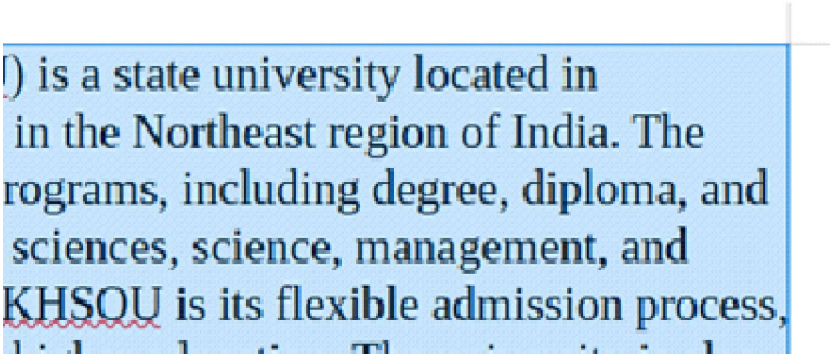



6. Click on the Font Name dropdown menu and select the font style that you want to apply to your text. The font style will be applied to the selected text.
7. You can also change the font size of your text by selecting the text that you want to format and then selecting a font size from the Font Size dropdown menu in the Formatting Toolbar.

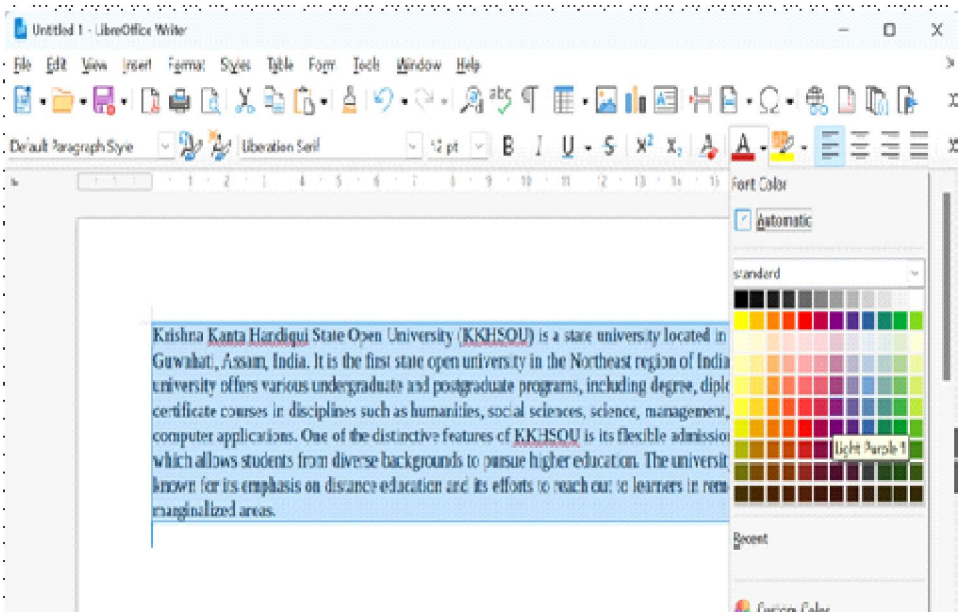


8. Additionally, you can make your text bold, italic, or underlined by clicking on the corresponding buttons in the Formatting Toolbar.






9. To change the color of your text, click on the Font Color button in the Formatting Toolbar and select a color from the color palette.

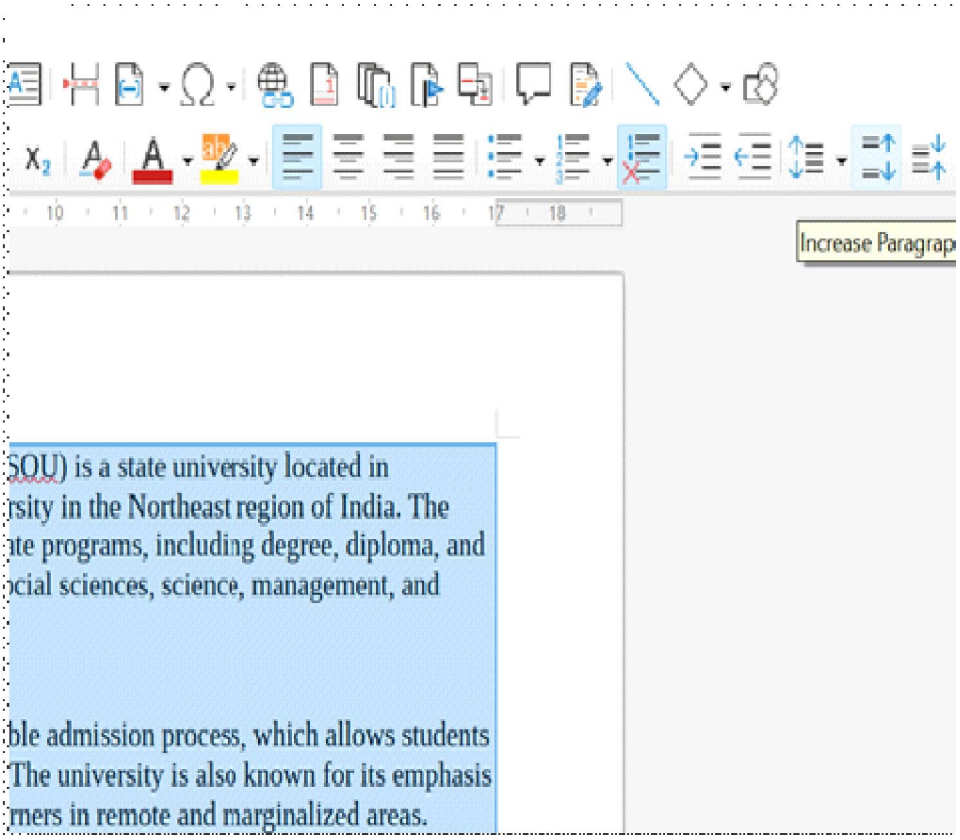


By following the above procedures, you can successfully apply font styles to your text in LibreOffice Writer. You can continue to use these formatting tools to customize the appearance of your document.

### 8.5.3 Working with Paragraphs

Sure, here's a step-by-step procedure to work with paragraphs in Writer:

1. Launch LibreOffice Writer and create a new document.
2. Type in the text that you want to include in your document.
3. To start a new paragraph, press the Enter key on your keyboard.
4. To add spacing between paragraphs, select the paragraph(s) that you want to add spacing to, and then use the Paragraph Spacing options available in the Formatting Toolbar.




5. To change the alignment of a paragraph, select the paragraph that you want to align, and then use the Alignment buttons available in the Formatting Toolbar. You can align your paragraph to the left, center, right, or justified.

6. To add bullet points or numbers to a paragraph, place your cursor at the beginning of the paragraph and then click on the Bullets or Numbering button available in the Formatting Toolbar.
7. To indent a paragraph, select the paragraph that you want to indent and then use the Indent buttons available in the Formatting Toolbar. You can indent your paragraph to the left or right.
8. To apply a specific paragraph style to your text, use the Styles and Formatting feature available in the Sidebar. Click on the Styles and Formatting button in the Sidebar, select the paragraph style that you want to apply, and click on the Apply button.
9. To create a numbered or bulleted list, type in the list items one after the other, each on a new line, and then click on the Numbering or Bullets button available in the Formatting Toolbar.

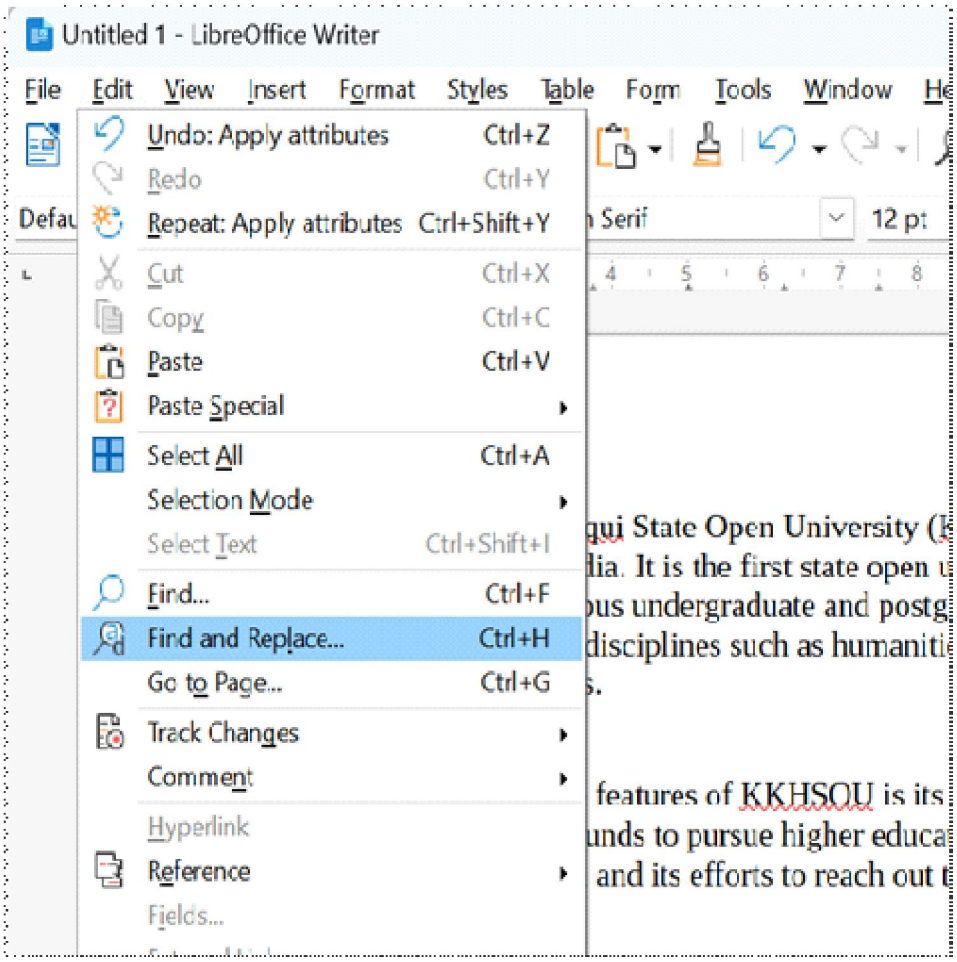
You can continue to use these formatting tools to customize the appearance of your document.

### 8.5.4 Find and Replace

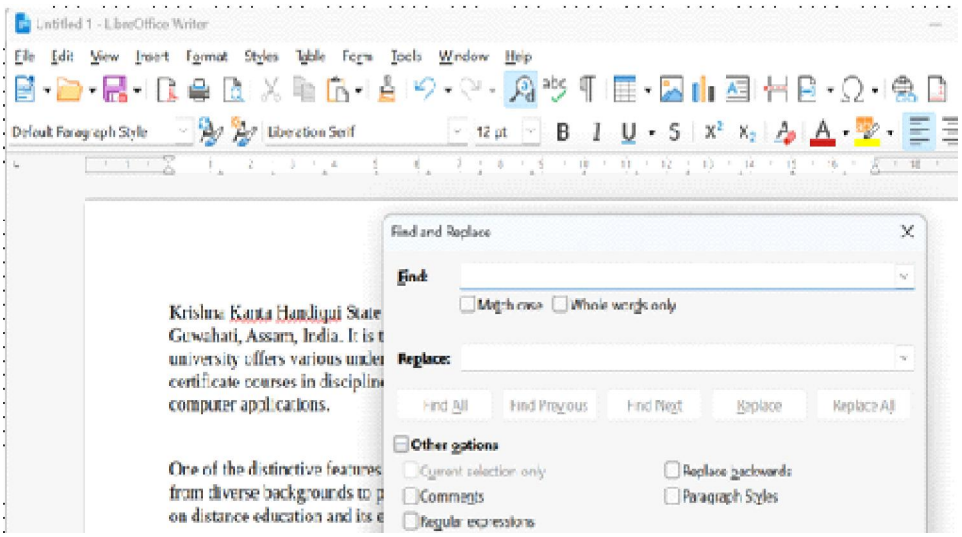
The “Find and Replace” feature in LibreOffice Writer is a powerful tool that allows you to search for a specific word, phrase or character in your document, and replace it with another word, phrase or character.

Following are step-by-step procedures to find and replace text in LibreOffice Writer:

1. Launch LibreOffice Writer and open the document that you want to search and replace text in.
2. Click on the Edit menu in the top-left corner of the window.
3. Click on the Find & Replace option. Alternatively, you can use the keyboard shortcut Ctrl+H.




4. In the Find & Replace dialog box, type in the text that you want to search for in the Search for field.



5. If you want to search for a whole word, check the Whole words only option.
6. If you want to match the case of the text that you're searching for, check the Match case option.
7. Click on the Find button to find the first occurrence of the text that you're searching for.
8. To replace the found text, click on the Replace button.
9. To replace all occurrences of the text, click on the Replace All button.
10. If you want to search for and replace more text, click on the Find Next button to find the next occurrence of the text.
11. Once you're done searching and replacing text, click on the Close button to close the Find & Replace dialog box.

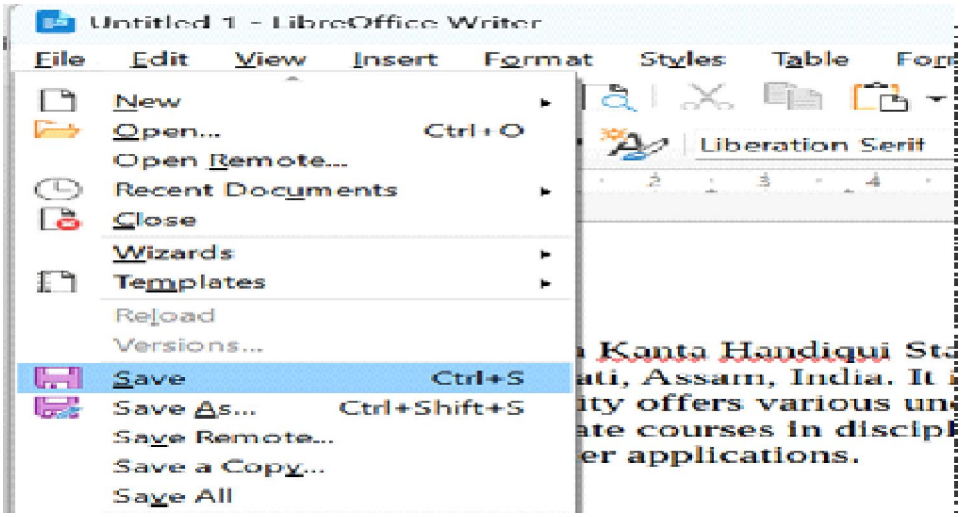
In this way, you can find and replace text in LibreOffice Writer. You can use these steps to quickly search and replace text in your documents.

### 8.5.5 Saving, Closing and Opening Existing Document

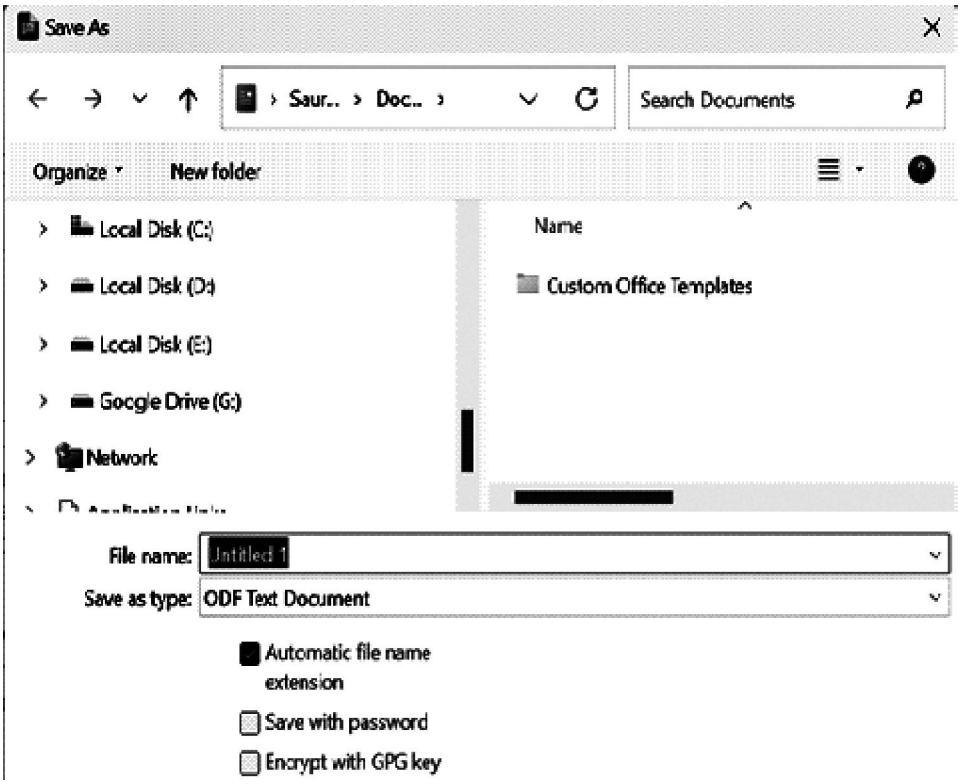
Following are step-by-step procedures to save, close, and open an existing document in LibreOffice Writer:

**To save a document:**

1. Click on the File menu in the top-left corner of the LibreOffice Writer window.
2. Click on the Save option. Alternatively, you can press the Ctrl+S keys on your keyboard.



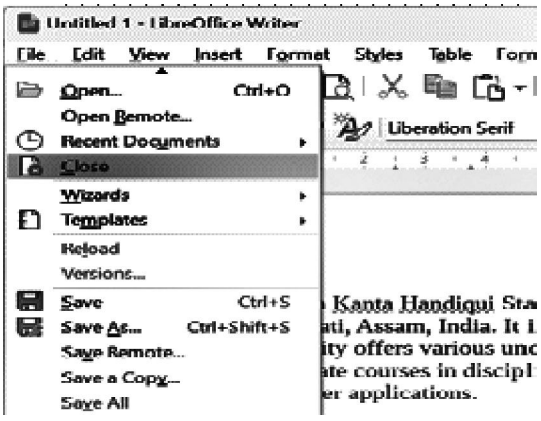
3. Choose a location where you want to save the document.




4. In the Save As dialog box, give your document a name and select the file type you want to save it in.
5. Click on the Save button.

**To close a document:**

1. Click on the File menu in the top-left corner of the LibreOffice Writer window.
2. Click on the Close option. Alternatively, you can press the Ctrl+W keys on your keyboard.

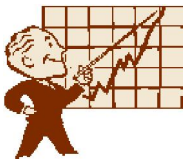


3. If there are any unsaved changes to your document, LibreOffice Writer will prompt you to save your changes before closing the document.

**To open an existing document:**

1. Click on the File menu in the top-left corner of the LibreOffice Writer window.
2. Click on the Open option. Alternatively, you can press the Ctrl+O keys on your keyboard.
3. Choose the location where the document is saved.
4. Select the document that you want to open.
5. Click on the Open button.

By following these steps, you can successfully save, close, and open an existing document in LibreOffice Writer.



## CHECK YOUR PROGRESS

1. Answer the following questions:

(a) What is LibreOffice Writer?

(b) What are the components of the LibreOffice Writer interface?

(c) How can you launch LibreOffice Writer?

(d) How can you open a new document in LibreOffice Writer?

(e) What is the purpose of the Ruler in LibreOffice Writer?

(f) Where is the Sidebar located in LibreOffice Writer?

(g) What options are available in the Formatting Toolbar in LibreOffice Writer?

(h) How can you apply font styles in LibreOffice Writer?

(i) How can you add bulleted or numbered lists in LibreOffice Writer?

(j) What is the purpose of the Styles and Formatting feature in LibreOffice Writer?



## 8.6 LET US SUM UP

- The Writer interface consists of a Menu Bar, Standard Toolbar, Formatting Toolbar, Ruler, Status Bar, Scroll Bar, Document Area, and Sidebar.
- The Ruler, Status Bar, and Sidebar provide additional functionality and customization options.
- To enter and format text in a LibreOffice Writer document, create a new document, type in the text, select the text, and use the formatting tools available in the Formatting Toolbar.
- The Formatting Toolbar includes options for font style, font size, alignment, bullet points, numbering, line spacing, paragraph spacing, and indentation.
- The Styles and Formatting feature available in the Sidebar can be used to apply a specific style to your text.
- Font styles can be applied by selecting the text, choosing a font style from the Font Name dropdown menu, changing the font size, making the text bold, italic or underlined, and changing the text color.
- LibreOffice Writer is user-friendly and intuitive with various tools and features readily accessible through the Menu Bar and toolbars.
- LibreOffice Writer is a good alternative to Microsoft Word for creating professional-looking documents.



## 8.7 ANSWERS TO CHECK YOUR PROGRESS

**Ans.to.Q.No.1:**

(a) LibreOffice Writer is a free and open-source word processor software.

(b) The components of the LibreOffice Writer interface are Menu Bar, Standard Toolbar, Formatting Toolbar, Ruler, Status Bar, Scroll Bar, Document Area, and Sidebar.

(c) You can launch LibreOffice Writer by searching for it in the Start menu or by clicking on the LibreOffice Writer icon on your desktop.

(d) You can open a new document in LibreOffice Writer by clicking on the File menu and selecting New, or by pressing Ctrl+N on your keyboard.

(e) The Ruler in LibreOffice Writer provides visual aids for adjusting margins, tabs, and indentation.

(f) The Sidebar is located on the right-hand side of the LibreOffice Writer window.

(g) The Formatting Toolbar in LibreOffice Writer contains options for formatting text such as font style, font size, alignment, and highlighting.

(h) You can apply font styles in LibreOffice Writer by selecting the text you want to format and using the Font Name dropdown menu and other formatting tools in the Formatting Toolbar.

(i) You can add bulleted or numbered lists in LibreOffice Writer by clicking on the Bullets or Numbering buttons in the Formatting Toolbar.

(j) The Styles and Formatting feature in LibreOffice Writer allows you to apply a specific style to your text.



## 8.8 FURTHER READING

1) "Getting Started with LibreOffice Writer," The Document Foundation, accessed March 11, 2023, https://documentation.libreoffice.org/en/english-documentation/getting-started-writer/.

2) "LibreOffice Writer Guide," The Document Foundation, accessed March 11, 2023, https://documentation.libreoffice.org/en/english-documentation/writer-guide/.

3) "LibreOffice Writer Tutorial," Tutorials Point, accessed March 11, 2023, https://www.tutorialspoint.com/libreoffice/libreoffice_writer_tutorial.htm.



## 8.9 MODEL QUESTIONS

**Q.1:**What are the components of the LibreOffice Writer interface?

**Q.2:**How do you enter and format text in a LibreOffice Writer document?

**Q.3:**What is the purpose of the Ruler in LibreOffice Writer?

**Q.4:**How can you add bulleted or numbered lists in a Writer document?

**Q.5:**How do you apply specific styles to text in Writer using the Styles and Formatting feature?

**Q.6:**What is the purpose of the Sidebar in LibreOffice Writer?

**Q.7:**How do you change the alignment of text in a Writer document?

**Q.8:**How can you adjust the spacing between lines or paragraphs in a Writer document?

**Q.9:**How can you indent text to the left or right in a Writer document?

**Q.10:**What are some of the font styles that can be applied to text in LibreOffice Writer?

*****

# UNIT 9: WORKING WITH TEMPLATES AND STYLES IN WRITER

## UNIT STRUCTURE


9.1 Learning Objectives

9.2 Introduction

9.3 Creating Document Templates

- 9.3.1 Understanding Document Templates
- 9.3.2 Creating a New Template
- 9.3.3 Modifying an Existing Template

9.4 Using Document Templates

- 9.4.1 Applying a Template to A New Document
- 9.4.2 Changing the Template for an Existing Document

9.5 Paragraph Styles

- 9.5.1 Understanding Paragraph Styles
- 9.5.2 Creating a New Paragraph Style
- 9.5.3 Modifying a Paragraph Style
- 9.5.4 Applying Paragraph Styles to Text

9.6 Managing Styles in the Styles and Formatting Dialog Box

- 9.6.1 Opening the Styles and Formatting Dialog Box
- 9.6.2 Navigating the Dialog Box
- 9.6.3 Managing Styles in The Dialog Box

9.7 Let Us Sum Up

9.8 Answers to Check Your Progress

9.9 Further Reading

9.10 Model Questions


## 9.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the concept of document templates and their importance in creating new documents.
- create a new document template in LibreOffice Writer.

- modify an existing document template to meet specific needs.
- save and use document templates efficiently in LibreOffice Writer.
- apply a document template to a new document and change it for an existing document.
- update a document template to reflect any changes made in the document.
- understand the concept of paragraph styles and their role in creating consistent formatting throughout a document.
- create new paragraph styles in LibreOffice Writer.
- modify existing paragraph styles to meet specific formatting needs.
- apply paragraph styles to text efficiently in LibreOffice Writer.
- navigate and manage styles effectively in the Styles and Formatting dialog box of LibreOffice Writer.

## 9.2 INTRODUCTION

LibreOffice Writer is a powerful word processing software that allows users to create professional-looking documents with ease. One of the most useful features of Writer is its ability to create and use document templates, which are pre-designed formats that can be used as a starting point for new documents. In this section, we will explore how to create, modify, and save document templates, as well as how to apply them to new and existing documents. Additionally, we will discuss the use of paragraph and character styles to further enhance the appearance of your documents. Finally, we will take a closer look at managing styles in the Styles and Formatting dialog box, which is a useful tool for organizing and manipulating styles. With these skills, you can create consistent, professional-looking documents quickly and easily in LibreOffice Writer.

## 9.3 CREATING DOCUMENT TEMPLATES

### 9.3.1 Understanding Document Templates

In LibreOffice Writer, document templates are pre-designed formats that can be used to create new documents. These templates include

various elements such as page layout, font styles, header and footer, and other design elements that make the document look professional and consistent.

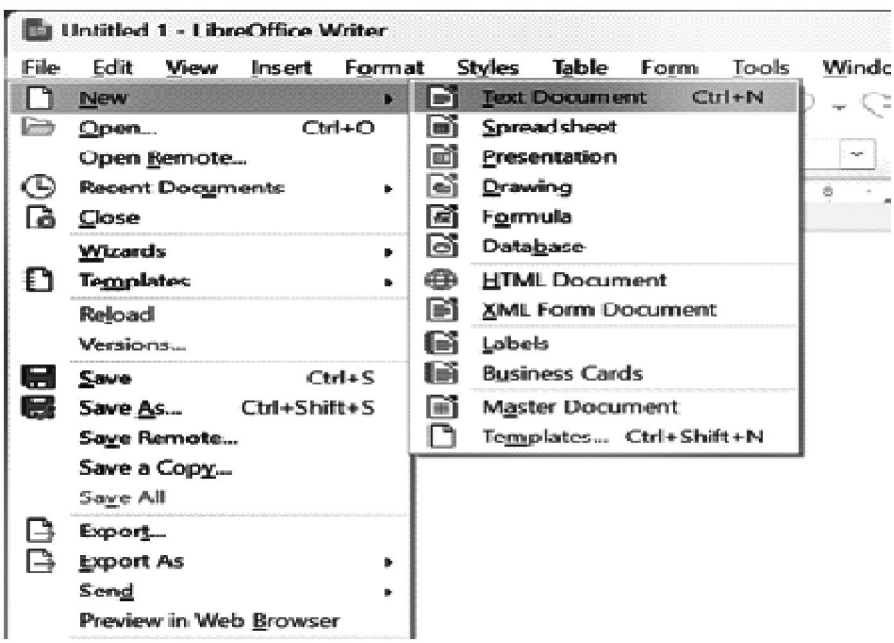
Document templates can save time and effort by providing a starting point for creating a new document. Instead of starting from scratch, you can select a template that best suits your needs, and then modify it to create your own document.

LibreOffice Writer comes with a range of built-in templates, and you can also create your own custom templates. To create a new template, you can start with a blank document or an existing document and customize it to suit your needs. Once you have created a template, you can save it and use it to create new documents in the future.

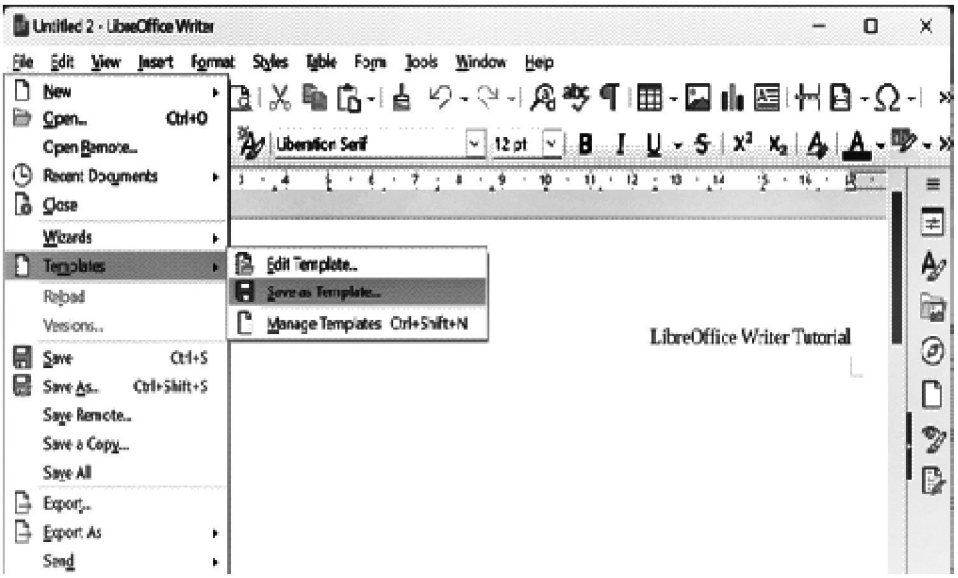
### 9.3.2 Creating a New Template

Here is the step-by-step procedure to create a new template in LibreOffice Writer:

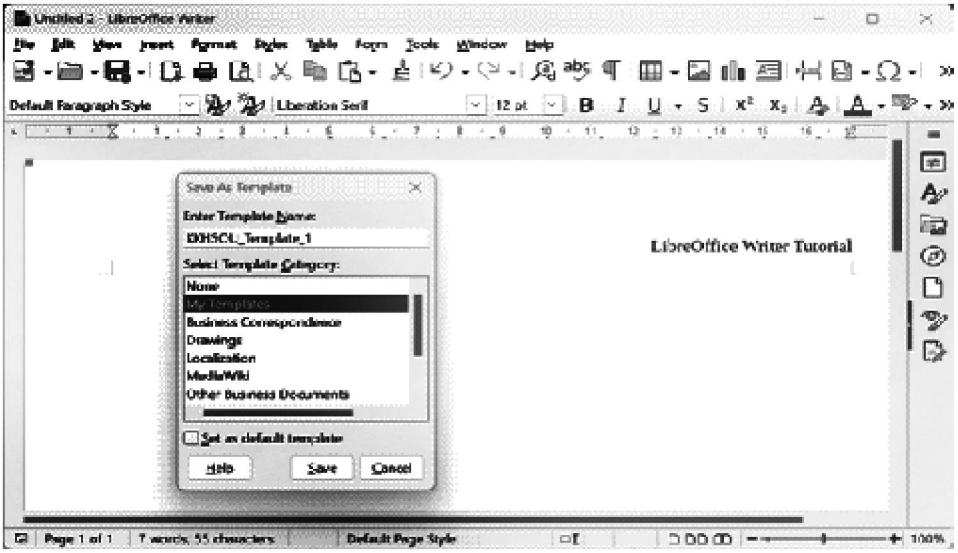
1. Open LibreOffice Writer and click on the “File” menu in the top-left corner.
2. From the drop-down menu, click on “New” and select “Text Document” from the options.



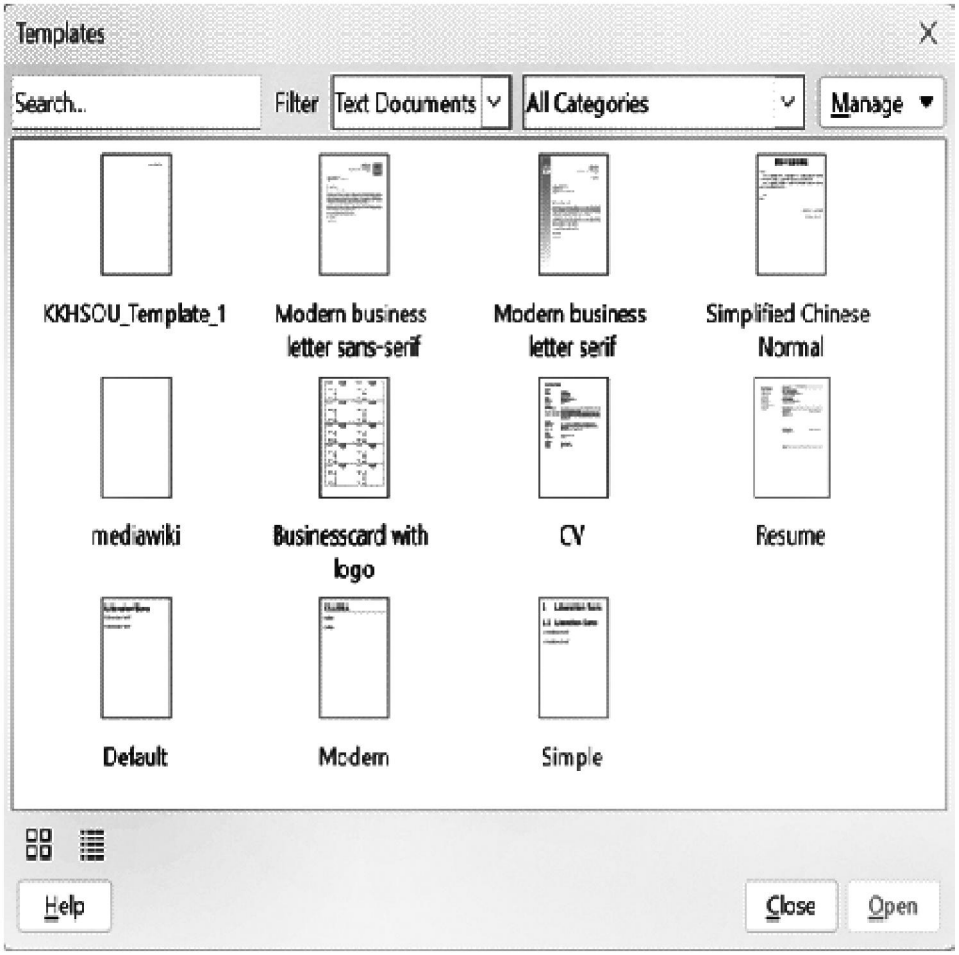
3. Customize the new document as per your requirements. This can include formatting the text, changing the page layout, adding headers and footers, and inserting any required design elements.
4. Once you have customized the document, click on the “File” menu again and select “Templates” > “Save as Template.”




5. In the “Save As Template” dialog box, enter a name for the template in the “Name” field.
6. Select the category where you want to save the template. Click on the “Save” button to save the template.



7. Your new template is now saved and can be accessed from the "File" menu > "New" > "Templates" > "KKHSOU_Template_1" in the future.



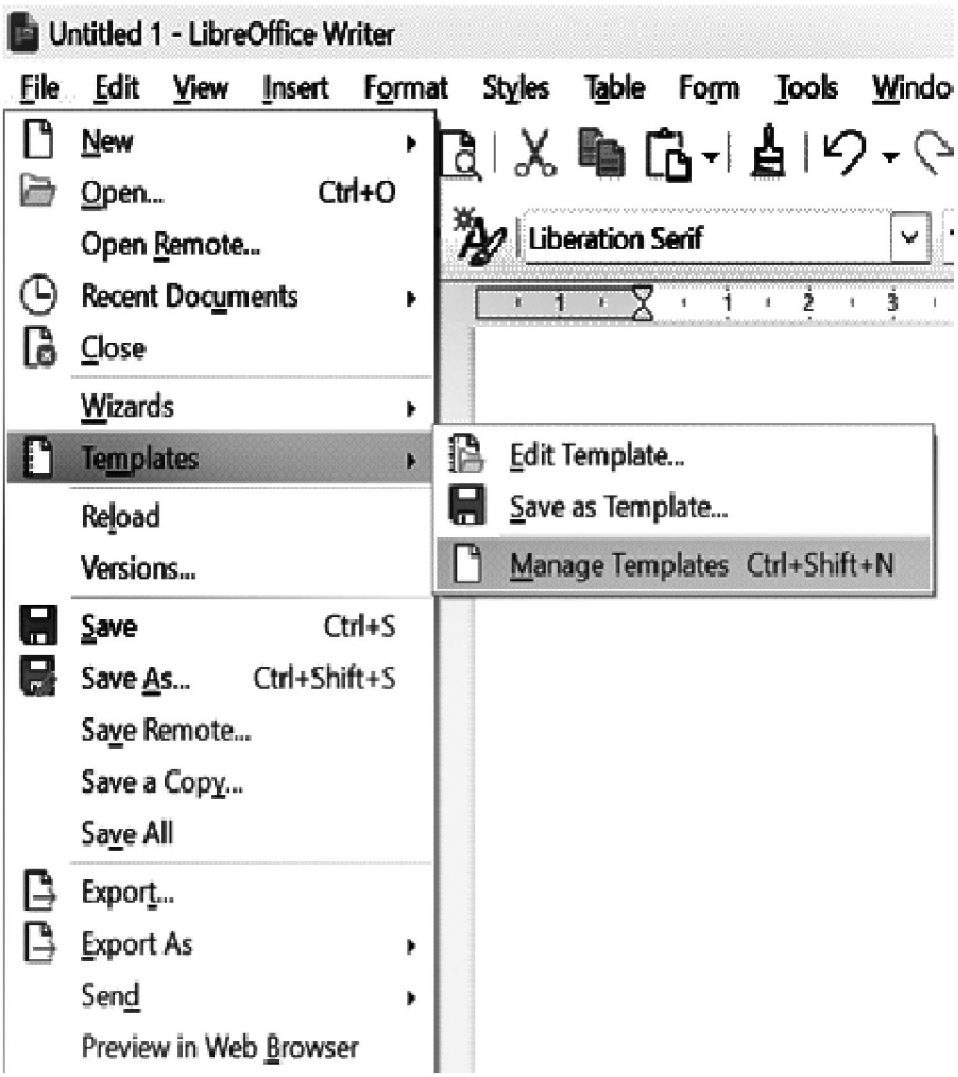

8. To use the template, simply open a new document from the "File" menu > "New" > "Templates" and select the template you want to use.

By following these steps, you can create a new template in LibreOffice Writer and save it for future use.

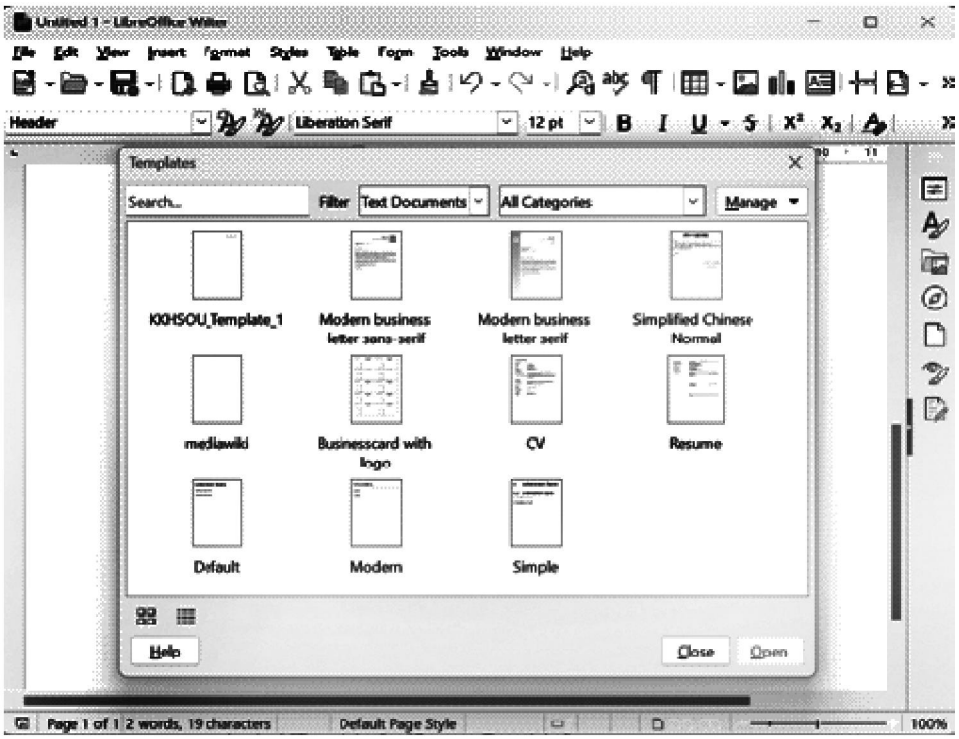
### 9.3.3 Modifying an Existing Template

You can modify an existing template by following the steps mentioned below:

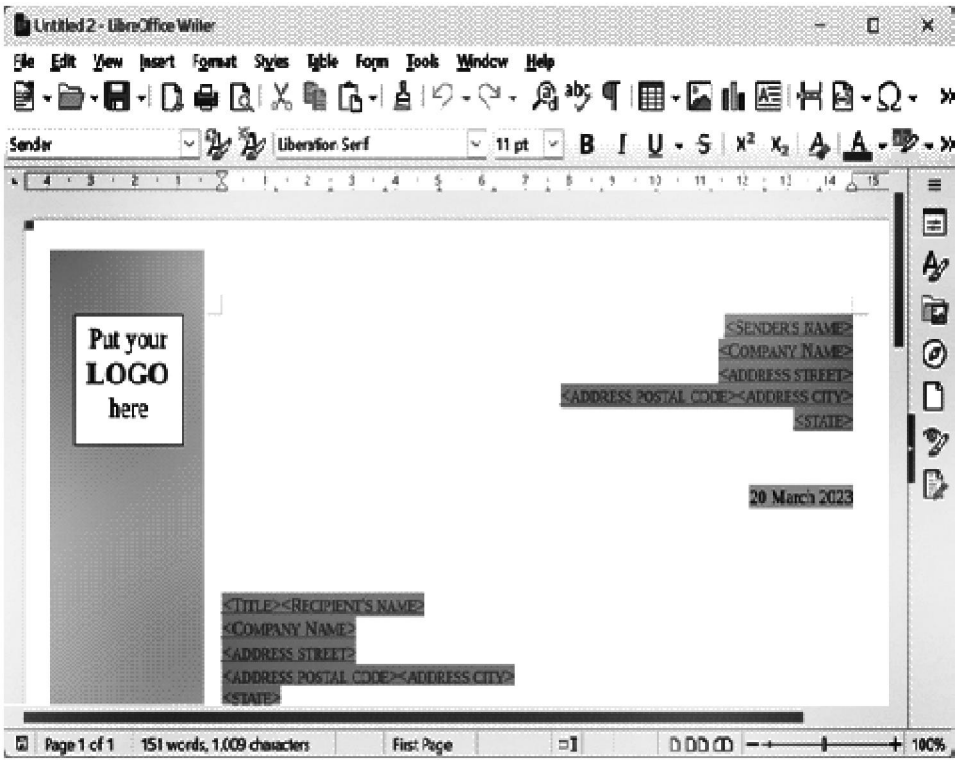
1. Open LibreOffice Writer and click on the “File” menu in the top-left corner.
2. From the drop-down menu, click on “Templates” > “Manage Templates” to open the “Template Manager” dialog box.




3. In the “Template Manager” dialog box, select the category where your existing template is saved. You can use the search bar to find the template quickly.




4. Once you have found the template, click on it to select it and then click on the “Edit” button. For example, we will edit the template named “Modern business letter serif”.



5. This will open the template in a new Writer document. You can now modify the template as per your requirements. You can add or delete text, change formatting, and modify design elements.
6. Once you have made the necessary changes, click on the “File” menu and select “Templates” > “Save as Template.”
7. In the “Save As Template” dialog box, ensure that the same template name and category are selected as the existing template.
8. Click on the “OK” button to save the modified template.

Your modified template is now saved and can be accessed from the “File” menu > “New” > “Templates” in the future.

## 9.4 USING DOCUMENT TEMPLATES

### 9.4.1 Applying a Template to a New Document

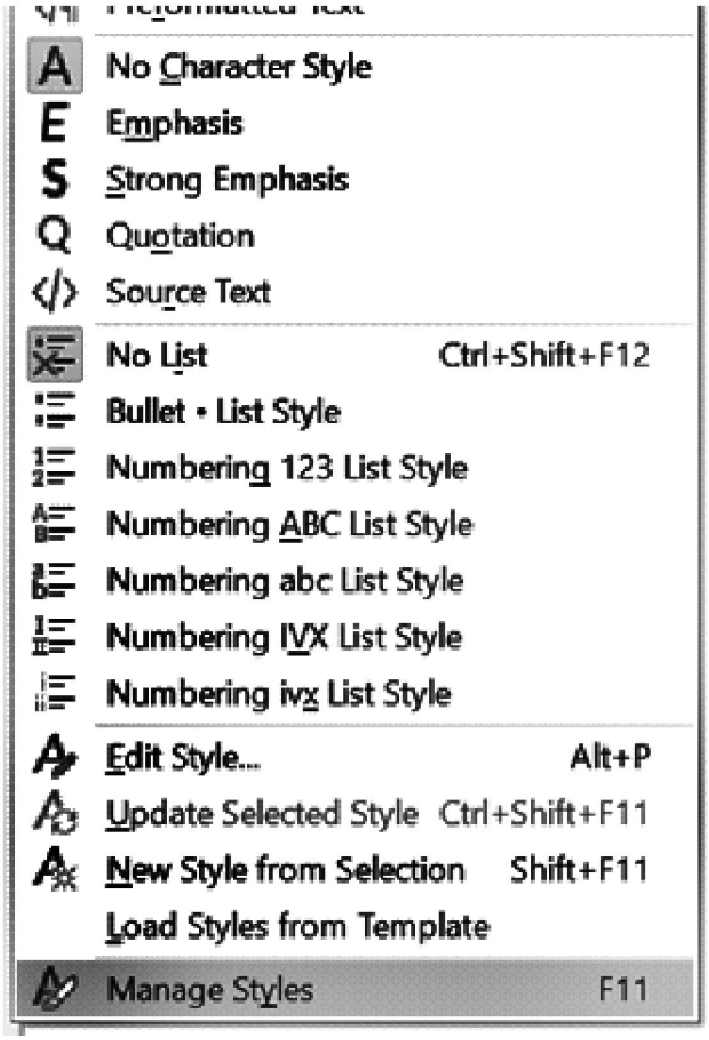
You canapply a templateto a new document in by following the steps mentioned below:

1. Open LibreOffice Writer.
2. Click on “File” in the menu bar and select “New” to create a new document.
3. In the “New Document” dialog box, select “Templates” on the left-hand side.
4. Click on the template category you want to use. For example, if you want to create a business letter, select “Business Correspondence” and then select the “Business Letter” template.
5. Once you have selected the template, click on “Create” at the bottom of the dialog box.
6. A new document will be created based on the selected template. You can now edit the document as needed.
7. If you want to save the document using a different name or location, click on “File” in the menu bar and select “Save As”. Enter the desired file name and location and click “Save”.

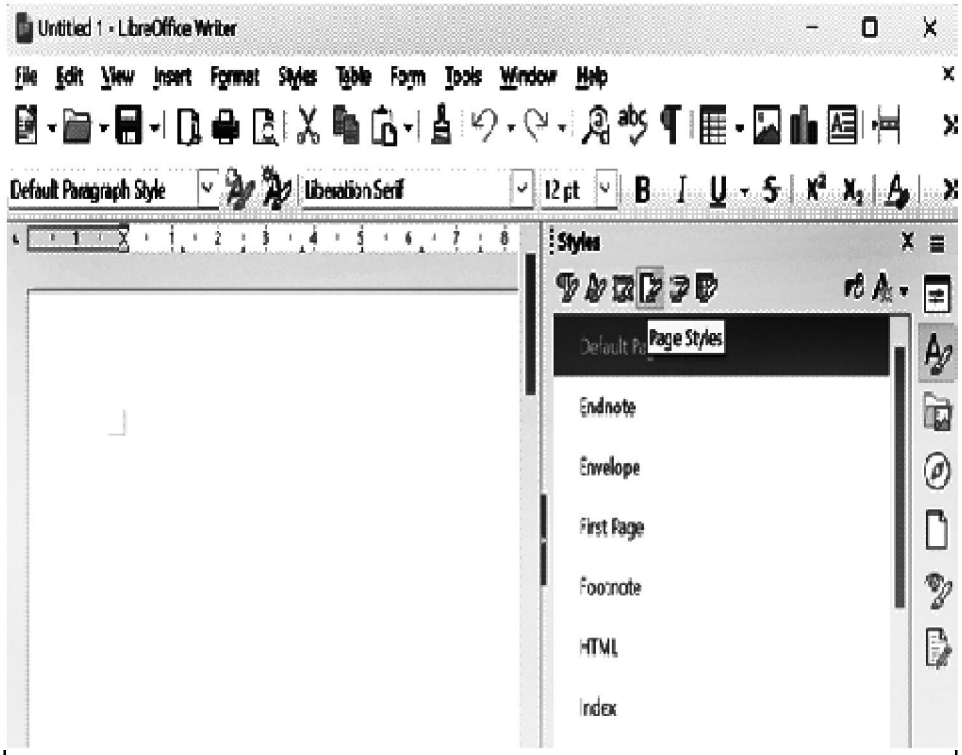
### 9.4.2 Changing the Template for an Existing Document

You can change the template for an existing document in LibreOffice Writer by following the steps mentioned below:

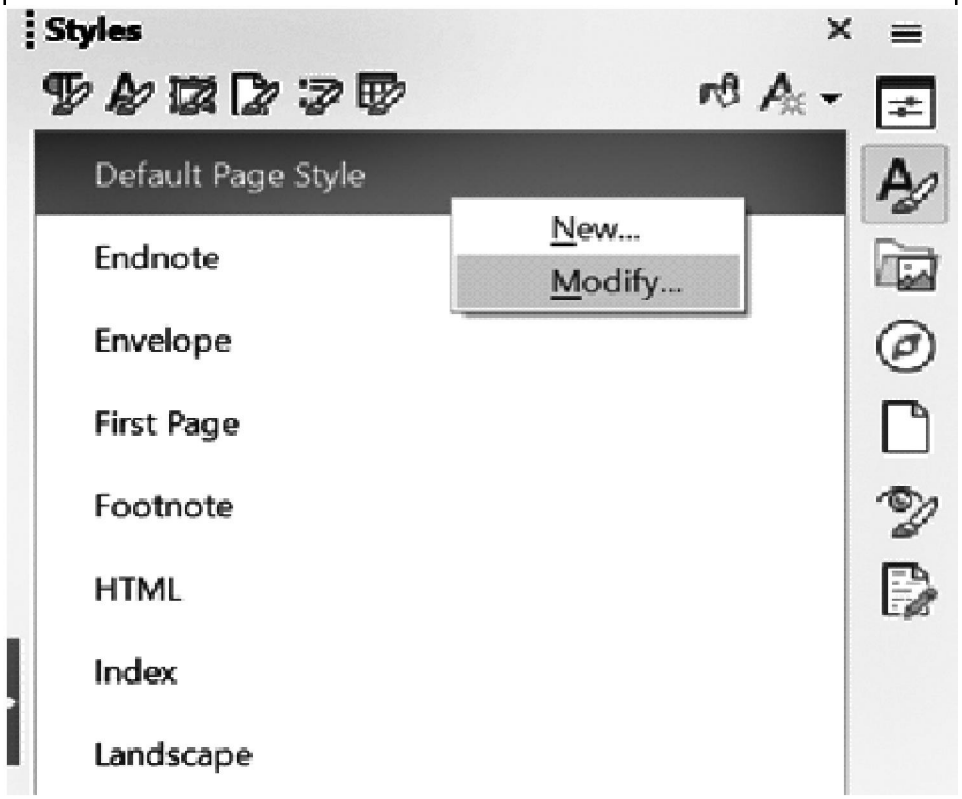
1. Open the document you want to change the template for in LibreOffice Writer.
2. Click on “Styles” in the menu bar and select “Manage Styles” from the drop-down menu.



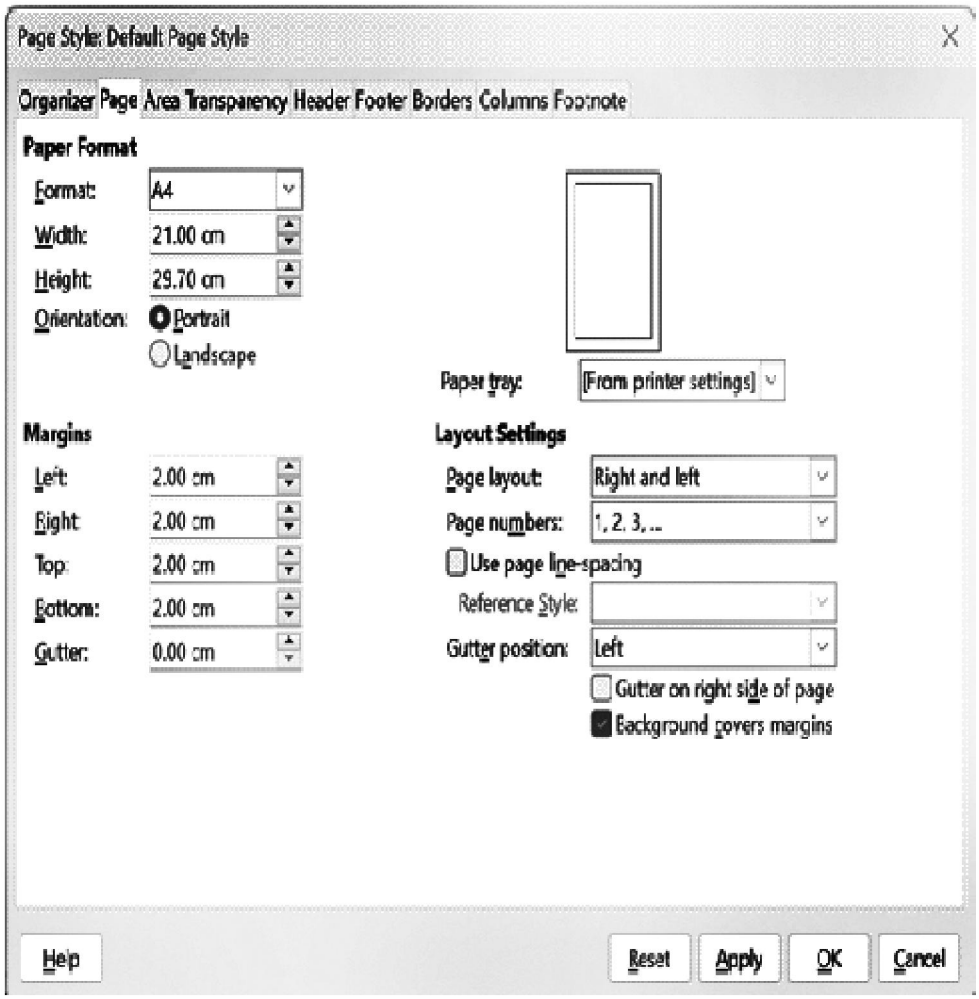

3. In the “Styles and Formatting” dialog box, click on the “Page Styles” icon.




4. Right-click on the current page style applied to the document and select “Modify” from the pop-up menu.



5. In the following window, you can change the page styles by clicking the tabs.




6. Save the changes to the document by clicking on the “Apply” and then the “OK” button.

## 9.5 PARAGRAPH STYLES

### 9.5.1 Understanding Paragraph Styles

In LibreOffice Writer, paragraph styles are a way to apply consistent formatting to a group of paragraphs. They allow you to define attributes such as font, font size, line spacing, indentation, and alignment. By applying paragraph styles, you can quickly and easily

format your document, while ensuring consistency and making it easier to modify the formatting later on.

To apply a paragraph style, you can either use the Styles and Formatting dialog or the sidebar. In the Styles and Formatting dialog, select the text you want to format and then double-click the appropriate paragraph style in the list. In the sidebar, select the text you want to format, expand the Styles section, and then click the appropriate paragraph style.

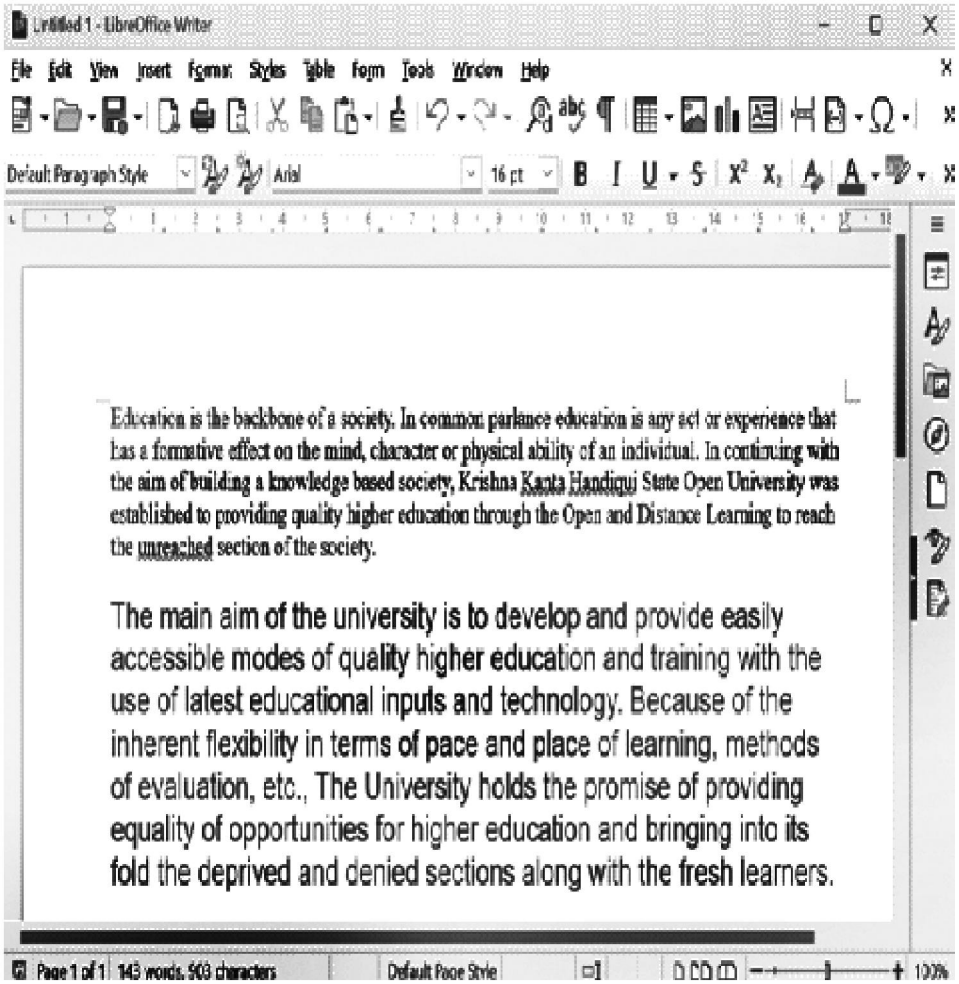
You can also modify existing paragraph styles or create new ones. To modify an existing style, right-click the style in the Styles and Formatting dialog and select Modify. You can then make changes to the attributes and save the modified style. To create a new style, click the New Style button in the Styles and Formatting dialog or in the sidebar, and then define the attributes for the new style.

Using paragraph styles in LibreOffice Writer can save you time and effort in formatting your document, while also ensuring consistency and making it easier to make changes later on.

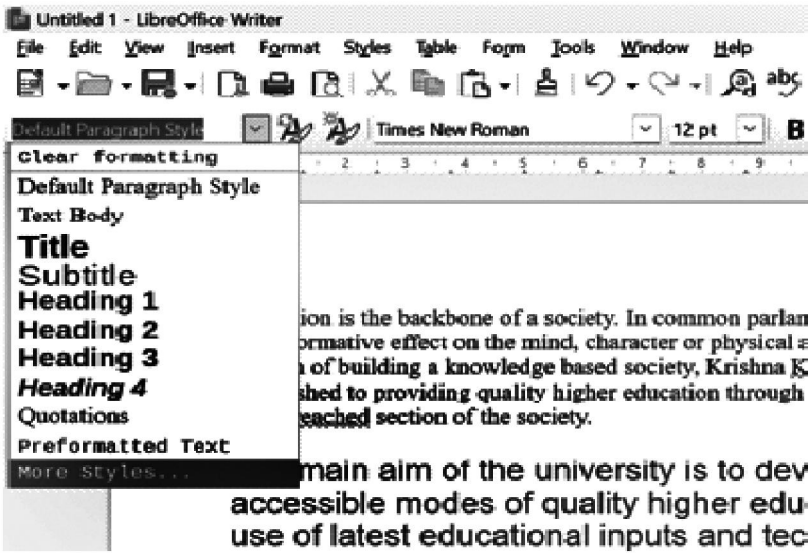
### 9.5.2 Creating a New Paragraph style

To create a new paragraph style in LibreOffice Writer, follow these steps:

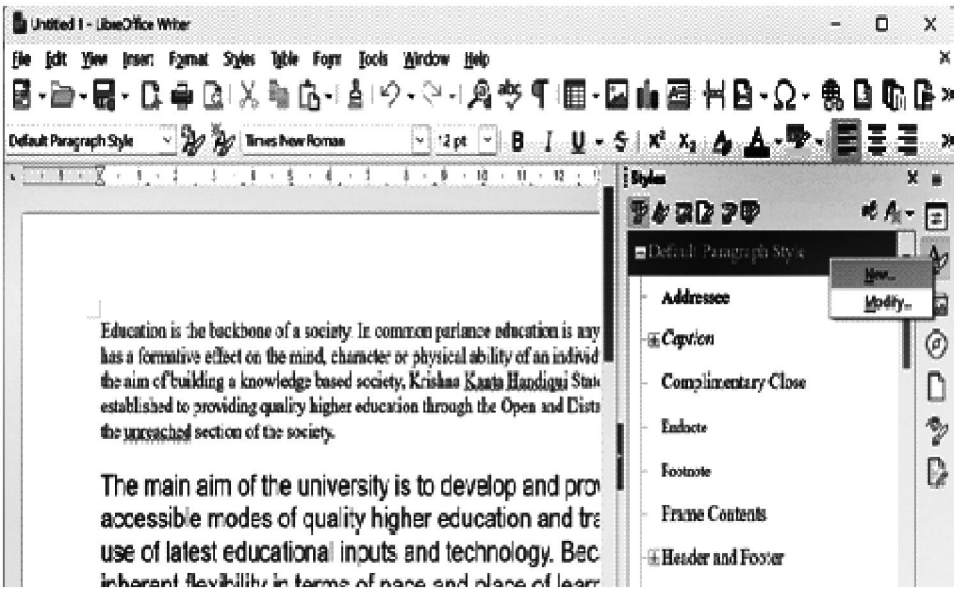
1. Open a new or existing document in Writer.For example, let us open an existing document which contains two paragraphs of different styles as shown below:



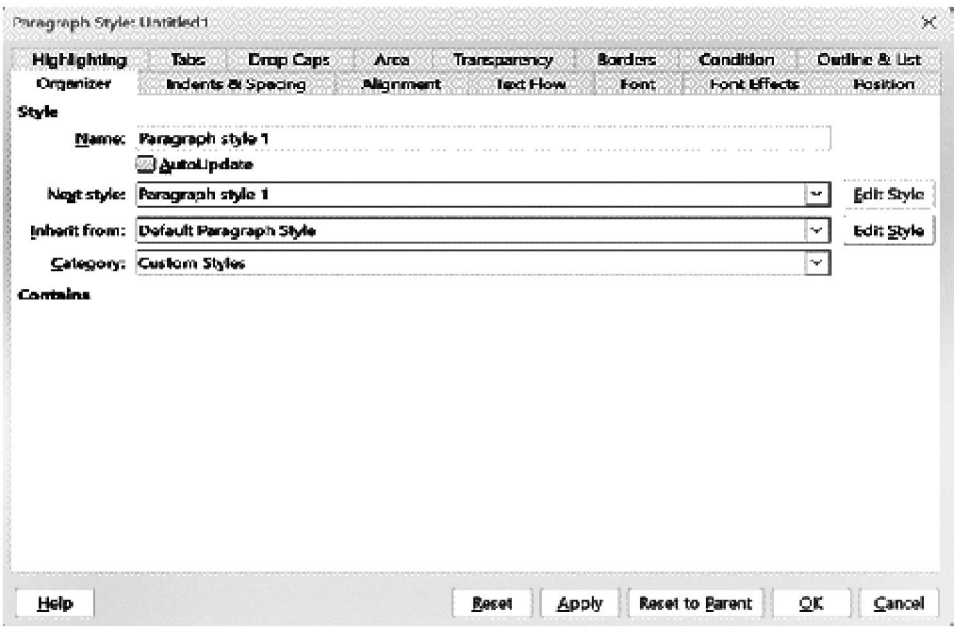

2. Go to “Default Paragraph Styles” > “More Styles” option (as shown below).

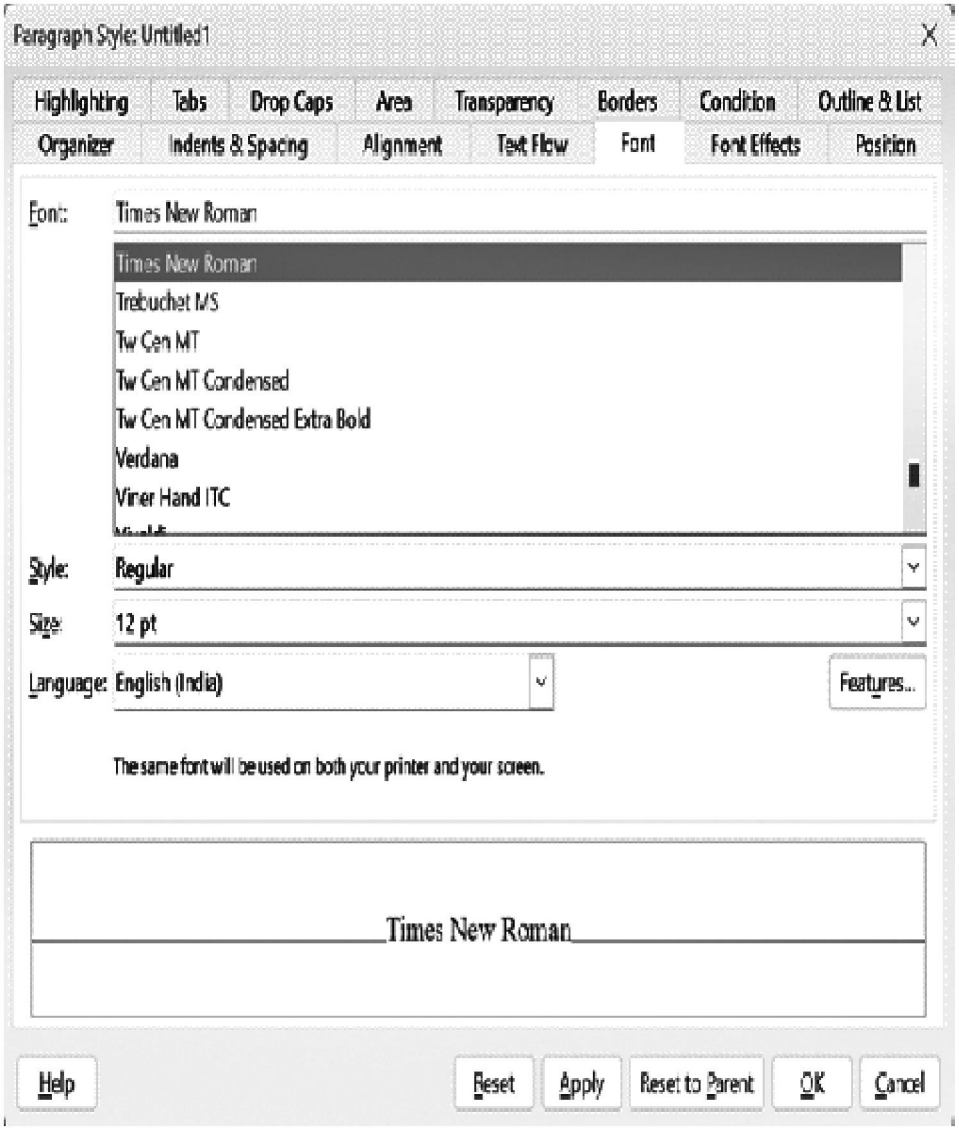


A Styles sidebar will appear in the right side of the document (as shown below).



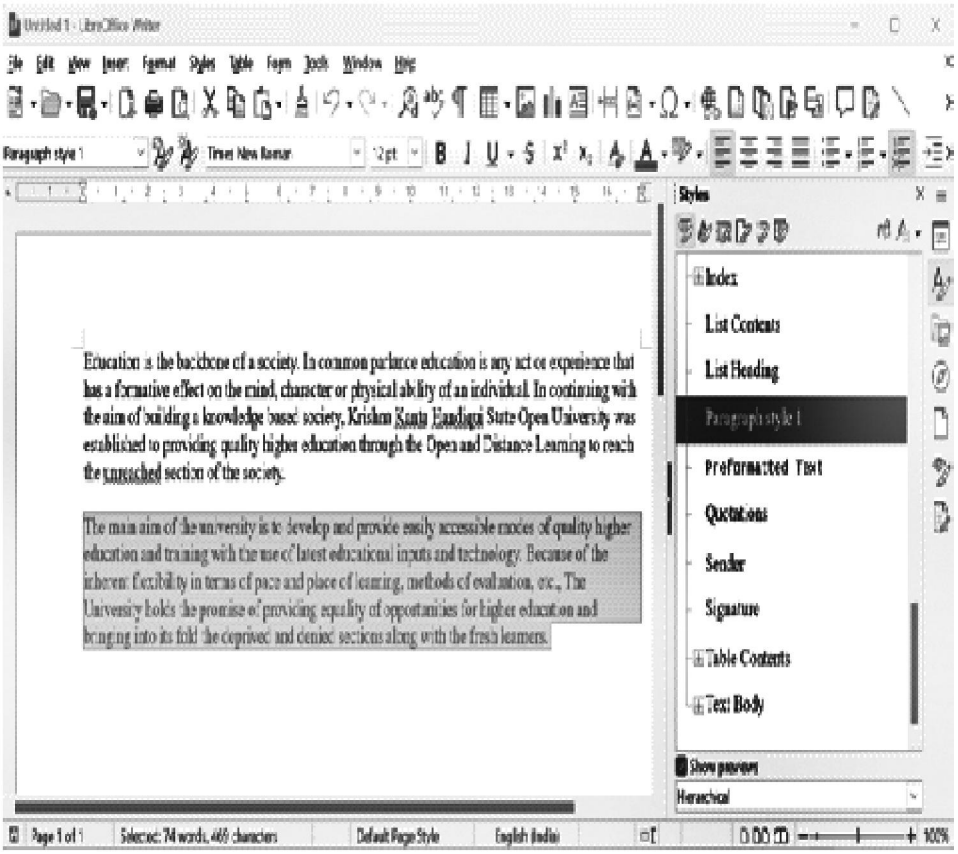

3. Right-click over the “Default Paragraph Styles” and select “New”.
4. In the Paragraph Style dialog box, give your new style a name, and then make any changes to the settings that you want to apply to the style, such as font, alignment, line spacing, or indentation. You can also choose to base your new style on an existing style by selecting it from the list of styles. (as shown below)






5. Click “Apply” and then “OK” to save your new paragraph style.

Your new style will now appear in the list of paragraph styles in the Styles and Formatting window. You can apply the style to any paragraph in your document by selecting the paragraph and then clicking on the style in the list. Let us change the second paragraph to this new style. For this, select the second paragraph in the document, then double click over the new paragraph style just created. The two paragraph styles will now be same.




You can also modify or delete the style by right-clicking on it and selecting Modify or Delete.

## 9.5.3 Modifying a Paragraph Style

To modify a paragraph style in LibreOffice Writer, follow these steps:

1. Open the document in which you want to modify the paragraph style.
2. Select the text whose paragraph style you want to modify.
3. Right-click on the selected text and choose “Paragraph” from the context menu.
4. In the Paragraph dialog box, you can modify various parameters such as alignment, line spacing, indentation, and borders.
5. Once you have made the necessary changes, click on the “OK” button to apply the changes to the selected text.
6. To apply the modified paragraph style to other text in the document, select the text and right-click on it. Choose “Styles” from the context menu and then select the modified paragraph style from the list of styles.

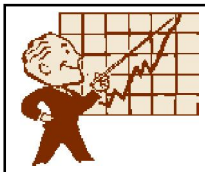
7. If you want to save the modified paragraph style as a new style, click on the “New Style” button in the Paragraph dialog box. Give a name to the new style and click on the “OK” button to save it.

By following these steps, you can easily modify a paragraph style in LibreOffice Writer.

## 9.5.4 Applying Paragraph Styles to Text

To apply paragraph styles to text in LibreOffice Writer, follow these steps:

1. First, select the text that you want to apply a style to.
2. Next, click the “Styles” menu.
3. You will see a list of available paragraph styles. Click on the style that you want to apply to the selected text.
4. If the style you want to apply is not listed, you can create a new style by right-clicking on an existing style and selecting “New”. You can then modify the new style to fit your needs.
5. Once you have selected the style you want to apply, the text will be automatically formatted according to the style’s settings.
6. If you want to modify the formatting of a style, you can go to the “Style” menu options again and select “Edit Style” options. This will allow you to change the font, size, color, and other formatting options for the style.



### CHECK YOUR PROGRESS

1. Answer the following questions:

(a) What are document templates in LibreOffice Writer?

(b) How can you create a new template in LibreOffice Writer?

(c) How can you modify an existing template in LibreOffice Writer?

(d) How can you apply a template to a new document in LibreOffice Writer?

(e) What are paragraph styles in LibreOffice Writer?

By using paragraph styles in LibreOffice Writer, you can quickly and easily format your text according to a consistent set of rules, which can save you time and effort when working on larger documents.

## 9.6 MANAGING STYLES IN THE STYLES AND FORMATTING DIALOG BOX

### 9.6.1 Opening the Styles and Formatting Dialog Box

To open the Styles and Formatting dialog box in LibreOffice Writer, there are a few different ways:

1. Method 1: Use the F11 key
   Press the F11 key on your keyboard. This will open the Styles and Formatting dialog box.
2. Method 2: Use the Format menu
   Click on the “Format” menu in the menu bar at the top of the Writer window. From the drop-down menu, select “Styles and Formatting”. This will open the Styles and Formatting dialog box.
3. Method 3: Use the sidebar
   If the sidebar is visible in your Writer window, click on the “Styles and Formatting” icon in the sidebar. This will open the Styles and Formatting dialog box.

Once you have opened the Styles and Formatting dialog box, you can use it to manage styles for your document. You can apply styles to text, modify existing styles, or create new styles.

### 9.6.2 Navigating the Dialog Box

When working with dialog boxes in LibreOffice Writer, you can navigate through the various options and settings using several methods. Here are some common ways to navigate dialog boxes in Writer:

1. Use the Tab key: In most dialog boxes, you can use the Tab key to move between fields and options. Pressing Tab will move the cursor to the next field, and Shift+Tab will move the cursor to the previous field.
2. Use the arrow keys: You can also use the arrow keys to move between fields and options. The up and down arrow keys will move the cursor between options, while the left and right arrow keys will move the cursor within a field.
3. Use the mouse: You can also use the mouse to select options and fields in the dialog box. Clicking on an option or field will select it, and you can then enter text or use the drop-down menus to select options.
4. Use keyboard shortcuts: Many dialog boxes have keyboard shortcuts that can be used to quickly navigate between options and fields. These shortcuts can be found in the menu bar or by hovering over the buttons in the dialog box.
5. Use the Enter key: In some dialog boxes, pressing the Enter key will select the current option and close the dialog box. This can be useful for quickly making changes without having to navigate through all the options.

By using these methods to navigate through dialog boxes in LibreOffice Writer, you can quickly and easily make changes to your documents and settings.

### 9.6.3 Managing Styles in the Dialog Box

To manage styles in the dialog box in LibreOffice Writer, follow these steps:

1. Open the Styles and Formatting window by pressing the F11 key or selecting “Styles” from the “Format” menu.
2. In the Styles and Formatting window, click on the “Manage Styles” button at the bottom of the window. This will open the “Organizer” dialog box.

3. In the Organizer dialog box, you can manage the styles in several ways:
4. To create a new style, click on the “New” button at the bottom of the window. This will open the “New Style” dialog box, where you can specify the properties of the new style.
5. To modify an existing style, select the style in the list on the left-hand side of the window and click on the “Modify” button. This will open the “Modify Style” dialog box, where you can change the properties of the style.
6. To delete a style, select the style in the list and click on the “Delete” button. Note that you cannot delete built-in styles.
7. To rename a style, select the style in the list and click on the “Rename” button. Enter the new name for the style in the dialog box that appears.
8. To import styles from another document or template, click on the “Import” button and select the document or template that contains the styles you want to import.
9. To export styles to another document or template, select the styles you want to export and click on the “Export” button. Save the styles as a separate document or template.

Once you have made any necessary changes to the styles, click on the “OK” button to close the Organizer dialog box and return to the Styles and Formatting window.

By managing styles in the dialog box, you can more easily create and modify styles in LibreOffice Writer. This can help you to create documents with a consistent and professional appearance.



## 9.7 LET US SUM UP

- Document templates in LibreOffice Writer are pre-designed formats that include page layout, font styles, header and footer, and other design elements to create a professional-looking document.

- These templates can save time and effort by providing a starting point for creating a new document.
- LibreOffice Writer comes with built-in templates, and you can also create your own custom templates.
- To create a new template, you can start with a blank document or an existing document and customize it to suit your needs.
- You can modify an existing template by opening it in LibreOffice Writer, making the necessary changes, and saving it as a new template.
- To use a template, you can select it from the “Templates” option under the “New” menu or from the “Template Manager” dialog box.
- LibreOffice Writer uses paragraph styles to apply consistent formatting to a group of paragraphs, including font, font size, line spacing, indentation, and alignment.
- Paragraph styles can be applied using the Styles and Formatting dialog or the sidebar, and existing styles can be modified or new ones created.
- Modifying a paragraph style can be done through the Paragraph dialog box, and the modified style can be saved as a new style.
- Applying paragraph styles to text is a simple process of selecting the text and choosing the appropriate style from the Styles and Formatting window.



## 9.8 ANSWERS TO CHECK YOUR PROGRESS

**Ans.to.Q.No.1:**

(a) Document templates are pre-designed formats that can be used to create new documents in LibreOffice Writer.

(b) To create a new template in LibreOffice Writer, you can customize a new or existing document and then click on “File” > “Templates” > “Save as Template.”

(c) To modify an existing template in LibreOffice Writer, you can select the template from the “Template Manager” dialog box, click on “Edit,” make the necessary changes, and then save the modified template.

(d) To apply a template to a new document in LibreOffice Writer, you can click on “File” > “New” > “Templates,” select the template category, choose the desired template, and then click on “Create.”

(e) Paragraph styles are a way to apply consistent formatting to multiple paragraphs in LibreOffice Writer.



## 9.9 FURTHER READING

1) “Getting Started with LibreOffice Writer,” The Document Foundation, accessed March 11, 2023 https://documentation.libreoffice.org/en/english-documentation/getting-started-writer/.
2) “LibreOffice Writer Guide,” The Document Foundation, accessed March 11, 2023, https://documentation.libreoffice.org/en/english-documentation/writer-guide/.
3) “LibreOffice Writer Tutorial,” Tutorials Point, accessed March 11, 2023, https://www.tutorialspoint.com/libreoffice/libreoffice_writer_tutorial.htm.



## 9.10 MODEL QUESTIONS

**Q.1:** What are document templates, and how can they be useful in LibreOffice Writer?

**Q.2:** How can you create a new template in LibreOffice Writer, and what steps are involved in the process?

**Q.3:** Can you modify an existing template in LibreOffice Writer? If so, how can you do it?

**Q.4:** What is the procedure for saving and using templates in LibreOffice Writer?

**Q.5:** How can you apply a template to a new document in LibreOffice Writer, and what are the steps involved in the process?

**Q.6:** Can you customize a document template in LibreOffice Writer, and if yes, what kind of modifications can you make?

**Q.7:** What are paragraph styles in LibreOffice Writer and how can they be useful in formatting a document?

**Q.8:** Can you explain the process of creating a new paragraph style in LibreOffice Writer?

**Q.9:** How can you modify an existing paragraph style in LibreOffice Writer?

**Q.10:** What are character styles in LibreOffice Writer and how do they differ from paragraph styles?

*****

# UNIT 10: FORMATTING DOCUMENTS IN WRITER

## UNIT STRUCTURE


10.1 Learning Objectives

10.2 Introduction

10.3 Inserting and Formatting Images

- 10.3.1 Adding images
- 10.3.2 Resizing images
- 10.3.3 Wrapping text around images
- 10.3.4 Applying image effects

10.4 Adding and Formatting Tables

- 10.4.1 Creating tables
- 10.4.4 Merging and splitting cells

10.5 Applying Advanced Formatting Options

- 10.5.1 Adding page borders
- 10.5.2 Applying page backgrounds

10.6 Using Writer's Built-in Tools for Checking and Translation

- 10.6.1 Spell-checking and autocorrect
- 10.6.2 Thesaurus and word completion

10.7 Let Us Sum Up

10.8 Answers to Check Your Progress

10.9 Further Reading

10.10 Model Questions


## 10.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- add images to a Writer document
- resize images to fit your document's layout
- wrap text around images to create an aesthetically pleasing design
- apply image effects such as brightness, contrast, and transparency
- create tables and add rows and columns to organize your content
- format table cells to adjust their appearance and alignment

- merge and split table cells as necessary
- apply table styles to improve the overall look of your tables
- add page borders, columns, and backgrounds to your document for advanced formatting options
- work with templates to save time and streamline your document creation process
- utilize Writer's built-in tools such as spell-checking, grammar-checking, thesaurus and word completion, and language translation to improve the quality of your writing.

## 10.2 INTRODUCTION

In Writer, LibreOffice's word processing software, you can enhance your documents by adding images and tables, as well as applying advanced formatting options. In this section, we will explore how to insert and format images, including resizing, wrapping text around images, and applying image effects. Additionally, we will learn how to create and format tables, including adding rows and columns, merging and splitting cells, and applying table styles. Finally, we will delve into advanced formatting options such as adding page borders, using columns, applying page backgrounds, and working with templates. To further improve your document's quality, Writer also provides built-in tools for checking spelling, grammar, thesaurus and word completion, and even language translation.

## 10.3 INSERTING AND FORMATTING IMAGES

### 10.3.1 Adding images

Here is a step-by-step procedure to add images to your LibreOffice Writer document:

1. Open the LibreOffice Writer document in which you want to add an image.
2. Click on the location in the document where you want to insert the image.

3. Click on the “Insert” tab in the menu bar at the top of the screen.
4. Click on the “Image” option from the drop-down menu.
5. In the “Insert Image” dialog box that appears, navigate to the folder where the image you want to insert is located.
6. Click on the image file to select it and then click on the “Open” button.
7. The “Insert Image” dialog box will reappear, showing a preview of the image you have selected. You can adjust the settings for the image, such as size and position, using the options available.
8. Once you have made the desired adjustments, click on the “Insert” button to insert the image into your document.
9. You can then move and resize the image as necessary by clicking and dragging it to the desired location and dragging its edges to adjust its size.
10. To apply image effects, such as brightness, contrast, and transparency, select the image and click on the “Image” tab in the sidebar that appears. Here, you will find options to adjust the image’s color, position, size, and more.

When you are finished working with the image, save your document by clicking on “File” in the menu bar and selecting “Save” or “Save As.”

### 10.3.2 Resizing images

Here is the step-by-step procedure to resize images in LibreOffice Writer:

1. Open the LibreOffice Writer document that contains the image you want to resize.
2. Click on the image to select it. You should see small boxes or handles around the image, indicating that it is selected.
3. To resize the image, hover your mouse over one of the handles until it changes to a double-headed arrow. Click and hold the mouse button, then drag the handle to adjust the size of the image.

4. As you resize the image, you may notice that its aspect ratio changes. To maintain the original aspect ratio, hold down the Shift key while dragging the handle.
5. You can also adjust the size of the image by right-clicking on it and selecting “Picture” from the context menu. In the Picture dialog box, go to the “Type” tab and adjust the values in the “Size” section.
6. To further customize the image size, you can use the “Crop” and “Position” tabs in the Picture dialog box. The “Crop” tab allows you to trim the edges of the image, while the “Position” tab lets you adjust the image’s position within the frame.
7. Once you are satisfied with the image size and positioning, click “OK” to apply the changes.
8. Save your document to ensure that the resized image is saved with the document.

### 10.3.3 Wrapping text around images

Here are the steps to wrap text around images in LibreOffice Writer:

1. Insert the image into your document by clicking on “Insert” in the menu bar and then selecting “Image.”
2. Select the image by clicking on it.
3. Click on the “Wrap” tab in the “Image” dialog box that appears.
4. Choose one of the text wrapping options: “Right,” “Left,” or “Through.” These options allow you to position the image to the left or right of your text or to have the text flow around the image.
5. Adjust the distance between the text and the image by setting the “Spacing” option. You can specify the distance in inches or centimeters.
6. Set the “Anchor” option to determine how the image will be positioned on the page. You can anchor the image to the paragraph, the page, or to a character.
7. Click “OK” to apply the changes.

You can further adjust the image and text wrapping settings by selecting the image and going back to the “Wrap” tab in the “Image” dialog box. Experiment with different options to achieve the desired layout for your document.

### 10.3.4 Applying image effects

1. Open the document in which you want to apply image effects.
2. Insert an image in the document by going to Insert > Image.
3. Once the image is inserted, click on the image to select it.
4. Go to the Format menu and select Image.
5. In the Image dialog box, you will see various tabs such as Type, Crop, Borders, and Effects. Click on the Effects tab.
6. Under the Effects tab, you will see several options for adjusting the image’s brightness, contrast, and transparency.
7. To adjust the brightness, move the slider to the left to decrease the brightness or to the right to increase the brightness.
8. To adjust the contrast, move the slider to the left to decrease the contrast or to the right to increase the contrast.
9. To adjust the transparency, move the slider to the left to decrease the opacity or to the right to increase the opacity.
10. You can also choose to apply a color filter to the image. To do so, select the desired color from the drop-down menu under the Color Filter section.
11. Once you have adjusted the image effects to your liking, click OK to apply the changes.
12. Save the document to ensure that the image effects are retained.

By following these steps, you can easily apply image effects to your images in LibreOffice Writer.

# 10.4 ADDING AND FORMATTING TABLES

## 10.4.1 Creating tables

Here's a step-by-step procedure to create a table in LibreOffice Writer:

1. Open a new or existing document in LibreOffice Writer.
2. Place the cursor where you want to insert the table.
3. Click on the "Table" menu in the top menu bar.
4. Select "Insert Table" from the drop-down menu and click on it.
5. In the "Insert Table" dialog box, specify the number of rows and columns you want in the table.
6. Select a style for the table.
7. Click "Insert" to insert the table into your document.
8. Your cursor will now be in the top-left cell of the table, allowing you to begin entering data.
9. To add rows or columns to the table, right-click anywhere within the table and select "Insert" from the context menu. From there, you can choose to insert a row above or below the current row, or a column to the left or right of the current column.
10. To format the table, you can change the font, text alignment, cell borders, and more using the formatting options in the top menu bar or by right-clicking within the table and selecting "Table Properties" from the context menu.

## 10.4.2 Merging and splitting cells

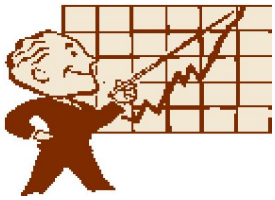
Merging Cells:

1. Open your Writer document and locate the table that you want to edit.
2. Select the cells that you want to merge by clicking and dragging the mouse over them.

3. Right-click on the selected cells and click “Merge Cells” from the dropdown menu.
4. The selected cells will now be merged into one cell.

**Splitting Cells:**

1. Open your Writer document and locate the table that you want to edit.
2. Place the cursor inside the cell that you want to split.
3. Right-click on the cell and click “Split Cells” from the dropdown menu.
4. In the “Split Cells” dialog box, specify the number of rows and columns you want to split the cell into.



## CHECK YOUR PROGRESS

1. Write short answers of the followings:

(a) How do you add an image to a LibreOffice Writer document?

(b) How do you resize an image in LibreOffice Writer?

(c) How do you wrap text around an image in LibreOffice Writer?

(d) Can you adjust the size and position of an image in LibreOffice Writer?

(e) What is the purpose of the “Wrap” tab in the “Image” dialog box?

(f) What is the “Effects” tab in the “Image” dialog box used for? Click “OK” to split the cell into the specified number of rows and columns.

## 10.5 APPLYING ADVANCED FORMATTING OPTIONS

### 10.5.1 Adding page borders

1. Open your document in LibreOffice Writer.
2. Click on the “Format” menu in the top menu bar.
3. Select “Page Styles” from the dropdown menu.
4. In the Page Style dialog box, click on the Borders tab.

5. Choose the type of border you want from the dropdown list of border styles.
6. Choose the line style, color, and width of the border by clicking on the corresponding buttons.
7. Select the desired border spacing from the dropdown list.
8. Once you are satisfied with your border settings, click on the OK and then Apply button to apply the border to your document.

### 10.5.2 Applying page backgrounds

To apply page backgrounds in LibreOffice Writer, follow these steps:

1. Open your Writer document and go to the page where you want to add a background.
2. Click on the “Format” menu in the menu bar and select “Page Style”.
3. In the “Page Style” dialog box that appears, click on the “Area” tab.
4. Choose your option
5. Once you have selected your background type and made any necessary adjustments, click “OK” to apply the background to your page.

Your page background should now be visible in your document. You can repeat these steps to add a background to any other pages in your document as needed.

## 10.6 USING WRITER’S BUILT-IN TOOLS FOR CHECKING AND TRANSLATION

### 10.6.1 Spell-checking and autocorrect

Here is a step-by-step procedure to use spell-checking and autocorrect in LibreOffice Writer:

1. Open the document you want to spell-check in LibreOffice Writer.
2. Click on the ‘Tools’ menu in the top menu bar.

3. Select 'Spelling' from the drop-down menu.
4. The spell-checker will start scanning your document from the beginning, highlighting any misspelled words or grammar errors as it goes. Suggestions for corrections will appear in a pop-up window.
5. To correct an error, select the suggested word from the pop-up window and click 'Correct'. Alternatively, you can choose to ignore the error by clicking 'Ignore Once' or 'Ignore All'.
6. If a suggested correction is not suitable, you can edit the word directly in the document or add it to the dictionary by clicking 'Add to Dictionary'.
7. If you want LibreOffice Writer to automatically correct certain errors for you, click on the 'Tools' menu again and select 'Automatic Spell Checking" Option.
8. Click 'OK' to save your changes and close the AutoCorrect dialog box.
9. When you're finished spell-checking your document, click 'Close' in the 'Spelling' dialog box to close it.

By following these steps, you can quickly and easily check your document for spelling and grammar errors and set up autocorrect options to save time and improve the quality of your writing.

### 10.6.2 Thesaurus and word completion

Here is the step-by-step procedure to use the Thesaurus and word completion features in LibreOffice Writer:

Thesaurus:

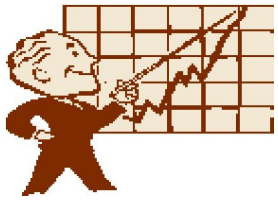
1. Open the LibreOffice Writer document.
2. Select the word that you want to look up synonyms for.
3. Click on the "Tools" menu from the top menu bar and select "Thesaurus".
4. A new dialog box will appear that will display a list of synonyms for

the selected word. You can choose any word from the list and click "Replace" to replace the original word with the new one.

Word Completion:

1. Open the LibreOffice Writer document.
2. Start typing a word that you want to complete.
3. Click on the "Tools" menu from the top menu bar and select "AutoCorrect Options."
4. In the "AutOnce word completion is enabled, you can start using it by typing a word. As you type, LibreOffice Writer will suggest words that match what you have typed so far. You can press Tab to accept the suggestion, or keep typing to see other suggestions.
5. You can also use the arrow keys to move through the list of suggestions. To insert a suggested word without accepting it, press the Spacebar.

Once word completion is enabled, you can start using it by typing a word. As you type, LibreOffice Writer will suggest words that match what you have typed so far. You can press Tab to accept the suggestion, or keep typing to see other suggestions.You can also use the arrow keys to move through the list of suggestions. To insert a suggested word without accepting it, press the Spacebar.To disable word completion, follow the same steps as above, but uncheck the Enable Word Completion checkbox.



## CHECK YOUR PROGRESS

2. Fill in the blanks:

(a) To apply page backgrounds in LibreOffice Writer, go to the _____ where you want to add a background.

(b) The spell-checker in LibreOffice Writer will highlight any misspelled words or grammar errors and suggest corrections in a _____ window.

(c) To use the Thesaurus feature in LibreOffice Writer, select the word you want to look up _____ for.

(d) To enable word completion in LibreOffice Writer, go to the "AutoCorrect" tab in the "AutoCorrect Options" dialog box and make sure that the "Enable word completion" option is _____.

These features can help you to save time and improve the quality of your writing by providing you with synonyms and completing words for you as you type.



## 10.7 LET US SUM UP

- LibreOffice Writer is a popular word processing software that allows users to add and format images in their documents.
- Users can insert images in a Writer document by clicking on the "Insert" tab and selecting "Image" from the drop-down menu.
- The image can be resized by dragging the handles or by adjusting the values in the "Size" section of the Picture dialog box.
- Users can wrap text around images by selecting the image and going to the "Wrap" tab in the "Image" dialog box.
- The "Effects" tab in the "Image" dialog box allows users to adjust the brightness, contrast, transparency, and color filter of an image.
- Images can be anchored to a paragraph, page, or character by adjusting the "Anchor" option in the "Wrap" tab.
- The "Crop" tab in the "Picture" dialog box allows users to trim the edges of the image.
- The "Position" tab in the "Picture" dialog box allows users to adjust the image's position within the frame.
- Users can adjust the spacing between the text and image by setting the "Spacing" option in the "Wrap" tab.
- Once the desired adjustments have been made to the image, users can save their document to ensure that the changes are retained.

## 10.8 ANSWERS TO CHECK YOUR PROGRESS

**Ans.to.Q.No.1:**

**(a)** Click on the "Insert" tab in the menu bar, select "Image," navigate to the folder where the image is located, select the image file, and click "Open."

**(b)** Click on the image to select it and drag the handles to adjust its size. Hold down the Shift key to maintain the original aspect ratio.

**(c)** Insert the image, select it, click on the "Wrap" tab in the "Image" dialog box, choose a wrapping option, adjust the spacing, and set the anchor.

**(d)** Yes, by dragging the image and adjusting its settings in the "Image" dialog box.

**(e)** It allows you to adjust how text flows around the inserted image.

**(f)** It is used to adjust the brightness, contrast, transparency, and color filter of an image.

**Ans.to.Q.No.2.**

(a) page (b) pop-up (c) synonyms (d) selected

## 10.9 FURTHER READING

1) "Getting Started with LibreOffice Writer," The Document Foundation, accessed March 11, 2023, https://documentation.libreoffice.org/en/english-documentation/getting-started-writer/.

2) "LibreOffice Writer Guide," The Document Foundation, accessed March 11, 2023, https://documentation.libreoffice.org/en/english-documentation/writer-guide/.

3) "LibreOffice Writer Tutorial," Tutorials Point, accessed March 11, 2023, https://www.tutorialspoint.com/libreoffice/libreoffice_writer_tutorial.htm.



## 10.10 MODEL QUESTIONS

1. How do you add an image to a LibreOffice Writer document?
2. What is the purpose of the “Wrap” tab in the “Image” dialog box in LibreOffice Writer?
3. How do you resize an image in LibreOffice Writer?
4. What options are available for text wrapping around an image in LibreOffice Writer?
5. Can you adjust the brightness and contrast of an image in LibreOffice Writer? If so, how?
6. How do you adjust the transparency of an image in LibreOffice Writer?
7. What is the purpose of the “Crop” and “Position” tabs in the Picture dialog box in LibreOffice Writer?
8. How can you apply a color filter to an image in LibreOffice Writer?
9. Can you apply image effects to multiple images at once in LibreOffice Writer?
10. How do you save a document to ensure that the resized image and image effects are retained in LibreOffice Writer?

******

# UNIT 11: INTRODUCTION TO CALC

## UNIT STRUCTURE

11.1 Learning Objectives
11.2 Introduction
11.3 Overview of Calc and its features as a spreadsheet program
11.4 Launching Calc and creating a new spreadsheet
11.5 Navigating the Calc interface and understanding the different components of the worksheet window
11.6 Entering and formatting data
11.7 Applying cell formatting
11.8 Let us Sum Up
11.9 Answers to Check Your Progress
11.10 Further Reading
11.11 Model Questions

## 11.1 LEARNING OBJECTIVES

After going through this unit, a learner will be able to :

- explore the LibreOffice calc
- create a spreadsheet using calc
- explore the ways to enter and format data in calc
- practice formatting of data and cells in calc

## 11.2 INTRODUCTION

LibreOffice Calc is a robust spreadsheet programme that is available for free and may be used for a variety of data processing activities. Calc is a fantastic alternative to proprietary spreadsheet software because to its simple user interface and wealth of functionality. In this post, we'll examine some of LibreOffice Calc's most useful capabilities and how they may be applied to efficient data management and analysis.

## 11.3 OVERVIEW OF CALC AND ITS FEATURES AS A SPREADSHEET PROGRAM

One of the most widely used spreadsheet programmes accessible today is Calc, an open-source spreadsheet programme created by the Apache OpenOffice project. It offers users a robust range of functions for managing and analysing data, making it an indispensable tool for organisations, people, and students.

Calc allows users to create and edit spreadsheets, perform calculations, and analyse data in various formats. Here are some of its key features:

- **Spreadsheet Creation and Editing:** Spreadsheets can be readily created, edited, and formatted with Calc. Cells, rows, and columns may be added, removed, or moved by users. Calc also offers a number of templates for typical spreadsheets including budget sheets, calendars, and invoicing.
- **Calculation and Formulas:** Calc provides a wide range of mathematical and financial functions that enable users to perform complex calculations on their data. It supports a range of operators, including arithmetic, comparison, and logical operators. Users can create complex formulas using functions and operators to perform calculations on their data.
- **Data Analysis:** A variety of tools are available in Calc to assist users in data analysis. Data can be sorted and filtered by users, pivot tables can be made, and the DataPilot function can be used to build sophisticated data analysis models. Moreover, Calc supports a number of chart types, enabling users to rapidly and simply visualise their data.
- **Compatibility:** Calc is compatible with Microsoft Excel, which means users can open, edit, and save Excel files using Calc. This makes it easy to share files with others who use Excel.
- **Collaboration:** Calc supports collaboration features that enable users to work together on a spreadsheet. Users can share their spreadsheets with others and track changes made by different

users. Additionally, Calc supports a range of file formats, making it easy to exchange files with other spreadsheet programs.

- **Macros:** Calc allows users to create macros, which are sets of instructions that automate repetitive tasks. Users can create macros using Calc's built-in macro recorder or write macros using a programming language called OpenOffice Basic.

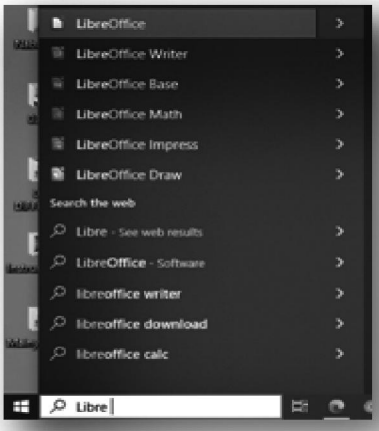
Calc is a robust and adaptable spreadsheet tool that offers a number of functions for data management and analysis. It is the perfect solution for businesses and individuals who need to use spreadsheets because of its interoperability with Microsoft Excel and collaborative features. Calc offers the tools you need to complete the task, whether you're making a budget, evaluating data, or working with colleagues.

## 11.4 LAUNCHING CALC AND CREATING A NEW SPREADSHEET

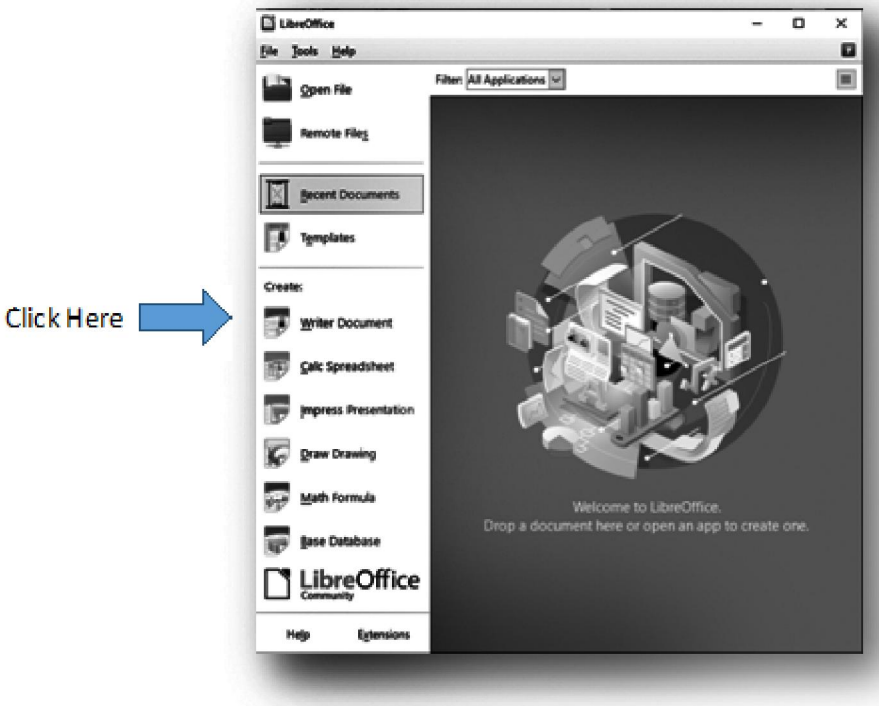
LibreOffice Calc is a free and open-source spreadsheet program that allows users to create and edit spreadsheets. It is part of the LibreOffice suite, which is available for Windows, macOS, and Linux. Here are the steps to launch LibreOffice Calc and create a new spreadsheet:

1. **Launch LibreOffice:** To launch LibreOffice, you can either click on the LibreOffice shortcut on your desktop or open the Start menu and search for LibreOffice. Click on the LibreOffice icon to launch the program.

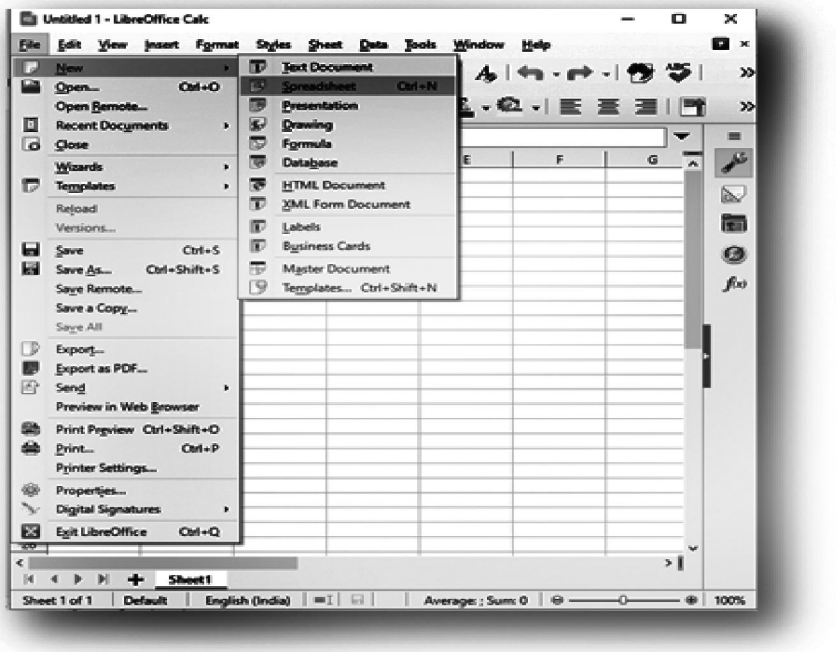


2. **Open Calc:** Once LibreOffice is open, click on the Calc Spreadsheet




3. **Create a new spreadsheet:** To create a new spreadsheet, click on the File menu and select New > Spreadsheet. Alternatively, you can press the shortcut key Ctrl+N to create a new spreadsheet.

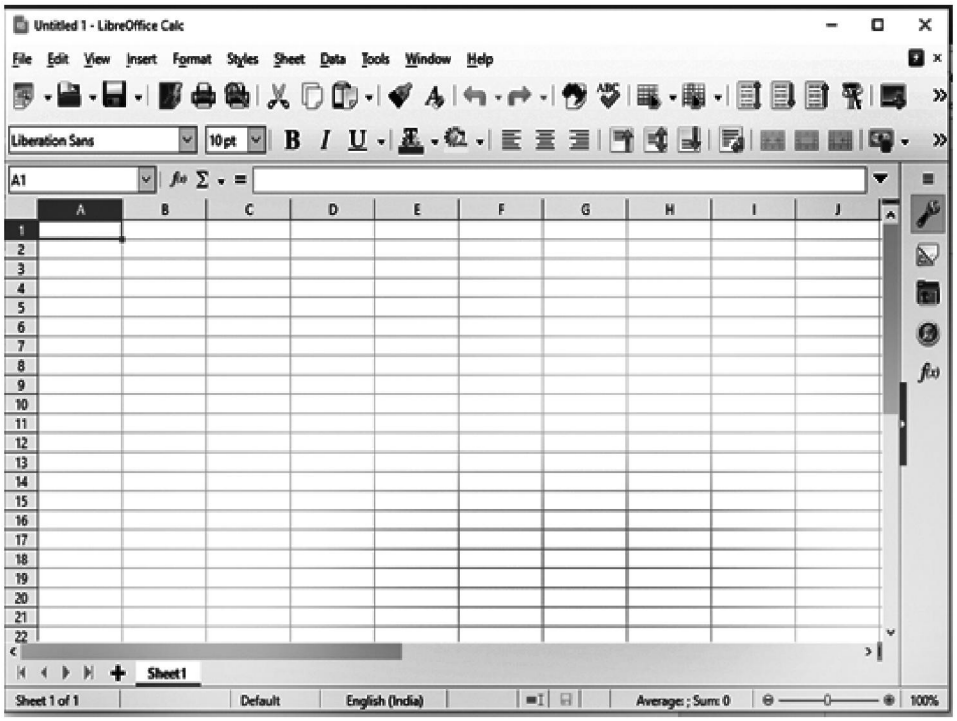


4. **Customize the spreadsheet:** Once you've created a new spreadsheet, you can customize it by adding or removing rows and columns, changing the font size and style, and changing the background color. You can also add borders and shading to cells, merge cells, and add conditional formatting.
5. **Add data:** To add data to your spreadsheet, simply click on a cell and start typing. You can also copy and paste data from other sources, such as a website or another spreadsheet program. Once you've added your data, you can use Calc's calculation and formula functions to perform calculations and analyse your data.
6. **Save the spreadsheet:** To save your spreadsheet, click on the File menu and select Save. You can also use the shortcut key Ctrl+S. Choose a location on your computer to save the spreadsheet, give it a name, and select a file format. Calc supports a range of file formats, including ODS, XLS, and CSV.

## 11.5 NAVIGATING THE CALC INTERFACE AND UNDERSTANDING THE DIFFERENT COMPONENTS OF THE WORKSHEET WINDOW

LibreOffice Calc is a spreadsheet application that allows users to create, edit, and manipulate data in a table format. Navigating the interface of LibreOffice Calc is essential to efficiently work with data in the worksheet window. The following steps will help you navigate the LibreOffice Calc interface and understand its different components.

Let us again open Calc as described above and open a new spreadsheet. Now the spreadsheet window is the primary working area of LibreOffice Calc, where you enter and manipulate data. The worksheet window is divided into several components, which include:




**Title bar:** The Title Bar is located at the very top of the window. On the Title Bar, Calc displays the name of the spreadsheet you are currently using with the application name. At the top of your window, you could see "Untitled 1 -LibreOffice Calc" or a similar name.

**Menu bar:** The menu bar is located at the top of the LibreOffice Calc window and contains a list of commands that you can use to manipulate data in your worksheet.

**Toolbars:** Toolbars are located below the menu bar and contain a set of tools that you can use to perform various tasks.

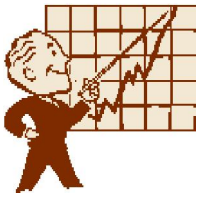
Formula bar: The formula bar is located below the toolbars and displays the contents of the currently selected cell or range of cells.

**Column and row headers:** Columns are labeled with letters from A to Z, and then AA to AZ, BA to BZ, and so on. Rows are labeled with numbers from 1 to 1048576.

**Sheet tabs:** Sheet tabs are located at the bottom of the worksheet window and allow you to switch between different sheets in your workbook.

**Status bar:** The status bar is located at the bottom of the LibreOffice Calc window and displays information about the current status of your worksheet.

1. Navigating the worksheet window: To navigate the worksheet window, you can use the arrow keys on your keyboard or use the scroll bars on the right and bottom of the window to move up, down, left, or right.
2. Selecting cells and ranges: To select a single cell, click on it. To select a range of cells, click and drag the cursor over the cells you want to select, or hold down the Shift key while using the arrow keys to move to the range you want to select.
3. Entering data: To enter data in a cell, click on the cell, and start typing. You can also use the formula bar to enter data by typing it directly into the formula bar.
4. Saving your work: To save your work, click on the File menu and select Save or use the shortcut key Ctrl+S. You can also use the Save As option to save your workbook with a different name or in a different location.



## CHECK YOUR PROGRESS

Choose the correct option

1. What is Calc?

A) A word processing program B) A presentation program

C) A spreadsheet program D) A database program

2. What is the purpose of macros in Calc?

A) To create data charts

B) To automate repetitive tasks

C) To import data from other sources

D) To filter and sort data

3. What is the shortcut key to create a new spreadsheet in LibreOffice Calc?

   A) Ctrl+S B) Ctrl+N

   C) Ctrl+O D) Ctrl+P

4. What is the purpose of the Formula bar in LibreOffice Calc?

   A) To display the contents of the currently selected cell or range of cells

   B) To customize the appearance of cells

   C) To add or remove rows and columns

   D) To save a spreadsheet

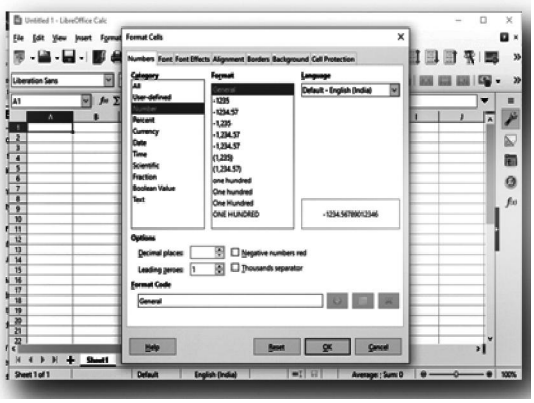
## 11.6 ENTERING AND FORMATTING DATA

Till now we have discussed about how to start LibreOffice Calc and create a new spreadsheet. Now let us discuss the steps involved in Entering and formatting data in LibreOffice Calc.

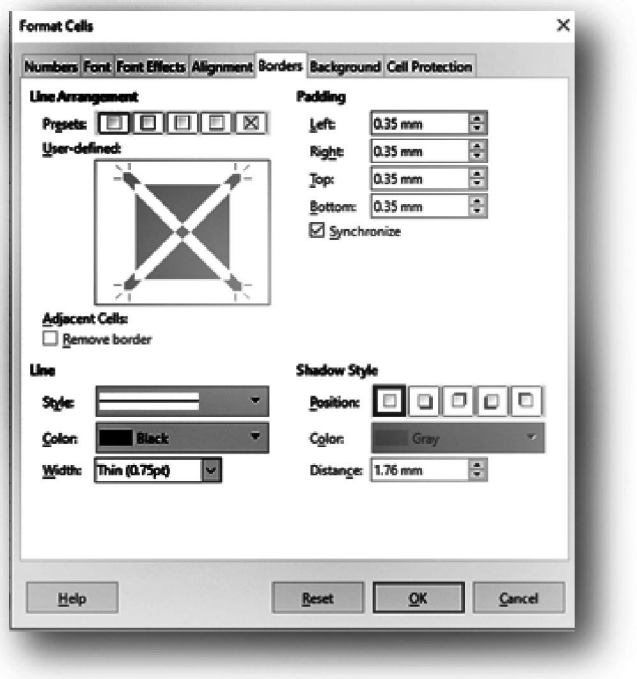
To enter data into a cell, simply click on the cell you want to enter data into and start typing. You can enter text, numbers, dates, and formulas.

**Enter data into cells:** To enter data into a cell, simply click on the cell you want to enter data into and start typing. You can enter text, numbers, dates, and formulas.

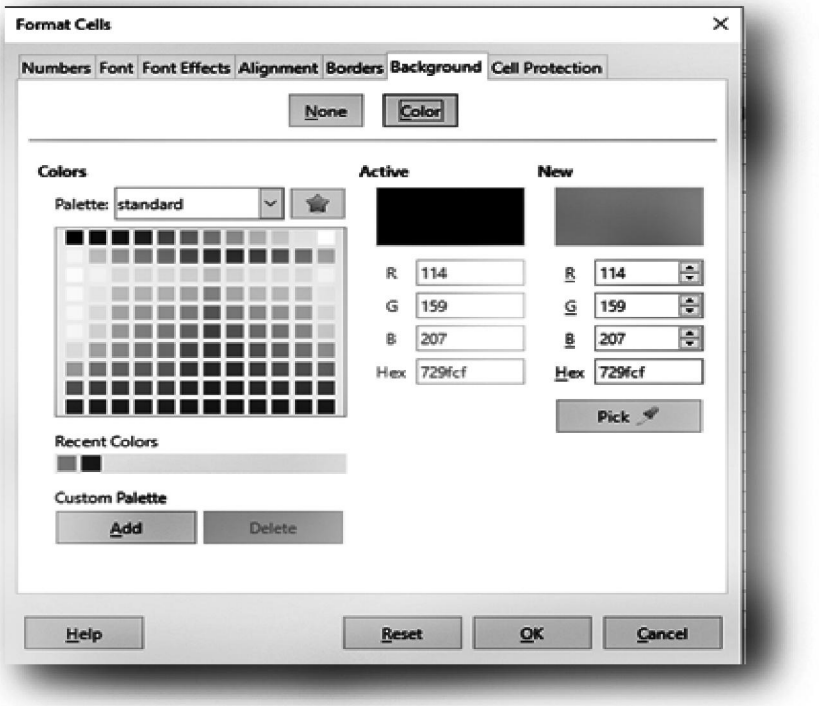
**Format cells:** To format cells, select the cells you want to format by clicking and dragging your mouse over them. Then, right-click and select “Format Cells” from the context menu. This will open the “Format Cells” dialog box, where you can choose the formatting options you want to apply.



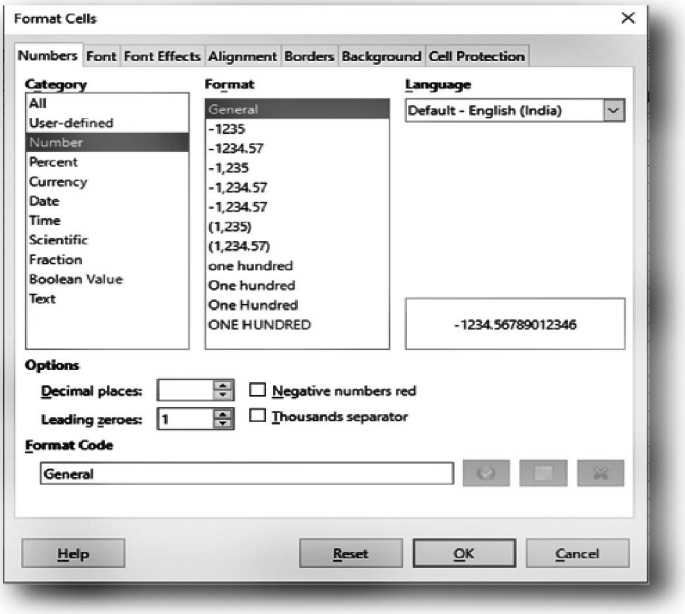
**Apply cell borders:** To apply cell borders, select the cells you want to apply borders to by clicking and dragging your mouse over them. Then, right-click and select “Format Cells” from the context menu. In the “Format Cells” dialog box, select the “Borders” tab and choose the border style you want to apply.




**Apply cell background colour:** To apply a background colour to cells, select the cells you want to apply the background colour to by clicking and dragging your mouse over them. Then, right-click and select “Format Cells” from the context menu. In the “Format Cells” dialog box, select the “Background” tab and choose the background color you want to apply.




**Apply number formatting:** To apply number formatting to cells, select the cells you want to apply number formatting to by clicking and dragging your mouse over them. Then, right-click and select “Format Cells” from the context menu. In the “Format Cells” dialog box, select the “Numbers” tab and choose the number formatting you want to apply.



Save your work: Once you have entered and formatted your data, it is important to save your work. To do this, select “File” > “Save” from the menu and choose a location on your computer to save the spreadsheet.

## 11.7 APPLYING CELL FORMATTING

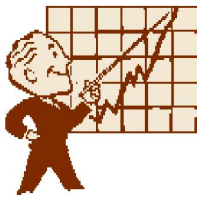
LibreOffice Calc is a powerful spreadsheet program that allows you to apply a variety of cell formatting options to your data. Here are the steps involved in applying cell formatting in LibreOffice Calc:

1. Select the cell(s) you want to format: To apply formatting to a cell, first, you need to select the cell or range of cells you want to format. You can do this by clicking and dragging your mouse over the cells or by clicking on the first cell and then holding down the Shift key while clicking on the last cell in the range.
2. Open the “Format Cells” dialog box: Once you have selected the cell(s) you want to format, right-click on the selected cell(s) and select “Format Cells” from the context menu. Alternatively, you can go to the “Format” menu and select “Cells.”



3. Choose the type of formatting you want to apply: In the “Format Cells” dialog box, you will see several tabs that allow you to choose the type of formatting you want to apply. For example, you can choose to format the cells as numbers, currency, percentages, dates, times, or text. You can also apply different types of alignment, borders, and background colors.
4. Customize the formatting options: Once you have selected the type of formatting you want to apply, you can customize the formatting options to meet your specific needs. For example, you can choose the number of decimal places to display, the currency symbol to use, or the date format o apply.
5. Preview your formatting: As you make changes to your formatting options, you can preview the changes in the “Preview” section of the “Format Cells” dialog box. This allows you to see how your data will look before you apply the formatting.
6. Apply your formatting: Once you are satisfied with the formatting options, click the “OK” button to apply the formatting to your selected cells.

By following these simple steps, you can apply a wide range of formatting options to your data in LibreOffice Calc, making it easy to present your data in a clear and professional manner.



**CHECK YOUR PROGRESS**

Fill-up the gaps for the following

1. To enter data into a cell in LibreOffice Calc, simply click on the cell you want to enter data into and start _____.
2. To format cells in LibreOffice Calc, select the cells you want to format by clicking and dragging your mouse over them. Then, right-click and select “Format Cells” from the _____ menu.
3. To apply cell borders in LibreOffice Calc, select the cells you want to apply borders to by clicking and dragging your mouse over

them. Then, right-click and select “Format Cells” from the context menu. In the “Format Cells” dialog box, select the “Borders” tab and choose the border style you want to _____.

To apply number formatting to cells in LibreOffice Calc, select the cells you want to apply number formatting to by clicking and dragging your mouse over them. Then, right-click and select “Format Cells” from the context menu. In the “Format Cells” dialog box, select the “Numbers” tab and choose the number formatting you want to _____.



## 11.8 LET US SUM UP

- Calc is a versatile and powerful open-source spreadsheet program that provides users with a range of functions for managing and analyzing data, including spreadsheet creation and editing, calculation and formulas, data analysis, compatibility with Microsoft Excel, collaboration features, and macros.
- With its ease of use, robust features, and compatibility with Microsoft Excel, Calc is an essential tool for businesses, individuals, and students who need to create and manage spreadsheets, perform complex calculations, analyze data, and collaborate with others.
- LibreOffice Calc is a free and open-source spreadsheet program that is available for Windows, macOS, and Linux and allows users to create and edit spreadsheets.
- To launch LibreOffice Calc and create a new spreadsheet, users need to open the LibreOffice program, select Calc Spreadsheet, create a new spreadsheet, customize it, add data, and save the file in a chosen file format.
- The LibreOffice Calc interface consists of several components, including the title bar, menu bar, toolbars, formula bar, column and row headers, sheet tabs, and status bar. Navigating and working with data in Calc requires an understanding of these different components.

- To enter and format data in Calc, you can click on a cell to enter data, select cells to apply formatting, and use various formatting options, such as cell borders, background colors, and number formatting. It is important to save your work regularly to avoid losing any changes.
- The steps involved in applying cell formatting in LibreOffice Calc include selecting the cell(s), opening the "Format Cells" dialog box, choosing the type of formatting, customizing the formatting options, previewing the formatting changes, and applying the formatting to the selected cells. By following these steps, users can apply various formatting options to their data in LibreOffice Calc to present it in a clear and professional manner.



## 11.9 ANSWERS TO CHECK YOUR PROGRESS

**Answer to Q No 1:** C) A spreadsheet program

**Answer to Q No 2:** B) To automate repetitive tasks

**Answer to Q No 3:** B) Ctrl+N

**Answer to Q No 4:** A) To display the contents of the currently selected cell or range of cells

**Answer to Q No 5:** Answer: typing

**Answer to Q No 6:** Answer: context

**Answer to Q No 7:** Answer: apply

**Answer to Q No 8:** Answer: apply



## 11.10 FURTHER READING

1. Lowenthal, M. (2015). Calc for dummies. John Wiley & Sons.
2. Starks, C. (2013). LibreOffice Calc Guide. The Document Foundation.



## 11.11 MODEL QUESTIONS

1. What are some of the key features of LibreOffice Calc as a spreadsheet program, and how can they be used for data management and analysis?
2. How can users launch LibreOffice Calc and create a new spreadsheet, and what customization options are available to them?
3. What are the different components of the worksheet window in LibreOffice Calc, and how can users navigate the interface?
4. How does LibreOffice Calc support collaboration among users, and what tools are available for sharing and tracking changes to spreadsheets?
5. How can users automate repetitive tasks in LibreOffice Calc using macros, and what programming language is used to write macros?

** *** **

# UNIT 12: WORKING WITH FUNCTIONS AND FORMULAS IN CALC

**UNIT STRUCTURE**


12.1 Learning Objectives

12.2 Introduction

12.3 Using built-in functions and formulas for common calculations in Calc

12.4 Creating custom functions and formulas for complex calculations

12.5 Using conditional formatting to highlight data based on certain criteria

12.6 Let Us Sum Up

12.7 Answers to Check Your Progress

12.8 Further Reading

12.9 Model Questions


## 12.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- apply the built in function in LibreOffice Calc.
- create custom functions and formulas in LibreOffice Calc
- utilize the conditional formatting facility in Calc

## 12.2 INTRODUCTION

In this unit, we will explore working with functions and formulas in LibreOffice Calc. Calc comes with a variety of built-in functions that allow you to perform common calculations on your data, such as summing a range of cells, finding the average of a range of cells, counting the number of cells with a certain value, and more. In addition to these built-in functions, you can also create custom functions and formulas using the Basic programming language to perform complex calculations. We will also look at how to use conditional formatting to highlight data based on certain criteria.

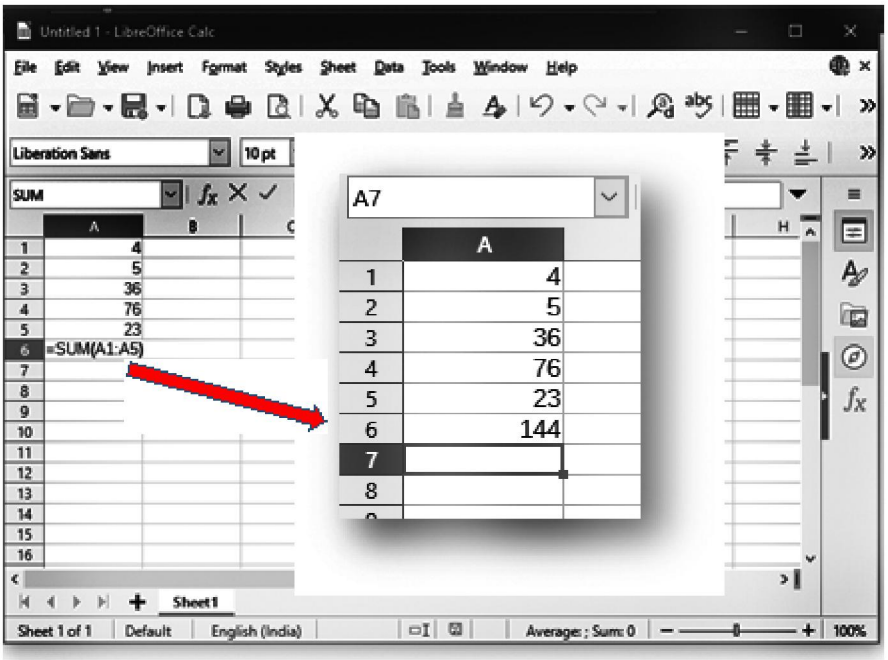
By the end of this unit, you will have a solid understanding of how to work with functions and formulas in Calc to efficiently analyse and manipulate your data.

## 12.3 USING BUILT-IN FUNCTIONS AND FORMULAS FOR COMMON CALCULATIONS IN CALC

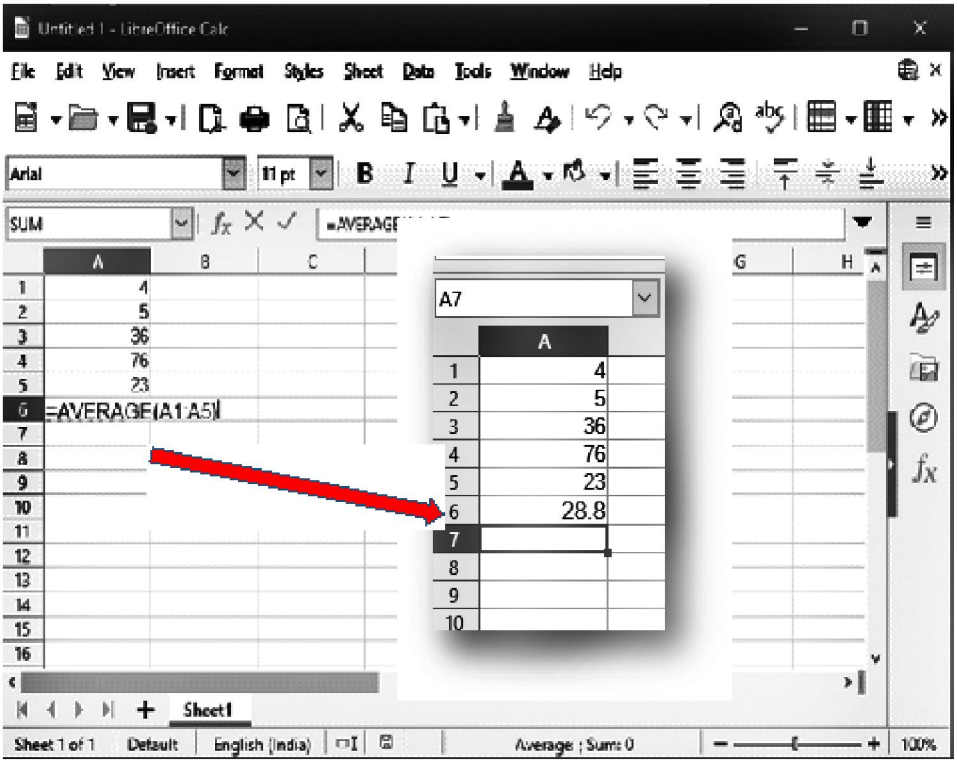
LibreOffice Calc comes with a variety of built-in functions that you can use to perform common calculations on your data. Here is a detailed guide on using built-in functions and formulas for common calculations in LibreOffice Calc, along with examples:

1. Summing a range of cells: One of the most common calculations you may need to perform is adding up a range of cells. You can use the SUM function to do this.

   For example, if you have a list of numbers in cells A1 to A5 and want to calculate their sum, you can use the formula "=SUM(A1:A5)" in another cell. This will add up the values in cells A1 to A5 and display the result in the cell with the formula.

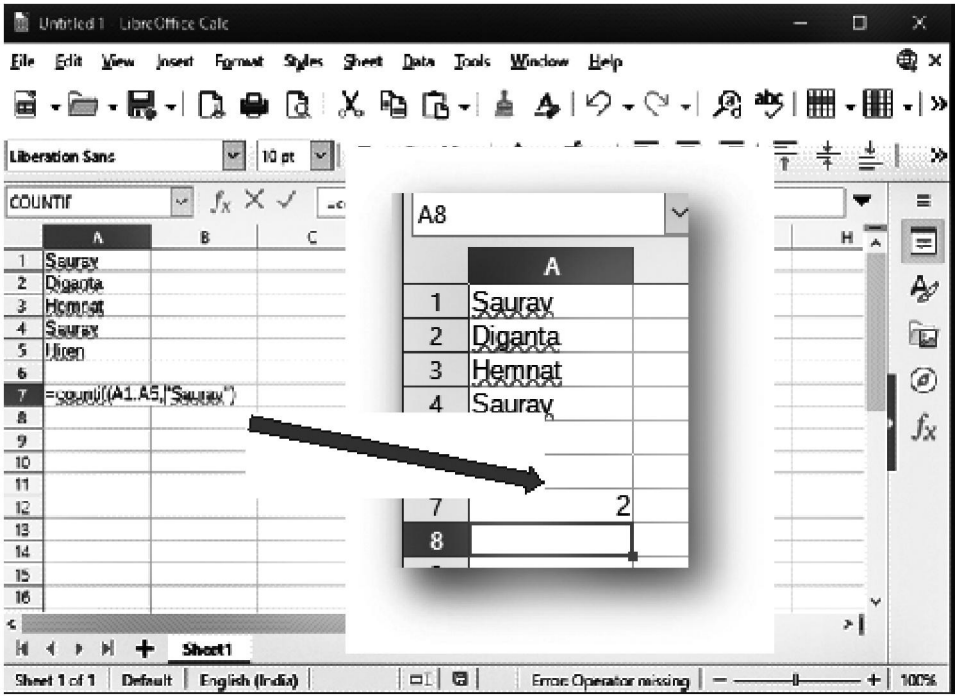


2. Finding the average of a range of cells: If you have a list of numbers and want to find their average, you can use the AVERAGE function. For example, if you have a list of test scores in cells A1 to A5 and want to find their average, you can use the formula "=AVERAGE(A1:A5)" in another cell. This will calculate the average of the values in cells A1 to A5 and display the result in the cell with the formula.




3. Counting the number of cells with a certain value: If you want to count the number of cells in a range that contain a certain value, you can use the COUNTIF function.

For example, if you have a list of names in cells A1 to A5 and want to count the number of cells that contain the name "Saurav," you can use the formula "=COUNTIF(A1:A5,"Saurav")" in another cell. This will count the number of cells in cells A1 to A5 that contain the name "Saurav" and display the result in the cell with the formula.

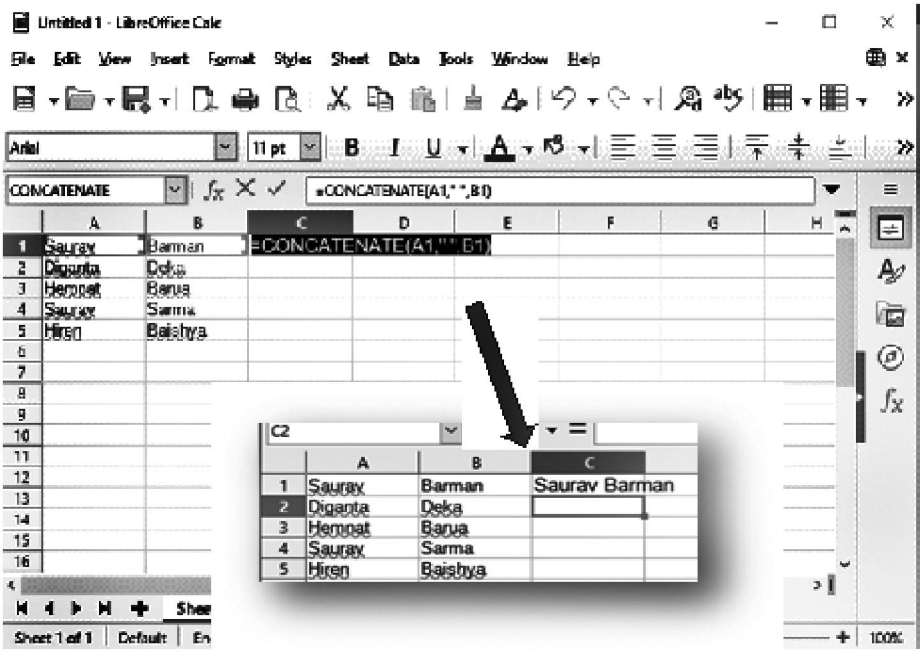



4. Finding the maximum or minimum value in a range of cells: If you want to find the maximum or minimum value in a range of cells, you can use the MAX or MIN function.

   For example, if you have a list of prices in cells A1 to A5 and want to find the highest price, you can use the formula "=MAX(A1:A5)" in another cell. This will find the maximum value in cells A1 to A5 and display the result in the cell with the formula.

5. Concatenating text strings: If you want to combine two or more text strings into one cell, you can use the CONCATENATE function.

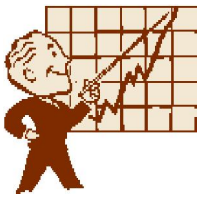
   For example, if you have a first name in cell A1 and a last name in cell B1 and want to combine them into one cell, you can use the formula "=CONCATENATE(A1," ",B1)" in another cell. This will combine the values in cells A1 and B1 with a space in between and display the result in the cell with the formula.




6. Converting between units: If you want to convert a value from one unit to another, you can use the CONVERT function.

For example, if you have a length in inches in cell A1 and want to convert it to centimeters, you can use the formula "=CONVERT(A1,"in","cm")" in another cell. This will convert the value in inches to centimeters and display the result in the cell with the formula.

In conclusion, LibreOffice Calc comes with a wide range of built-in functions and formulas that you can use to perform common calculations on your data. By using these functions and formulas, you can save time and ensure accuracy in your calculations.



## CHECK YOUR PROGRESS

1. What function can you use to find the sum of a range of cells in LibreOffice Calc?

   .....

2. How do you calculate the average of a range of cells in LibreOffice Calc?

   .....

3. What function can you use to find the maximum or minimum value in a range of cells in LibreOffice Calc?

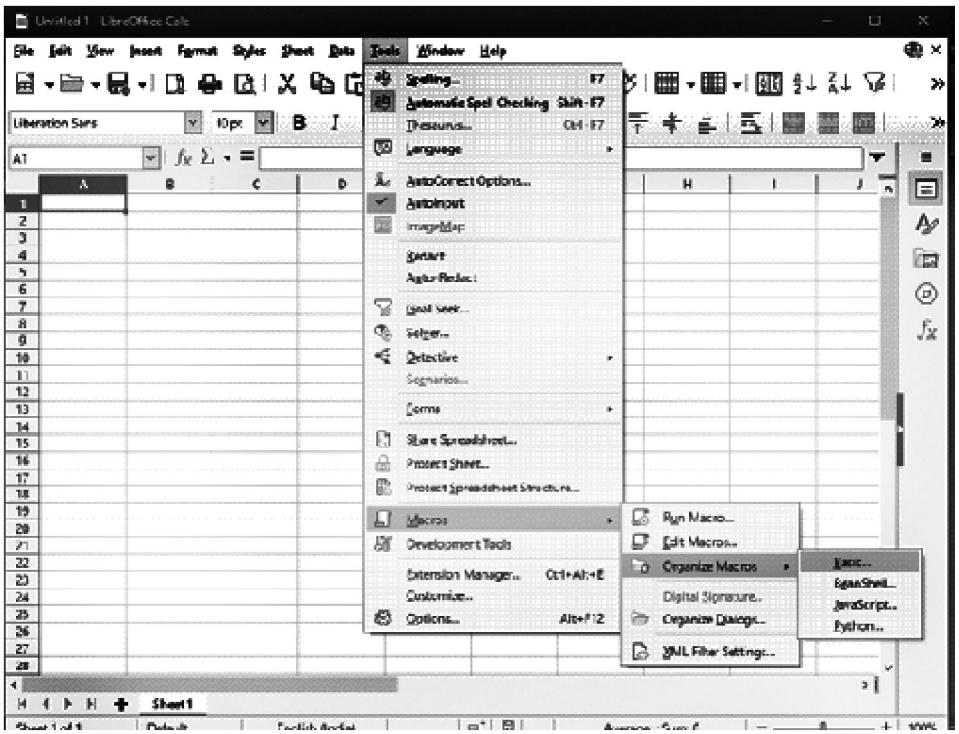
## 12.4 CREATING CUSTOM FUNCTIONS AND FORMULAS FOR COMPLEX CALCULATIONS

LibreOffice Calc is a spreadsheet program that allows users to create complex calculations and formulas using built-in functions and also create custom functions to meet specific requirements. In this note, we will discuss how to create custom functions and formulas in LibreOffice Calc with basic examples.

**Creating Custom Functions:**

Custom functions are user-defined functions that can be created to perform specific calculations. LibreOffice Calc supports the creation of custom functions using the Basic programming language. Here are the steps to create a custom function:

- Open a new or existing spreadsheet in LibreOffice Calc.
- Go to “Tools” on the menu bar and select “Macros” -> “Organize Macros” -> “ Basic...”..



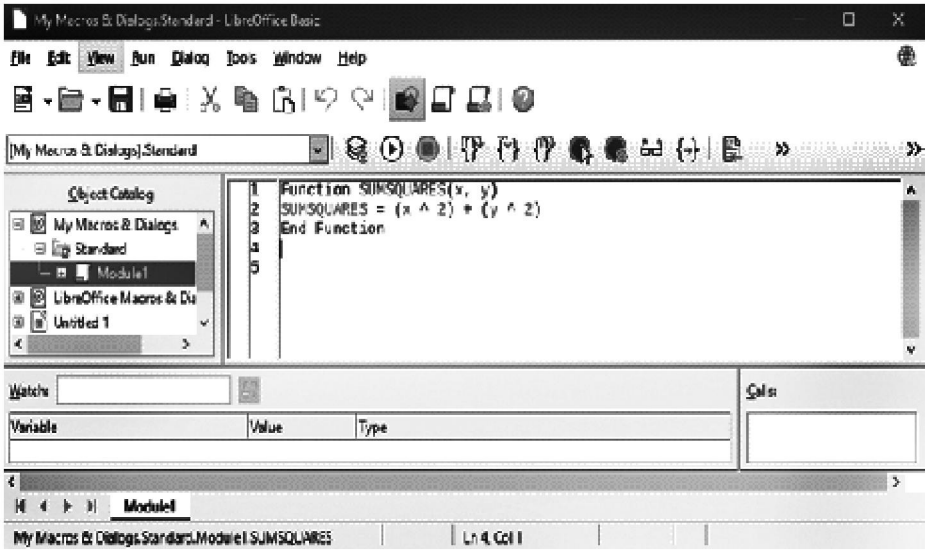
- In the " Basic Macros" dialog box, select "My Macros" and click "New".
- In the "New Module" dialog box, give a name to the module and click "OK".




- In the Basic editor window, write the code for the custom function. For example, the following code creates a custom function called "SUMSQUARES" that calculates the sum of squares of two numbers:

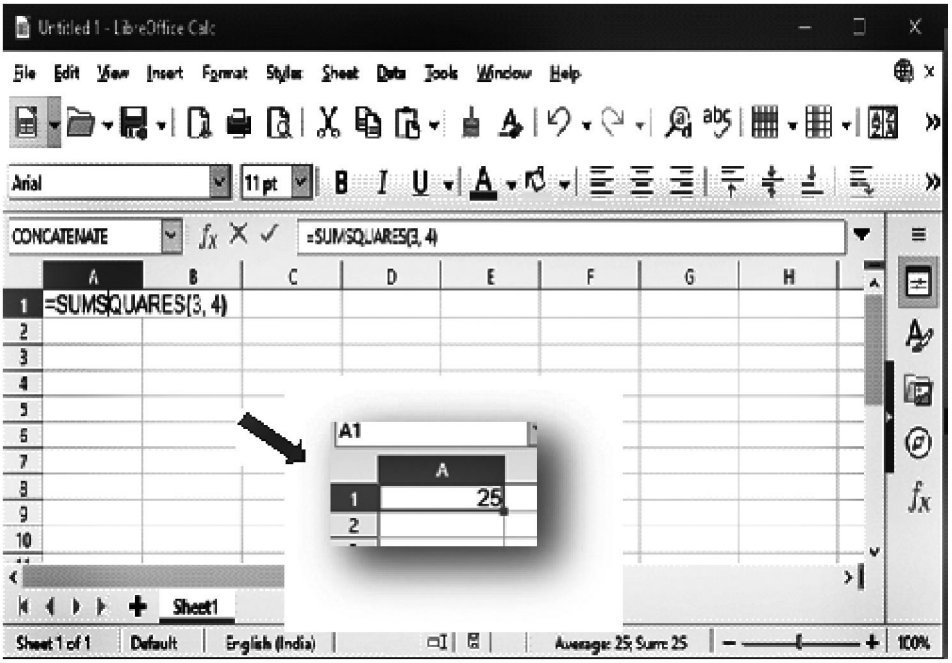
```
Function SUMSQUARES(x, y)
SUMSQUARES = (x ^ 2) + (y ^ 2)
End Function
```

- Save the module by selecting "File" -> "Save" on the menu bar.




- Close the Basic editor window.

Now that we have created the custom function, we can use it in our spreadsheet just like any other built-in function. For example, to use the SUMSQUARES function, we can type “=SUMSQUARES(3, 4)” in a cell, which would return the value 25.

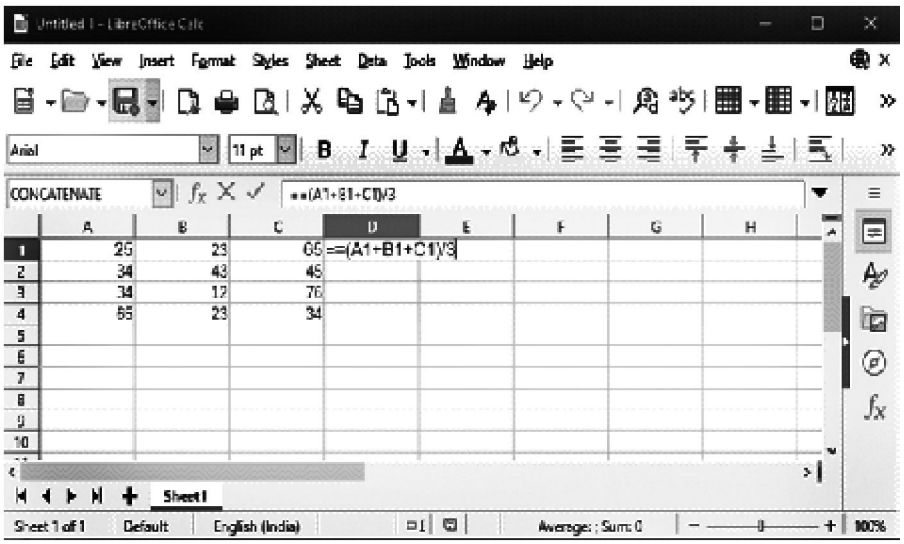


**Creating Custom Formulas:**

Custom formulas are user-defined formulas that can be created to perform specific calculations. LibreOffice Calc supports the creation of custom formulas using built-in functions and operators. Here are the steps to create a custom formula:

- Open a new or existing spreadsheet in LibreOffice Calc.
- Select a cell where you want to create the custom formula.
- In the formula bar, type the formula using built-in functions and operators. For example, the following formula calculates the average of three numbers:

=(A1+B1+C1)/3




- Once you have typed the formula, press “Enter” to calculate the result.
- To save the custom formula, select the cell with the formula and drag the fill handle (a small square at the bottom right corner of the cell) to other cells where you want to use the formula.
- Now that we have created the custom formula, we can use it in other cells just like any other built-in formula. For example, if we want to calculate the average of four numbers, we can simply change the formula to include the fourth number, like this:

=(A1+B1+C1+D1)/4

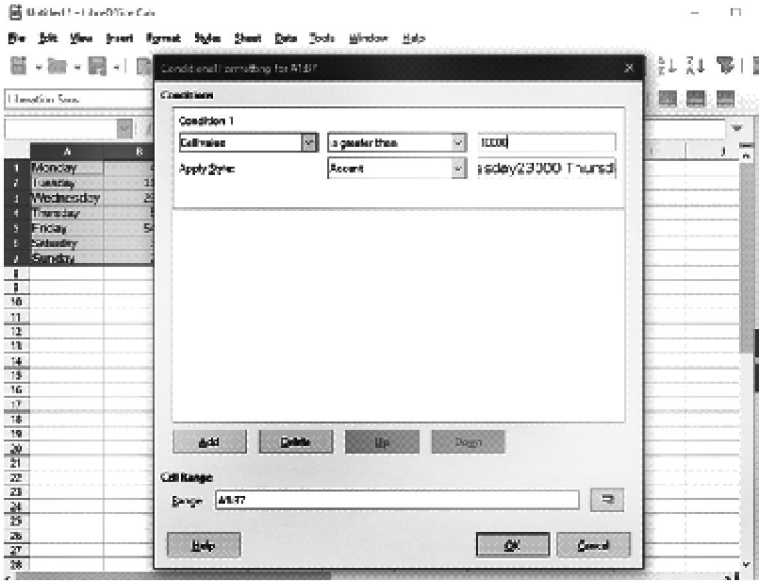
Thus we can see that LibreOffice Calc provides powerful tools for creating custom functions and formulas to perform complex calculations. By using these tools, users can meet specific requirements and achieve greater efficiency in their spreadsheet work.

## 12.5 USING CONDITIONAL FORMATTING TO HIGHLIGHT DATA BASED ON CERTAIN CRITERIA

Conditional formatting in LibreOffice Calc is a useful feature that allows you to automatically format cells based on specific criteria. This can help you to quickly identify important data in your spreadsheets.

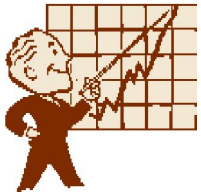
Here are some examples of how you can use conditional formatting to highlight data based on certain criteria in LibreOffice Calc:

1. **Highlight cells that contain a certain value**: Let's say you have a spreadsheet of sales data, and you want to highlight all the cells that contain sales over Rs 10,000. To do this, select the cells you want to format, and then click on Format > Conditional Formatting > Condition. In the Condition dialog box, select "Cell value is" from the first drop-down menu, and then select "greater than" from the second drop-down menu. In the third field, enter the value "10000". Then, choose the formatting you want to apply to the cells, such as a different background colour or font colour



2. Highlight cells that are within a certain range: Let's say you have a spreadsheet of student grades, and you want to highlight all the cells that are between 70 and 90. To do this, select the cells you want to format, and then click on Format > Conditional Formatting > Condition. In the Condition dialog box, select "Cell value is" from the first drop-down menu, and then select "between" from the second drop-down menu. In the third field, enter the values "70" and "90". Then, choose the formatting you want to apply to the cells.
3. Highlight cells that contain a certain text string: Let's say you have a spreadsheet of customer data, and you want to highlight all the cells that contain the text "VIP". To do this, select the cells you want to format, and then click on Format > Conditional Formatting > Condition. In the Condition dialog box, select "Cell contains" from the first drop-down menu, and then enter the text "VIP" in the second field. Then, choose the formatting you want to apply to the cells.

These are just a few examples of how you can use conditional formatting to highlight data based on certain criteria in LibreOffice Calc. There are many more possibilities, and you can experiment with different options to find the ones that work best for your needs.



## CHECK YOUR PROGRESS

4. What is conditional formatting in LibreOffice Calc?

.....

5. How can you highlight cells that contain a certain value using conditional formatting in LibreOffice Calc?

.....

6. How can you create custom functions in LibreOffice Calc using Basic programming language?

.....



## 12.6 LET US SUM UP

- LibreOffice Calc has built-in functions for common calculations, such as SUM, AVERAGE, COUNTIF, MAX, MIN, CONCATENATE, and CONVERT.
- You can use the SUM function to add up a range of cells, AVERAGE to find the average of a range of cells, COUNTIF to count the number of cells with a certain value, MAX or MIN to find the highest or lowest value in a range of cells, CONCATENATE to combine two or more text strings, and CONVERT to convert between units.
- Using built-in functions and formulas can save time and ensure accuracy in calculations.
- Custom functions and formulas can be created in LibreOffice Calc to perform specific calculations.
- Custom functions can be created using the Basic programming language by going to “Tools” -> “Macros” -> “Organize Macros” -> “Basic...” and writing the code in the Basic editor window.
- Custom formulas can be created using built-in functions and operators by typing the formula in a cell and pressing enter.
- Using custom functions and formulas can help meet specific requirements for complex calculations.



## 12.8 FURTHER READING

1. Lowenthal, M. (2015). Calc for dummies. John Wiley & Sons.
2. Starks, C. (2013). LibreOffice Calc Guide. The Document Foundation.



## 12.7 ANSWERS TO CHECK YOUR PROGRESS

Answer to Q No 1: The SUM function.

Answer to Q No 2: By using the AVERAGE function.

Answer to Q No 3: The MAX or MIN function.

Answer to Q No 4: Conditional formatting is a feature in LibreOffice Calc that allows users to automatically format cells based on specific criteria.

Answer to Q No 5: To highlight cells that contain a certain value, select the cells to format, go to Format > Conditional Formatting > Condition, select “Cell value is” from the first drop-down menu, select “greater than” or “less than” from the second drop-down menu, and enter the desired value in the third field.

Answer to Q No 6: To create custom functions in LibreOffice Calc, go to “Tools” on the menu bar and select “Macros” -> “Organize Macros” -> “Basic...”. In the “Basic Macros” dialog box, select “My Macros” and click “New”. In the “New Module” dialog box, give a name to the module and click “OK”. In the Basic editor window, write the code for the custom function and save the module by selecting “File” -> “Save” on the menu bar.



## 12.9 MODEL QUESTIONS

1. What are some of the most common built-in functions in LibreOffice Calc and how can they be used to perform common calculations on data? Provide examples of how to use these functions to perform tasks such as summing a range of cells, finding the average of a range of cells, counting the number of cells with a certain value,

finding the maximum or minimum value in a range of cells, and concatenating text strings.

2. How can you create custom functions in LibreOffice Calc to perform specific calculations? What programming language does LibreOffice Calc support for creating custom functions? Provide a step-by-step guide on how to create a custom function in LibreOffice Calc, using an example of a custom function that calculates the sum of squares of two numbers.
3. How can you create custom formulas in LibreOffice Calc to perform specific calculations using built-in functions and operators? Provide a step-by-step guide on how to create a custom formula in LibreOffice Calc, using an example of a custom formula that calculates the area of a circle based on its radius.
4. What are some of the benefits of using built-in functions and formulas in LibreOffice Calc for common calculations, as opposed to manual calculations? How can these functions and formulas save time and ensure accuracy in your calculations? Provide examples to illustrate your answer.
5. What are some of the limitations of using built-in functions and formulas in LibreOffice Calc for complex calculations? When might it be necessary to create custom functions or formulas to perform more complex calculations? Provide examples to illustrate your answer.

**********

# UNIT 13: ADVANCED FORMATTING AND CHARTING IN CALC

## UNIT STRUCTURE


13.1 Learning Objectives

13.2 Introduction

13.3 Applying Advanced Formatting Options

13.4 Creating and modifying charts

13.5 Using Calc's built-in tools

13.6 Let Us Sum Up

13.7 Answers to Check Your Progress

13.8 Further Reading

13.9 Model Questions


## 13.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- apply conditional formatting to highlight specific data.
- validate data inputs to ensure they meet predefined criteria.
- customize number formats
- create and modify charts
- use Calc's built-in filtering and sorting tools
- analyse and extract specific information from a dataset.

## 13.2 INTRODUCTION

The spreadsheet programme Calc, which is part of the LibreOffice package, is an effective tool for compiling and analysing data. Calc provides a variety of sophisticated formatting options and data analysis capabilities that let users to make sense of complicated datasets, in addition to fundamental spreadsheet features like entering and manipulating numerical data. A few of these features, including as conditional formatting, data validation, custom number formats, the construction and editing of charts, and built-in tools for data filtering, sorting, and analysis, will be covered in this unit. You will have a good understanding of how to use these features

by the conclusion of this unit to improve the look and ease of analysis of your data.

## 13.3 APPLYING ADVANCED FORMATTING OPTIONS

LibreOffice Calc offers a wide range of advanced formatting options that allow users to customize and present their data in a visually appealing and informative way. These options include conditional formatting, data validation, cell styles, custom number formats, and more. With conditional formatting, users can highlight specific cells or ranges of cells based on certain criteria, such as cell values or text. Data validation enables users to set rules for data entry, ensuring that only valid and accurate data is entered. Cell styles allow users to apply a consistent look and feel to their worksheets, while custom number formats enable users to format numbers in a way that makes them more easily understandable. Overall, the advanced formatting options in LibreOffice Calc provide users with powerful tools to create professional-looking spreadsheets and effectively communicate their data.

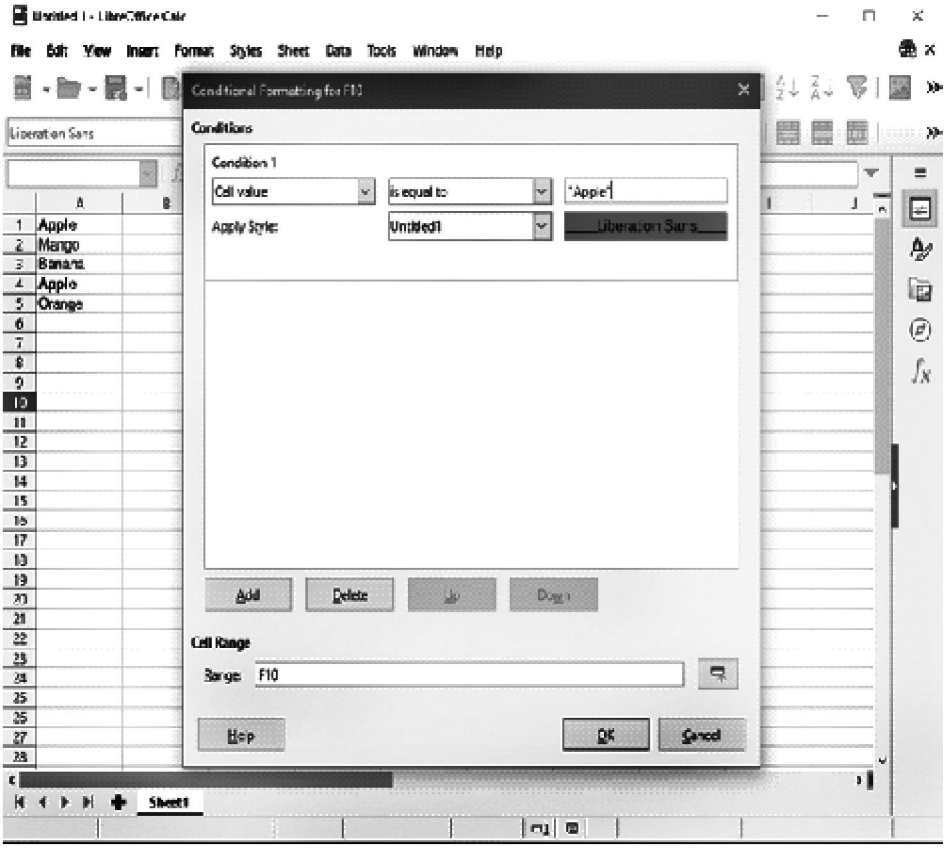
**Conditional Formatting**

Conditional formatting in LibreOffice Calc is a powerful feature that allows users to apply formatting to cells based on certain conditions. By using conditional formatting, users can easily highlight cells that meet specific criteria, making it easier to identify trends and patterns in their data.

Here are some examples of how to use conditional formatting in LibreOffice Calc:

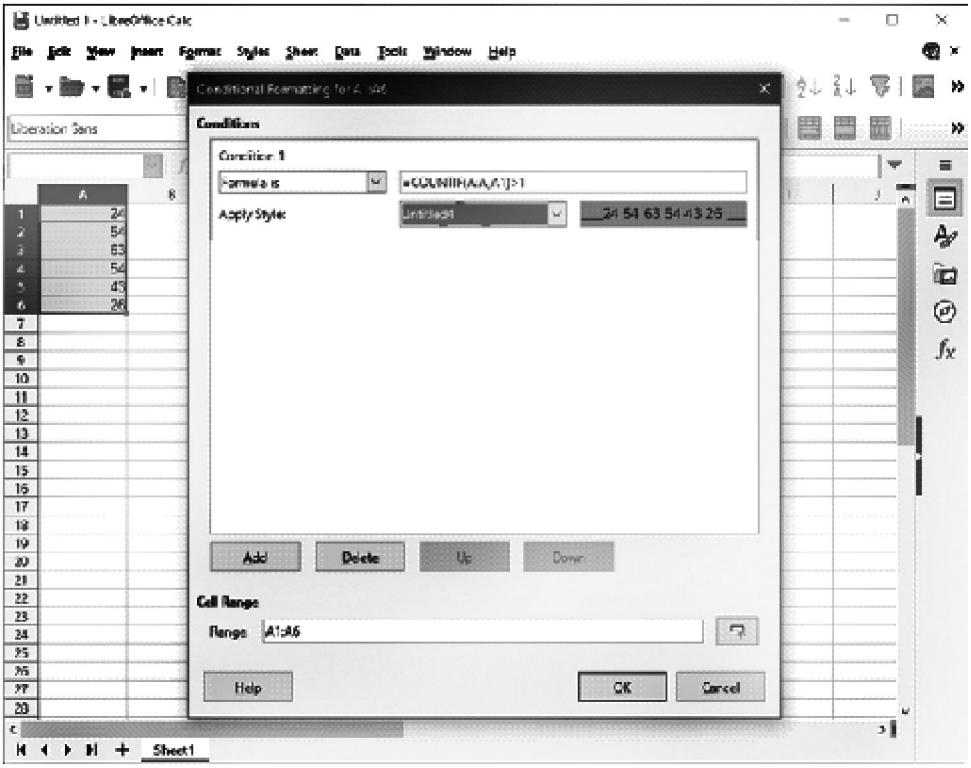
1. Highlight cells with specific text: Assume you have a column of data with different types of fruits in it. Cells that contain a particular fruit can be highlighted using conditional formatting. To do this, choose the range of cells you wish to format, then select “Conditional Formatting” from the menu bar’s “Format” drop-down menu. Select “Equal to” from the second drop-down list after selecting “Cell Value is” from the first drop-down list in the “Conditional Formatting” dialogue box. Type the name of the fruit you want to highlight, such as “Apples,”

in the following box. Select the formatting options you want to use, such as a background colour or font style, in the final step.




1. Highlight cells based on numerical values: Suppose you have a list of test scores and you want to highlight all scores above a certain threshold. To do this, select the range of cells you want to format, click on “Format” from the menu bar, and select “Conditional Formatting”. In the “Conditional Formatting” dialog box, choose “Cell Value is” from the drop-down list, and then select “Greater than” from the second drop-down list. In the next box, enter the threshold score, such as “80”. Finally, choose the formatting options you want to apply, such as a background colour or font style.
2. 1. Highlight cells based on numerical values: Assume you have a list of test results and want to emphasise any scores that are higher than a particular cutoff. To do this, choose the range of cells you wish to format, then select “Conditional Formatting” from the menu bar’s “Format” drop-down menu. Choose “Cell Value is” from the

drop-down list in the “Conditional Formatting” dialogue box, and then pick “Greater than” from the subsequent drop-down list. Put the required score—for example, “80”—in the following box. Select the formatting options you want to use, such as a background colour or font style, in the final step.



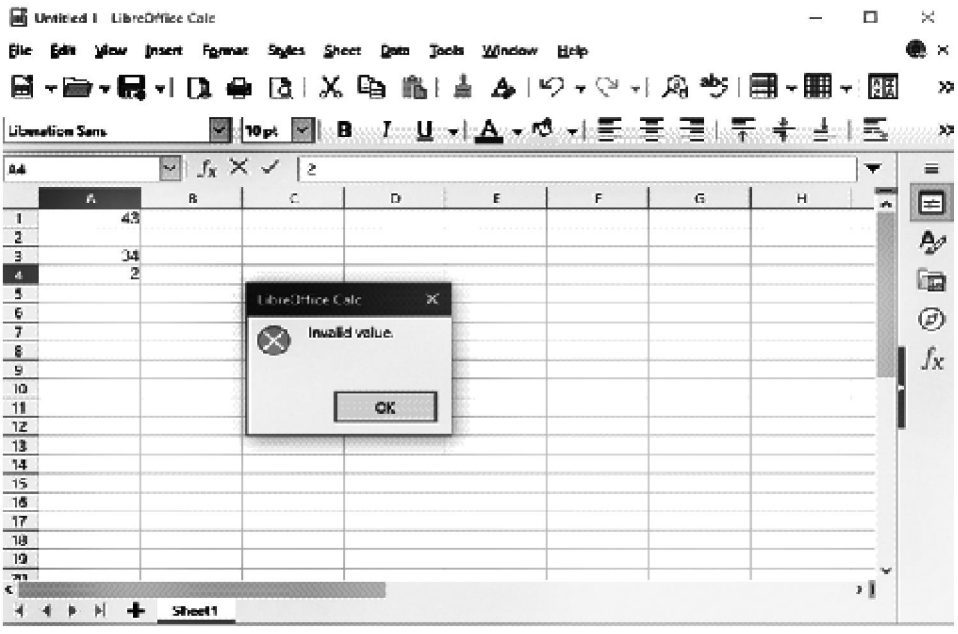

## Data Validation

Users of LibreOffice Calc can regulate the kind and scope of data that can be entered into cells using the data validation feature. This makes it easier to make sure that the information entered is correct and complies with a particular set of rules or guidelines. In LibreOffice Calc, you can choose from a variety of data validation options, including those for text, numbers, dates, and more.

1. The steps below explain how to apply data validation to a cell or range of cells in LibreOffice Calc.
2. Choose the cell or range of cells to which data validation should be applied.
3. Select “Validity” from the “Data” menu by clicking on it.

4. From the “Allow” dropdown menu in the “Validity” dialogue box, choose the category of data you want to validate. There are many options available, including “Whole number,” “Decimal,” “Date,” “Time,” “Text length,” and more.
5. Set the parameters for the chosen data type. You can specify a minimum and maximum value for the number, for instance, if you chose “Whole number”.
6. You have the option to specify an error message that will be displayed if the user enters incorrect information.
7. To apply the data validation to the chosen cells, click “OK”.

For example, suppose you have a spreadsheet with a column for product prices, and you want to ensure that the prices entered are between Rs 10/- and Rs 100/-. To do this, select the column of prices, go to “Data” > “Validity”, select “Whole number” from the “Allow” dropdown menu, and enter 10 and 100 as the minimum and maximum values. Now, any time someone enters a price that falls outside of this range, an error message will appear.



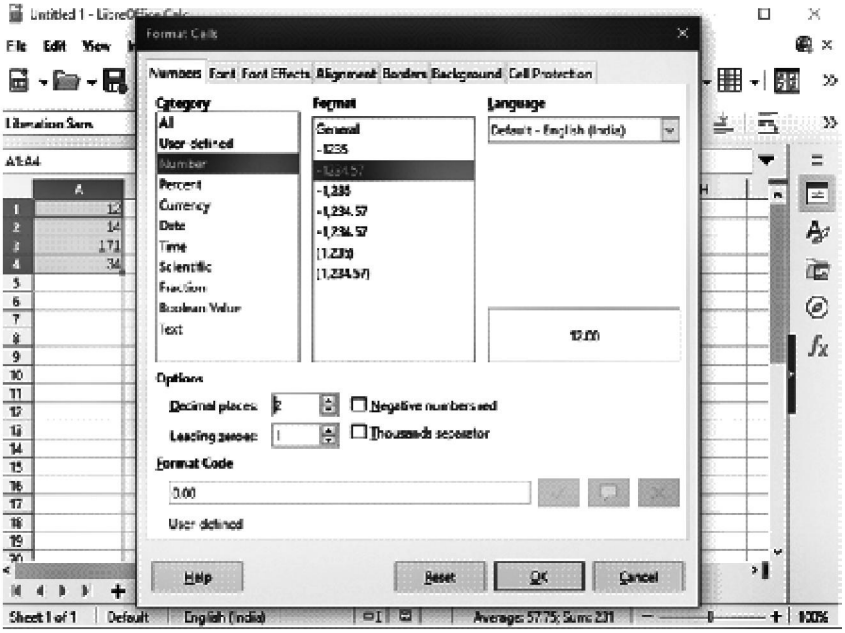

Setting up a dropdown list for a cell is another illustration of data validation. When you want to restrict the options available for a specific cell, this can be helpful. To accomplish this, first choose the cell that needs validation, then navigate to “Data” > “Validity,” choose “List” from the “Allow” dropdown

menu, and then enter the options you want to show up in the dropdown list. Now, only the options you listed will be available to anyone who selects that cell.

**Custom Number Formats**

Users of LibreOffice Calc can format numbers in a way that best suits their needs by using custom number formats. The appearance of numbers, including the number of decimal places, the use of currency symbols, and the display of negative numbers, can be customised by users. Dates, times, and other types of data can be displayed using custom number formats in a way that is simple to understand and read.Here are some examples of custom number formats in LibreOffice Calc:

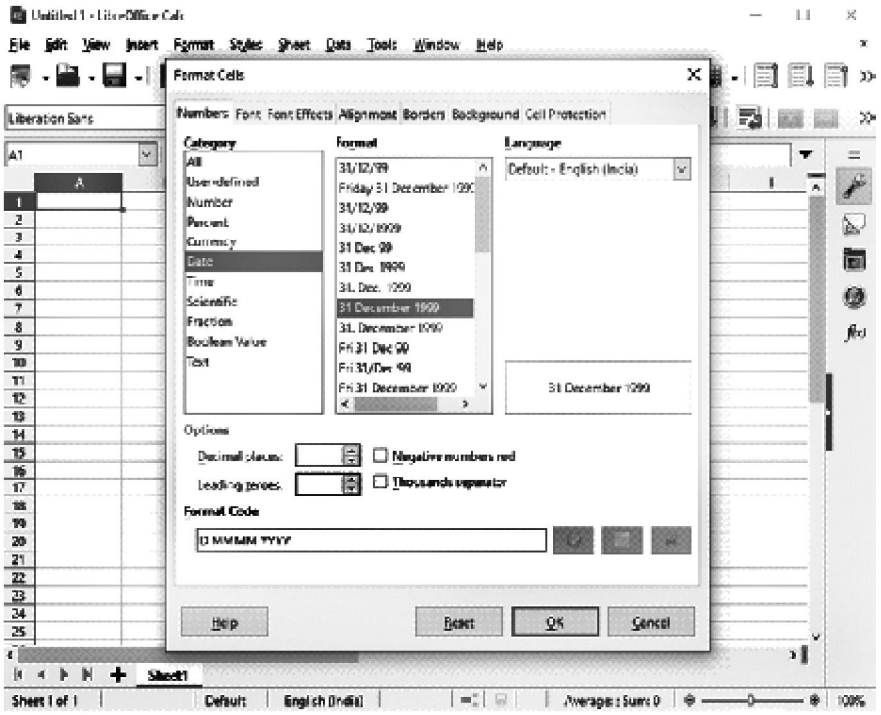
1. **Number format with decimal places:** Select the cells you want to format, then select “Format” > “Cells” to format numbers with two decimal places. Select “Numbers” from the “Format Cells” dialogue box, and then type “0.00” in the “Format Code” field.

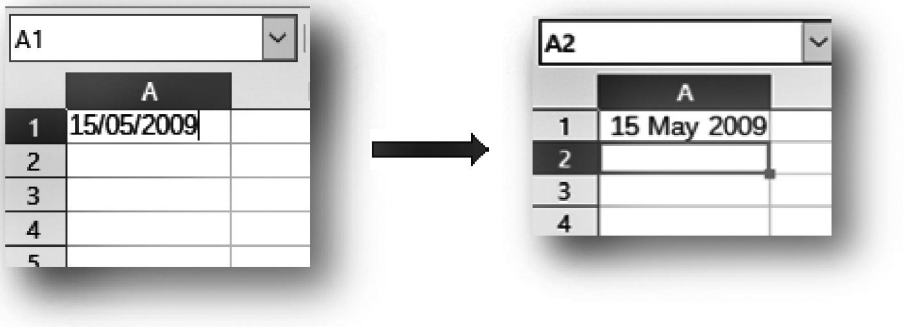



2. 2. Currency format: Select the cells you want to format and choose “Format” > “Cells” to format numbers as currencies. Choose

"Numbers" from the "Format Cells" dialogue box, then choose the desired currency symbol from the drop-down list.

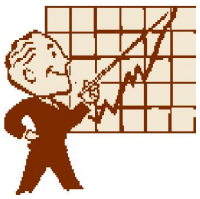
3. Formatting dates: Choose the desired cells and choose "Format" > "Cells" to format dates. Select "Date" in the "Format Cells" dialogue box, then select the desired format from the drop-down list.




5. 5. Scientific notation format: Select the cells you want to format and choose "Format" > "Cells" to format numbers in scientific notation. Select "Numbers" in the "Format Cells" dialogue box, and then type "#.###E+00" in the "Format Code" field.

6. Custom format for negative numbers: Negative numbers can be formatted in a specific way by choosing the desired cells and choosing “Format” > “Cells.” 6. Custom format for negative numbers. To display negative numbers in parentheses and with a currency symbol, choose “Numbers” from the “Format Cells” dialogue box, and then type a custom format code, such as “($#,##0.00);($#,##0.00)”.



## CHECK YOUR PROGRESS

Fill in the blanks

1. LibreOffice Calc offers a wide range of _____ options to customize and present data.
2. Conditional formatting allows users to easily highlight cells that meet specific _____.
3. Data validation is a feature in LibreOffice Calc that allows users to control the type and range of data that can be entered into _____.
4. Custom number formats in LibreOffice Calc allow users to format numbers in a way that meets their specific _____.
5. A dropdown list can be set up for a cell using the _____ feature in LibreOffice Calc.

## 13.4 CREATING AND MODIFYING CHARTS

With the help of the robust spreadsheet programme LibreOffice Calc, users can design and edit charts that present data in an easier-to-understand manner. Chart creation and modification in Calc is a fairly simple process that can be finished in a few easy steps.

Here are the steps to create and modify charts in LibreOffice Calc:

1. **Preparing the Data:**

   It is essential to prepare the data that will be represented in the chart before beginning to create one. Each set of data should have its own row and column headings in a table with the data. Columns for

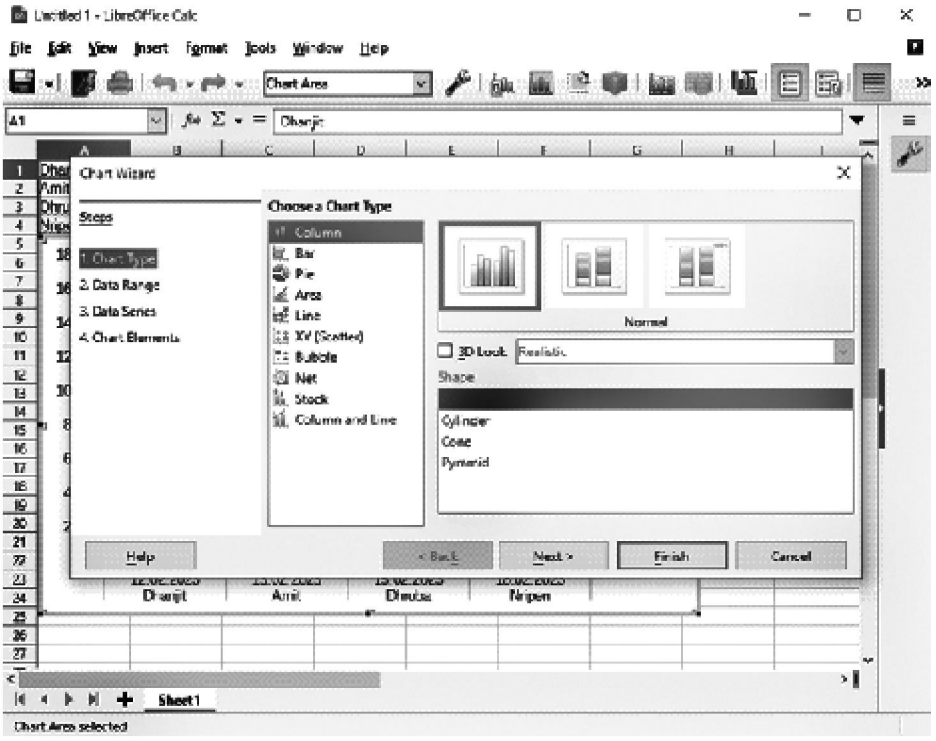
salesperson names, sale dates, and sale amounts, for instance, might be included in a chart that displays sales data for a business.

**2. Selecting the Data:**

Choose the cells you want to include in the chart after you have prepared the data. To select multiple cells at once, hold down the Shift key while clicking and dragging the mouse over the desired cells.

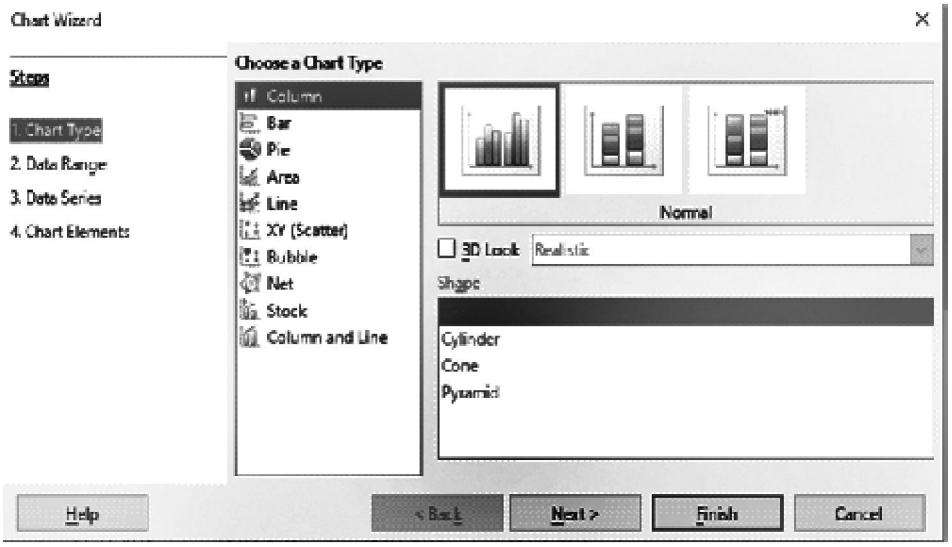
**3. Inserting the Chart:**

After choosing your data, choose “Chart” from the “Insert” menu in the menu bar. You can then follow the instructions in the “Chart Wizard” dialogue box to create the chart. In addition, you can utilise the “Chart” icon located in the toolbar.



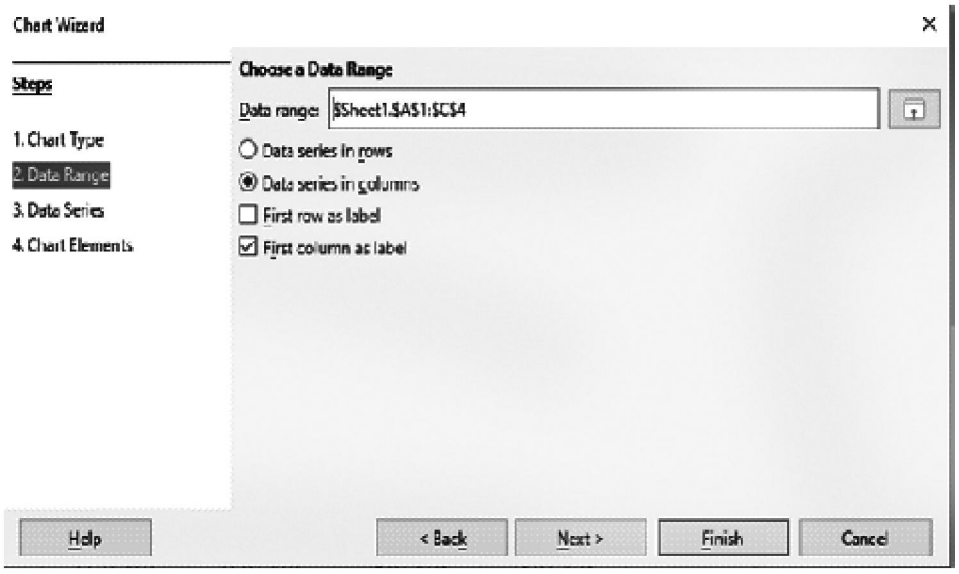

**4. Choosing the Chart Type:**

You must choose the type of chart you want to make in the Chart Wizard dialogue box. Calc supports the following chart types: Column, Line, Pie, Bar, Area, XY (Scatter), Net, and Stock. Pick the option that most closely fits your needs.




### 5. Defining the Chart Data Range:

The next step is to specify the data range for your chart. The categories and data series must be specified in this. A data series is a collection of associated data points, and each data series has a category label. The values of each data point are shown next to the data point in the chart as data labels, which are an additional option.




### 6. Customizing the Chart:

You can alter the chart's appearance, layout, and formatting after specifying the data range. The chart's title, legend, axis labels, and axis scales can all be changed. Additionally, you can alter the chart's colours, fonts, and other visual components.

**7. Saving and Exporting the Chart**:

Once the chart has been designed and customised, you can export it to a file format like PNG, JPG, or PDF or save it to your spreadsheet.



**ACTIVITY**

Suppose you have a table with sales data for the past six months. To create a column chart for this data, follow these steps:

1. Select the cells that contain the sales data.
2. Click on the “Insert” menu in the menu bar and select “Chart.”
3. In the Chart Wizard dialog box, select “Column” as the chart type.
4. Define the data range by selecting the cells containing the data series and categories.
5. Customize the chart by changing the title, axis labels, and colours.
6. Save the chart to your spreadsheet or export it to a file format.

## 13.5 USING CALC'S BUILT-IN TOOLS

Dealing with large datasets is made simpler by a variety of built-in tools for filtering, sorting, and analysis provided by LibreOffice Calc. Users of the filtering tool can limit the display of data to only that which satisfies their criteria, enabling more focused analysis. Sorting enables users to group data according to different criteria, such as numerical value or alphabetical order, making it simpler to spot patterns and trends in the data. Additionally, Calc offers a variety of tools for data analysis, including pivot tables, which enable users to meaningfully summarise and visualise data. Overall, Calc’s built-in tools make it simpler for users to work with data and extract insights from sizable datasets without the use of additional programmes or tools.

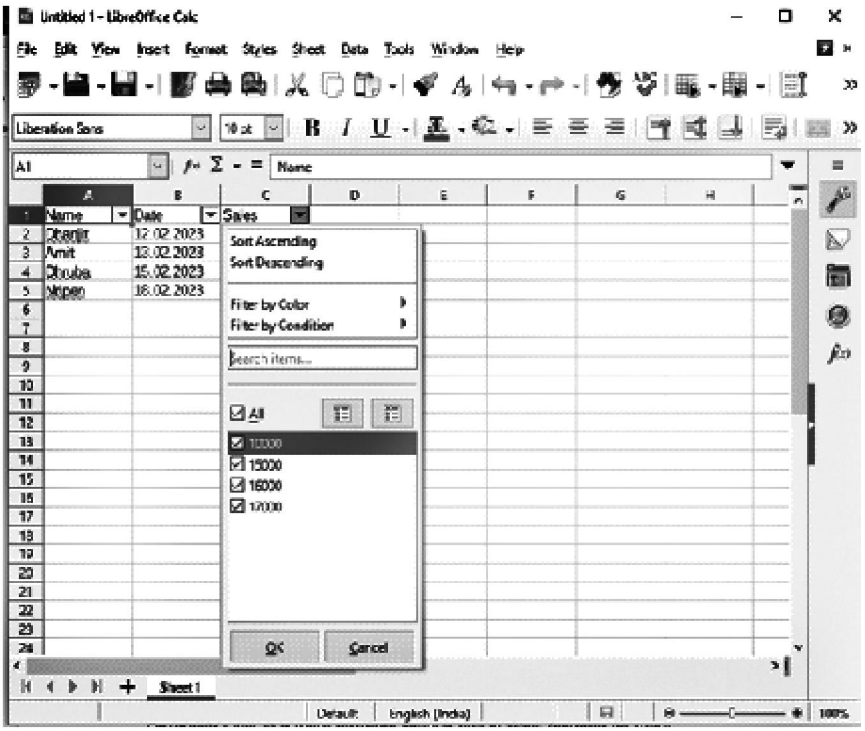
### 1. FILTERING DATA

- There is a robust set of built-in data filtering tools available in LibreOffice Calc. With the help of these tools, users can choose to display only the data that satisfies specific criteria, which can

aid in performing focused analysis and comprehending particular subsets of data. Here are some examples and instructions for using these tools to filter data in Calc:

**AutoFilter:**

Data filtering in Calc is quick and simple thanks to AutoFilter. Selecting the cells containing the data you wish to filter before selecting the “Data” menu from the menu bar will activate AutoFilter. Choose “Filter” and then “AutoFilter” from there. Each column’s header will have a tiny arrow that you can use to select or deselect particular values to filter the data.

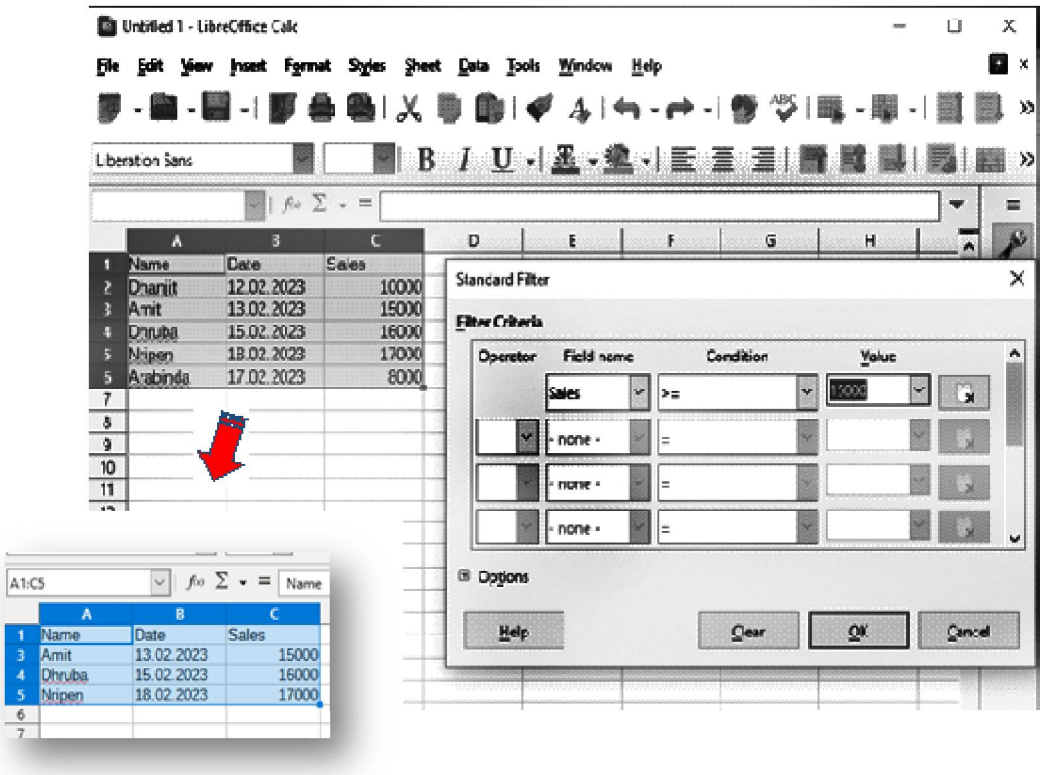



- **Advanced Filter:**

Calc’s Advanced Filter is a more powerful filtering tool that supports more complicated filtering criteria. Select the cells containing the data you wish to filter, and then click the “Data” menu link in the menu bar to access Advanced Filter. Choose “Filter” and then “Advanced Filter” from there. You can specify the filtering criteria based on various conditions

in the ensuing dialogue box, such as values in other cells, regular expressions, and more.

For example, suppose you have a table containing the sales data for different salespersons, and you want to see only the sales figures for the salespersons who sold more than Rs 15,000 worth of products. Using Advanced Filter, you can specify the filtering criteria to show only the salespersons whose sales figures meet this condition.




- **Form Filter:**

Another filtering tool in Calc that lets users filter data based on form entries is called Form Filter. To use Form Filter, click the “Data” menu in the menu bar, choose “Form,” and then fill out the form that appears with the filtering requirements.

Consider the scenario where you have a table with the sales information for various salespeople and you want to view only the sales data for a particular salesperson. The salesperson’s name can be entered into the

form using Form Filter, and then the filter can be applied to only show the data that matches the entered criteria.

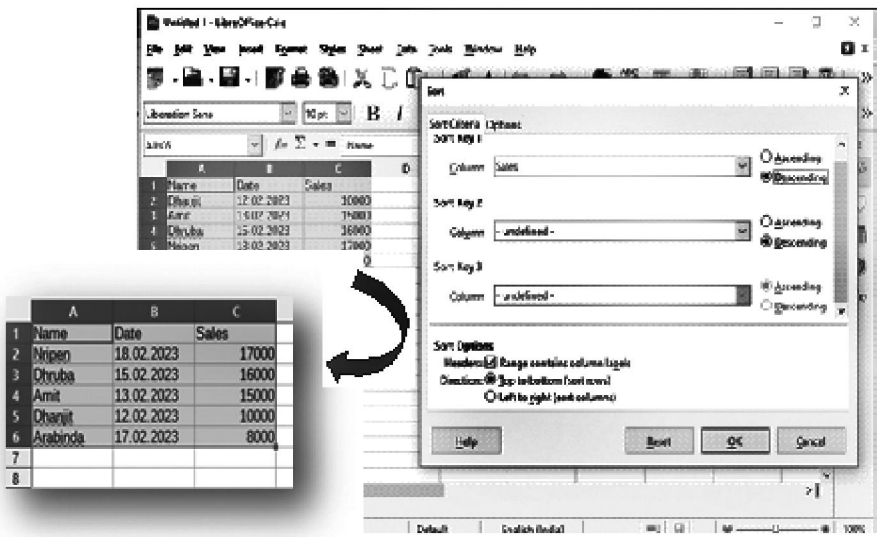
**2. SORTING OF DATA**

Many built-in data sorting tools in LibreOffice Calc can aid in more effective data organisation and analysis for huge datasets. Basic sorting, multi-level sorting, and custom sorting are some of these tools.

**Basic Sorting:**

Users of Calc's basic sorting tool can arrange data according to a single column or row. To use this tool, choose the desired data, then click the "Data" menu and choose "Sort." By doing so, the "Sort" dialogue box will open, allowing you to choose the column or row and the sort order (ascending or descending).

For instance, if you have a table of sales data with columns for salesperson names and sales amounts, you can use the basic sorting tool to determine which salesperson has sold the most by sorting the data based on the sales amounts in descending order.




- **Multi-Level Sorting:**

Users of Calc can sort data based on multiple columns or rows using the multi-level sorting tool. To use this tool, choose the desired data, then click the "Data" menu and choose "Sort." You can add more sorting

levels in the "Sort" dialogue box by selecting the "Add Level" button. This will enable you to group the data according to a variety of criteria, such as sales volume followed by salesperson name.

For example, if you have a table of sales data that includes columns for salesperson names, sales dates, and sales amounts, you can use the multi-level sorting tool to sort the data first by salesperson name and then by sales amount in descending order to see the total sales amount for each salesperson.

- **Custom Sorting:**

Users can sort data in Calc using custom criteria by using the tool for custom sorting. To use this tool, choose the desired data, then click the "Data" menu and choose "Sort." Choose "Custom sort order" from the "Sort by" drop-down menu in the "Sort" dialogue box. By adding new criteria, you can customise the sort order by opening the "Custom Sort" dialogue box.

For example, if you have a table of inventory data that includes columns for item names and stock levels, you can use the custom sorting tool to sort the data based on the item names, but with a custom sort order that places certain items at the top of the list, regardless of their alphabetical order.

**3. ANALYSING DATA**

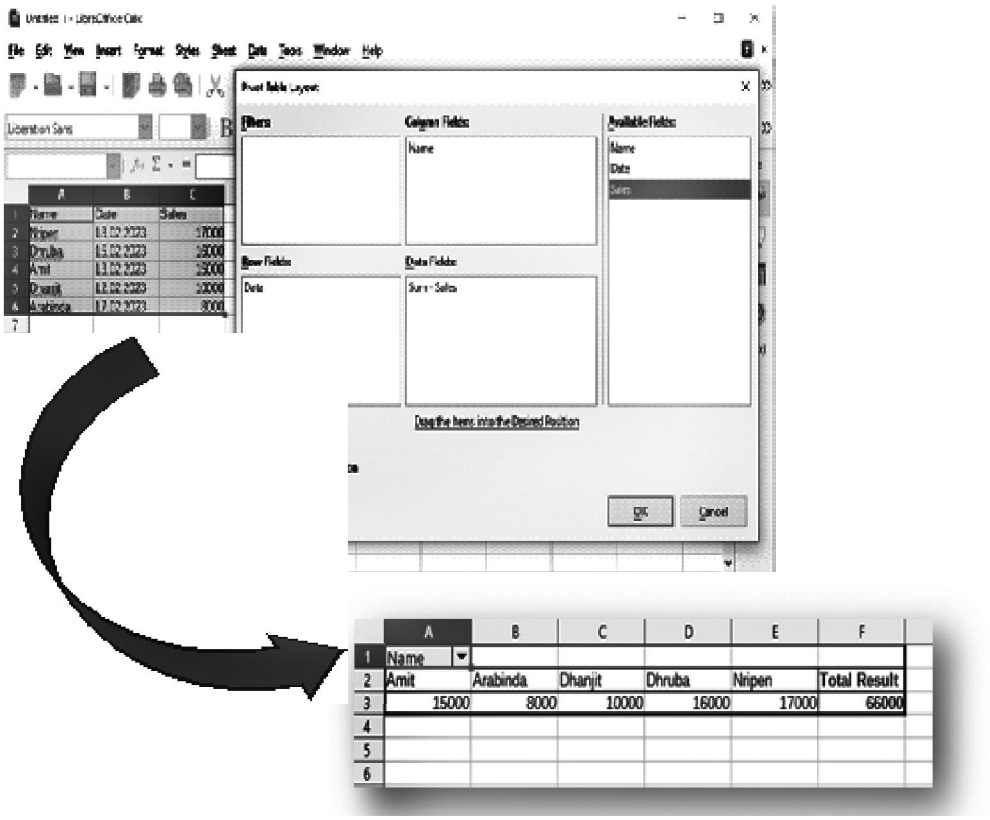
Several built-in data analysis tools in LibreOffice Calc are helpful for gaining insights into sizable datasets. Here are a few instances of how to analyse data using Calc's built-in tools:

- **Pivot Tables:**

Powerful tools for data analysis and summarization include pivot tables. They enable you to easily summarise sizable datasets and present them in a more readable manner. Select the data you want to analyse before you can create a pivot table in Calc. Then click the "Data" menu, choose "Pivot Table," and adhere to the wizard's directions. A pivot table can be made more unique by dragging and dropping fields to alter the layout and produce different summaries after it has been created.

Example: Suppose you have a dataset that includes sales data for a company. You could use a pivot table to summarize the data by

salesperson, month, or product category, and analyse which salesperson or product category is performing the best.



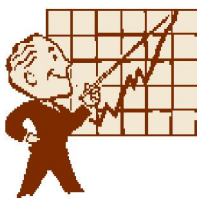

- **Data Analysis Tools:**

Regression analysis, Fourier analysis, and moving average are just a few of the data analysis tools available in Calc. These tools can help you predict the future based on historical data and understand the relationship between various variables. Click on the “Data” menu, choose “Statistics,” and then select the tool you want to use to access the data analysis tools.

Example: Suppose you have a dataset that includes information on the number of visitors to a website and the corresponding sales data. You could use regression analysis to understand the relationship between the number of visitors and sales, and predict future sales based on the number of visitors.



Similarly, other analysis like sampling, co-relation, chi-square etc can be done using Calc and all these above potential makes Libre office a great open source software for data analysis.



## CHECK YOUR PROGRESS

6. What is the first step to create and modify charts in LibreOffice Calc?

   a) Insert the chart
   b) Define the chart data range
   c) Select the data
   d) Customize the chart

7. Which of the following is a built-in tool in LibreOffice Calc for analyzing data?

a) Pivot tables
b) Photoshop
c) AutoCAD
d) InDesign

8. How can users use AutoFilter to filter data in Calc?
   a) Click on the “Insert” menu and select “AutoFilter”
   b) Click on the “Data” menu and select “Filter” and then “AutoFilter”
   c) Click on the “Chart” menu and select “AutoFilter”
   d) Click on the “Format” menu and select “AutoFilter”
9. Which of the following is a more powerful filtering tool in Calc?
   a) AutoFilter
   b) Basic Filter
   c) Advanced Filter
   d) Form Filter
10. What is the purpose of sorting data in LibreOffice Calc?
    a) To create charts
    b) To customize the chart
    c) To organize and analyse large datasets
    d) To export the chart to a file format



## 13.6 LET US SUM UP

- LibreOffice Calc offers a variety of advanced formatting options that allow users to customize and present their data in a visually appealing and informative way.
- Conditional formatting is a powerful feature in LibreOffice Calc that allows users to highlight cells based on specific conditions, making it easier to identify trends and patterns in their data.
- Data validation is another feature in LibreOffice Calc that enables users to control the type and range of data that can be entered into cells, ensuring that only valid and accurate data is entered.

- Cell styles and custom number formats can be used to apply a consistent look and feel to worksheets and format numbers in a way that makes them more easily understandable.
- Examples of how to use conditional formatting in LibreOffice Calc include highlighting cells based on specific text, numerical values, and duplicate values.
- Data validation can be applied to cells to ensure that the data entered conforms to specific rules or guidelines, such as limiting the options available for a particular cell or setting minimum and maximum values for numerical data.
- LibreOffice Calc is a powerful spreadsheet application that allows users to create and modify charts to visualize data in a more accessible and understandable format.
- To create and modify charts in Calc, the data needs to be prepared in a table with headings for each column and rows for each set of data.
- Calc provides a variety of built-in tools for filtering, sorting, and analyzing data, making it easier to work with large datasets.
- Filtering tools in Calc allow users to selectively display only the data that meets certain criteria, which can help in performing targeted analysis and understanding specific subsets of data.
- Sorting tools in Calc allow users to organize data based on various criteria, such as alphabetically or by numerical value, making it easier to see patterns and trends in the data.
- Calc also provides a range of tools for analysing data, such as pivot tables, which can help users summarize and visualize data in a meaningful way.
- Overall, these built-in tools make it easier for users to work with data in Calc and gain insights from large datasets without the need for external software or tools.



## 13.7 ANSWERS TO CHECK YOUR PROGRESS

**Answer to Q No 1:** formatting

**Answer to Q No 2:** criteria

**Answer to Q No 3:** cells

**Answer to Q No 4:** needs

**Answer to Q No 5:** data validation

**Answer to Q No 6:** c) Select the data

**Answer to Q No 7:** a) Pivot tables

**Answer to Q No 8:** b) Click on the “Data” menu and select “Filter” and then “AutoFilter”

**Answer to Q No 9:** c) Advanced Filter

**Answer to Q No 10:** c) To organize and analyse large datasets



## 13.8 FURTHER READING

1. Lowenthal, M. (2015). Calc for dummies. John Wiley & Sons.
2. Starks, C. (2013). LibreOffice Calc Guide. The Document Foundation.



## 13.9 MODEL QUESTIONS

1. How can conditional formatting be used to highlight specific cells or ranges of cells based on certain criteria in LibreOffice Calc? Provide at least three examples of how conditional formatting can be used effectively to analyse data and improve its presentation.
2. Data validation is an important feature in LibreOffice Calc that allows users to control the type and range of data that can be entered into cells. Explain how to apply data validation to a cell or range of cells in LibreOffice Calc, and provide an example of how data validation

can be used to ensure accurate data entry. In addition, discuss at least two other types of data validation options available in LibreOffice Calc and how they can be useful in data analysis.

3. How can LibreOffice Calc's built-in tools for filtering, sorting, and analyzing data be used to gain insights from large datasets? Provide examples of how each tool can be used to manipulate data and extract specific information from a dataset.
4. Describe the steps involved in creating and modifying charts in LibreOffice Calc. What are some of the customization options available to users when creating a chart, and how can these options be used to create a visually appealing and informative chart?
5. How can LibreOffice Calc be used to perform statistical analysis on a dataset? What are some of the statistical functions and tools available in Calc, and how can they be used to extract meaningful insights from a dataset? Provide examples of how statistical analysis can be used to identify trends and patterns in data.

** *** **

# UNIT 14: INTRODUCTION TO IMPRESS

**UNIT STRUCTURE**


14.1 Learning Objectives
14.2 Introduction
14.3 Overview of Impress
14.4 Features as a Presentation Program
14.5 Launching Impress
14.6 Creating a New Presentation
14.7 Navigating the Impress Interface
14.8 Understanding the Different Components of the Slide Window
14.9 Adding and Formatting Slides
14.10 Applying Transitions
14.11 Customizing Presentations Settings
14.12 Let Us Sum Up
14.13 Answers to Check Your Progress
14.14 Further Reading
14.15 Model Questions


## 14.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- start with Impress
- learn the different parts of the Impress such as the Title bar, Menu bar, Status bar, Horizontal and Vertical Scroll bar
- learn different component of Impress
- create a new presentation

## 14.2 INTRODUCTION

LibreOffice Impress is a powerful and free presentation software that is part of the LibreOffice suite. It allows you to create stunning presentations with a wide range of features and tools.In the same way as Microsoft PowerPoint, it helps users create professional-looking presentations. You can easily create professional-looking slide presentations using Impress. The program features a number of tools and features to

make your presentations more effective.The aim of this unit is to guide you through the Impress environment when designing your presentations.

## 14.3 OVERVIEW OF IMPRESS

Impress is a powerful presentation software developed as part of the LibreOffice suite. It is a free and open-source alternative to commercial software like Microsoft PowerPoint and it is available for Windows, macOS, and Linux operating systems.LibreOffice Impress allows users to create, edit, and deliver professional-looking slideshows and presentations.It offers a variety of templates and themes to choose from, or users can create their own custom designs. The software also supports a wide range of file formats, including Microsoft PowerPoint files, making it easy to import and export presentations to and from other software.Users can add and edit slides, create and format text, insert and manipulate images and other multimedia, and create animations and transitions between slides. Impress also includes drawing tools, charts, and diagrams, which can be used to create custom graphics within the presentation.

LibreOffice Impress offers a robust set of features and is suitable for personal, academic, and professional use. You can create slides that contain many different features, including text, bulleted and numbered lists, tables, charts, and a wide range of graphic objects such as clip-art, drawings and photographs. Impress also includes a spelling checker, a thesaurus, text styles, and background styles.

## 14.4 FEATURES AS A PRESENTATION PROGRAM

LibreOffice Impress, as a presentation program, offers a wide range of features to help you create and deliver impactful presentations.LibreOffice Impress provides a comprehensive set of features for creating, designing, and delivering professional presentations. Its open-source nature and compatibility with different file formats make it a versatile and accessible option for users seeking a free and powerful presentation program.

Here are some of the important features of LibreOffice Impress:

- **Slide Creation and Editing:** Impress provides an easy-to-use interface for creating and editing slides. It offers a range of formatting options for text, images, charts, tables, and other graphical elements, allowing users to customize their presentations to their needs.

- **Slide Transitions and Animations:** Impress offers a range of transition effects to smoothly transition between slides, and animation options to bring content to life during the presentation.

- **Templates and Styles:** Impress includes a collection of built-in templates and styles to give your presentations a professional look. You can choose from various themes and layouts or create your own custom templates to maintain consistency throughout your presentation.

- **Multimedia Support:** Impress supports adding multimedia content such as images, audio files, and videos directly into slides, enhancing the overall presentation experience.

- **Presenter View:** Impress provides a Presenter View option that displays additional information to the presenter while showing the slides to the audience. You can see your speaker notes, next slides, and slide timings, helping you deliver your presentation more effectively

- **Customization Options:** Impress allows users to customize the appearance and layout of their presentations, with a range of templates and themes available.

- **Slide Show Settings:** Impress offers customizable slide show settings. You can define the order in which your slides appear, set slide timings, and control slide transitions. The software also provides options for looping slide shows, enabling automatic advancements, and rehearsing timings.

- **Collaboration and Compatibility:** LibreOffice Impress supports a wide range of file formats, including the Microsoft PowerPoint formats (PPT, PPTX), making it easy to collaborate with users of other presentation software. You can import and export files in different formats, ensuring compatibility with different platforms.

- **Master Slides and Templates:** Impress supports master slides, which act as templates for your presentation. Master slides allow you to define the overall layout, background, fonts, and placeholders that are used consistently across multiple slides. This feature helps maintain a consistent design throughout your presentation and saves time when creating or modifying slides.

- **Speaker Notes and Presenter View:** Impress enables you to add speaker notes to your slides, which can be displayed separately to assist you during the presentation. The Presenter View provides a dual-screen setup where you can view your current slide, upcoming slides, speaker notes, and a timer, while your audience sees only the slides.

## 14.5 LAUNCHING IMPRESS

To launch LibreOffice Impress, you can follow these steps:

1. Ensure that you have LibreOffice installed on your computer. If you don't have it installed, you can download it for free from the official LibreOffice website (https://www.libreoffice.org).
2. Once LibreOffice is installed, open the application launcher or the Start menu on your computer.
3. Open your computer's start menu or launcher
4. Type "LibreOffice" in the search bar to find the LibreOffice program.
5. Click on the "LibreOffice Impress" icon to launch the program.
6. Once LibreOffice is open, click on the "Impress" icon, which should be located in the bottom row of icons. Alternatively, you can select "Impress" from the list of LibreOffice applications that appears when you click on the "Applications" menu at the top of the screen.
7. If you want to create a new presentation, select a blank slide or choose a template from the available options. Alternatively, you can open an existing presentation by selecting "Open" from the File menu.
8. Begin working on your presentation by adding slides, content, and formatting elements using the various tools and options available in the user interface.

Once you have launched LibreOffice Impress, you can start creating or editing your presentation. The software offers a range of tools and features to help you customize your slides, add multimedia content, apply animations and transitions, and many more.

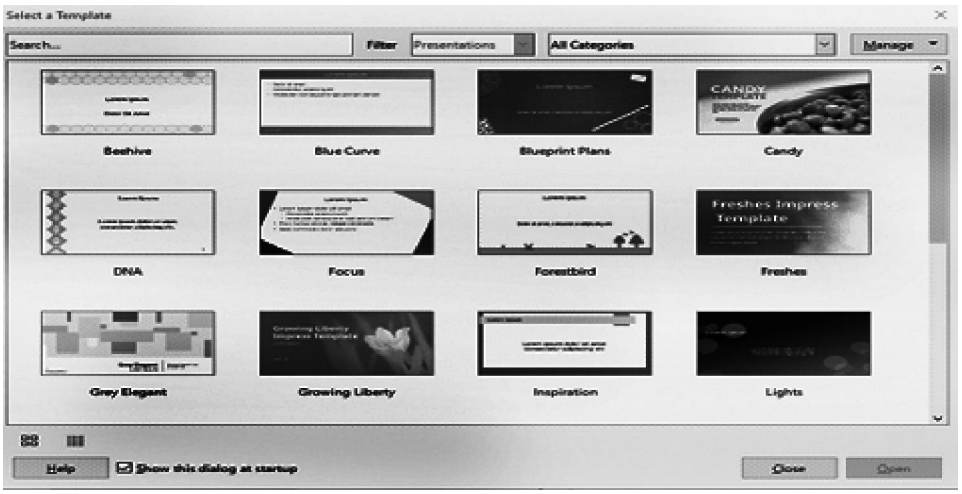



Figure 14.1:Template dialog

## 14.6 CREATING A NEW PRESENTATION

To create a new presentation in LibreOffice Impress, you can follow these steps:

- Launch LibreOffice Impress by following the instructions provided in the previous section.
- Once Impress is open, you will see a start screen with various options. To create a new presentation, click on the “Empty Presentation” option. This will open a new blank presentation for you to work on.
- Alternatively, you can also click on “Open File” if you want to start with an existing presentation template or a previously saved presentation.
- The main Impress interface will now be displayed, with a blank slide ready for editing. The slide pane on the right-hand side will show the thumbnail of the current slide.
- You can start building your presentation by adding slides. To add a new slide, you have a few options:
    - Click on the “New Slide” button on the toolbar. It typically looks like a plus symbol or a blank slide icon.
    - Go to the “Insert” menu and select “Slide” or “New Slide.”

- Use the keyboard shortcut “Ctrl+M” (Windows/Linux) or “Cmd+M” (Mac) to insert a new slide.

- Impress offers various slide layouts to choose from. You can select a layout that suits your content by clicking on the desired layout in the “Layouts” panel. The layout options are typically displayed on the right side of the interface.

- Now you can start adding content to your slides. Click on the text boxes provided on the slide and begin typing to enter your text. You can format the text by selecting it and using the formatting options available in the toolbar.

- To add images, charts, tables, or other graphical elements, go to the “Insert” menu and choose the desired option. You can also use the icons in the toolbar to insert these elements directly.

- Customize the appearance of your slides by applying different fonts, colors, backgrounds, and other formatting options available in the toolbar. You can also modify the slide master to ensure consistent formatting across all slides.

- To save your presentation, go to the “File” menu and choose “Save” or “Save As.” Give your presentation a name and select the desired file location on your computer.

- As you work on your presentation, remember to save your progress regularly to avoid losing any changes.

By following these steps, you can create a new presentation in LibreOffice Impress and begin designing your slides with various content elements and customization options.

## 14.7 NAVIGATING THE IMPRESS INTERFACE

When you first open LibreOffice Impress, you will see a user-friendly interface that consists of several elements. Here’s an overview of the main parts of the Impress interface and how to navigate them:

- Title Bar: The title bar at the top of the window displays the name of the program and the name of the current presentation.
- Menu Bar: The menu bar contains all the menus available in Impress,

such as File, Edit, View, Insert, Format, Slide, etc. You can access various options and settings from the menus.

- Toolbars: Impress has several toolbars, such as the Standard toolbar, the Formatting toolbar, and the Drawing toolbar. These toolbars contain various buttons and tools to help you create and edit your presentation.

- Slides Pane: The Slides pane is located on the left side of the window and displays a list of all the slides in your presentation. You can use it to navigate to a specific slide, add new slides, or delete existing slides.

- Workspace: The workspace is the main area where you create and edit your slides. It occupies the majority of the Impress window.

- Status Bar: The status bar is located at the bottom of the window and displays information about the current slide, such as the slide number, the slide layout, and the zoom level. You can also use it to switch between the normal and slide master views.

## 14.8 UNDERSTANDING THE DIFFERENT COMPONENTS OF THE SLIDE WINDOW

When working with slides in LibreOffice Impress, the Slide Window is the main area where you create and edit individual slides. Here are the different components of the Slide Window in LibreOffice Impress:

1. **Slide Area:** The largest section of the Slide Window is the Slide Area. It displays the content of the currently selected slide. You can add and format text, images, shapes, charts, and other elements within this area. It serves as a canvas for designing your slide layout.
2. **Slide Thumbnails:** On the left side of the Slide Window, you will find a vertical pane called the Slide Thumbnails pane. It provides a visual overview of all the slides in your presentation. You can click on a thumbnail to select and edit a specific slide. The selected slide's thumbnail is usually highlighted or visually differentiated from the rest.
3. **Slide Layout Pane:** Towards the right side of the Slide Window, you may find the Slide Layout pane. It displays different slide layout

options available for the selected slide. Each layout represents a predefined arrangement of placeholders for text, images, titles, and other content. You can select a layout that best suits your needs or modify it to fit your content.

4. **Properties Pane:** The Properties pane is located on the right side of the Slide Window, adjacent to the Slide Layout pane. It provides options to customize the properties and attributes of the selected slide or its elements. You can adjust settings related to slide transitions, animations, background color or image, and more. The options available in the Properties pane may vary depending on the selected slide element or the view mode.
5. **Ruler and Guides:** The Slide Window may have horizontal and vertical rulers at the top and left edges, respectively. The rulers help you align and position objects precisely on the slide. You can drag guides from the rulers onto the slide to create alignment guides, which assist in maintaining consistent spacing and alignment between slide elements.
6. **Task Panes:** Task Panes are additional panels that can be accessed through the View menu or specific toolbar buttons. These panes provide extended functionality for tasks such as formatting, applying transitions and animations, managing master slides, working with styles, and more. Task Panes can be docked to the Slide Window or placed as floating windows based on your preference.

Understanding these components of the Slide Window in LibreOffice Impress will allow you to efficiently create and design your slides, customize their layout and properties, and navigate through your presentation with ease.

These components of the Slide Window in LibreOffice Impress provide different ways to view, edit, and manage your slides. You can switch between these views and utilize their respective functionalities based on your specific needs during the creation and editing process of your presentation.

## 14.9 ADDING AND FORMATTING SLIDES:

To add and format slides in LibreOffice Impress, follow these steps:

1. Open LibreOffice Impress and click on the “New Presentation” option.
2. Choose a template or create a new blank presentation.
3. To add a new slide, click on the “New Slide” button located in the toolbar or go to the “Insert” menu and select “Slide”.

4. Choose the type of slide layout you want to use. You can select from a variety of pre-designed layouts or create your own.
5. To add content to your slide, click on the text boxes and insert your text. You can also insert images, shapes, charts, and other objects by going to the “Insert” menu.
6. To format your slide, go to the “Format” menu and choose the formatting options you want to apply. You can change the font, color, background, and other aspects of your slide.
7. To rearrange your slides, click and drag them to the desired position in the slide sorter view.
8. To apply transitions and animations to your slides, go to the “Slide Transition” and “Custom Animation” options located in the sidebar.
9. Save your presentation by going to the “File” menu and selecting “Save” or “Save As”.

By following these steps, you can create and format slides in LibreOffice Impress to create an engaging and visually appealing presentation.

## 14.10 APPLYING TRANSITIONS

LibreOffice Impress is a presentation software that allows users to create and edit slideshows with various effects, including transitions. The steps to apply transitions to slides in LibreOffice Impress are

1. Open your presentation in LibreOffice Impress.
2. Select the slide to which you want to apply a transition.
3. Click on the “Slide Transition” icon located in the sidebar or go to the “Slide” menu and select “Slide Transition.”
4. In the “Slide Transition” panel, select the transition effect you want to apply to the slide. You can choose from various options, such as fade, dissolve, push, wipe, and more.
5. Set the transition options, such as direction, speed, sound, and duration, by using the corresponding controls in the “Slide Transition” panel.
6. Preview the transition by clicking on the “Preview” button located at the bottom of the panel.
7. Apply the transition by clicking on the “Apply” button.

8. Repeat the process for other slides if you want to apply transitions to them as well.

9. Save your presentation by going to the “File” menu and selecting “Save” or “Save As.”

By following these steps, you can apply transitions to slides in LibreOffice Impress to create a dynamic and engaging slideshow.

## 14.11 CUSTOMIZING PRESENTATIONS SETTINGS

By following these steps, you can customize presentation settings in LibreOffice Impress to tailor your slideshow according to your preferences and requirements.

LibreOffice Impress is a presentation software that allows users to customize various settings to create and edit presentations. Here are the steps to customize presentation settings in LibreOffice Impress:

1. Open your presentation in LibreOffice Impress.

2. Click on the “Tools” menu and select “Options.”

3. In the “Options” dialog box, select “LibreOffice Impress” from the left-hand menu.

4. Customize the settings in the “General” tab, such as the default presentation format, the number of undo steps, and the default language.

5. Customize the settings in the “Print” tab, such as the printer settings, the number of copies, and the page layout.

6. Customize the settings in the “View” tab, such as the display options, the grid settings, and the zoom level.

7. Customize the settings in the “Slide Show” tab, such as the timing, the slide transition speed, and the sound.

8. Customize the settings in the “Compatibility” tab, such as the file format options and the font embedding.

9. Click on the “OK” button to apply the changes.



## CHECK YOUR PROGRSS

Q.1: What do you understand by a presentation?

Q.2: Define a template in Impress.

Q.3: What is a Normal view? Explain.

Q.4: How many types of views are provided by Impress to its users?

Q.5: Define the Slide Sorter view and its significance.



## 14.12 LET US SUM UP

- To create a new presentation, click File > New... and then click "Blank Presentation" in "New Presentation" task pane.
- There are three types of views of a presentation – Normal View, Slide Sorter View and Reading View.
- To create/insert a new slide in to your presentation, click on the slide after which you want to insert the new slide then click Home –> New Slide.
- You can change your font and font-styles of your text with the help of either Home menu or by short-cut buttons/keys.
- To delete an existing slide, right-click on the slide and then click "Delete Slide" option.
- You can also apply designs to your slides by using the design templates provided in Impress. To apply design template, select the "Design" menu and then select a design template.



## 14.13 ANSWERS TO CHECK YOUR PROGRESS

**Answer to Q No1:** An Impress presentation refers to a type of presentation created using LibreOffice Impress, which is a free and open-source presentation software. Impress is part of the LibreOffice suite, which provides a range of office productivity tools similar to Microsoft Office.Impress is designed to help users create professional-looking

slideshows and presentations. It offers a variety of features and tools for creating, editing, and delivering presentations.

**Answer to Q No 2:** In Impress, a template refers to a pre-designed layout or format that serves as a starting point for creating presentations. It is a predefined structure that includes placeholders for text, images, charts, and other visual elements. Templates in Impress provide users with a consistent and professional-looking design, helping them save time and effort in creating visually appealing presentations.

**Answer to Q No 3:** In the context of presentation software such as Impress or PowerPoint, the "Normal view" is a working mode that provides users with a comprehensive and versatile interface for creating and editing slides. It is also commonly referred to as the "Normal editing view" or "Slide editing view."The Normal view is specifically designed to provide a comprehensive workspace for efficiently creating and editing presentation slides.

**Answer to Q No 4:** Impress provides several different views to its users, each serving a specific purpose and offering a unique perspective on the presentation. The various views available in Impress include:(a) Normal View,(b)Slide Sorter View (c) Notes View(d) Handout View (e) Outline View (f) Slide Show View.

**Answer to Q No 5:** The Slide Sorter view in Impress is a viewing mode that displays a grid of thumbnail representations of all the slides in a presentation. It provides an overview of the entire presentation and allows users to easily manage and manipulate the sequence and arrangement of slides.



## 14.14 FURTHER READING

1) Gupta, Vikas. Comdex Linux and Open Office Course Kit (with CD Rom). New Delhi: Dreamtech Press, 2010. Print.

2) Wikipedia, the Free Encyclopedia (2012). OpenOffice.org. Web. 15 April 2013. <http://en.wikipedia.org/wiki/OpenOffice.org \>.

3) The Document Foundation. LibreOffice 4.0 Getting Started Guide. 2013. Web.20 April 2013.<http://www.libreoffice.org/get-help/documentation>.



## 14.15 MODEL QUESTIONS

Q.1: What are the purposes for which LibreOffice Impress can be used?

Q.2: What are the different types of views of Impress presentation?

Q.3: What view is useful to see possibly all the slides in a single window?

Q.4: What options are available for applying slide transitions in Impress?

Q.5: What options are available for applying slide transitions in Impress?

Q.6: What are master slides in LibreOffice Impress, and how can you use them?

Q.7: How do you create a new slide in LibreOffice Impress?

Q.8: What are the different slide layouts available in Impress?

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# UNIT 15 : WORKING WITH MULTIMEDIA AND ANIMATIONS IN IMPRESS

**UNIT STRUCTURE**


15.1 Learning Objectives

15..2 Introduction

15.3 Adding Images, Audio and Video to a Presentation

15.4 Creating and Modifying Animations to Enhance Visual Effects

15.5 Using Impress's Bulting Tools for Recording and Rehearing Presentations

15.6 Let Us Sum Up

15.7 Answers to Check Your Progress

15.8 Further Reading

15.9 Model Questions


## 15.2 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- add images, audio and video to a presentation
- create and modify animations to enhance visual effects
- use Impress's building tools for recording and rehearing presentations.

## 15.2 INTRODUCTION

In the previous unit we have learnt about the basic concept of Libreoffice Impress. This unit will help you to create and modify your presentation, i.e. inserting and deleting slides, applying existing design templates to the slides, adding animations to the contents of the slides and also adding slide transition effects to the slides.

## 15.3 ADDING IMAGES, AUDIO AND VIDEO TO A PRESENTATION

To add images, audio, and video to a presentation in LibreOffice Impress, follow these steps:

Adding Images:

1. Open your presentation in LibreOffice Impress.
2. Select the slide where you want to add the image.
3. Go to the “Insert” menu and choose “Image” or click on the “Insert Image” icon in the toolbar.
4. Locate and select the image file you want to insert, then click “Open.”
5. Resize and position the image on the slide as desired by clicking and dragging its corners or edges.




Figure 15.1: Inserting an image using Insert menu

In order to insert an image in OpenOffice Impress, place the cursor in the place where you want the image to be inserted (Figure 15.1).Then, Click Insert ’! select Picture ’! From File option from the Insert menu. OpenOffice Impress will display the dialog box, where you can select the image from the specific location and select open. The image will be inserted in the specified location. Figure 15.2

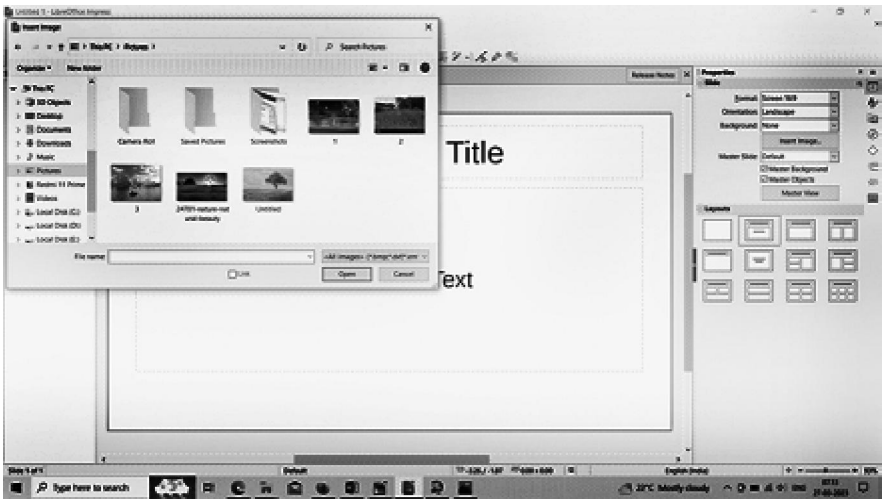



Figure 15.2 Selecting the image from a location

**Adding Audio:**

1. Open your presentation in LibreOffice Impress.
2. Select the slide where you want to add the audio.
3. Go to the “Insert” menu and choose “Audio or Video” or click on the “Insert Audio or Video” icon in the toolbar.
4. Locate and select the audio file you want to insert, then click “Open.”
5. A dialog box will appear with options to either play the audio automatically or when clicked. Choose the desired option and click “OK.”

**Adding Video:**

1. Open your presentation in LibreOffice Impress.
2. Select the slide where you want to add the video.
3. Go to the “Insert” menu and choose “Audio or Video” or click on the “Insert Audio or Video” icon in the toolbar.
4. Locate and select the video file you want to insert, then click “Open.”
5. A dialog box will appear with options to either play the video automatically or when clicked. Choose the desired option and click “OK.”

After adding images, audio, or video to your presentation, you can further customize their appearance and settings by selecting the inserted object and using the various formatting options available in LibreOffice Impress.

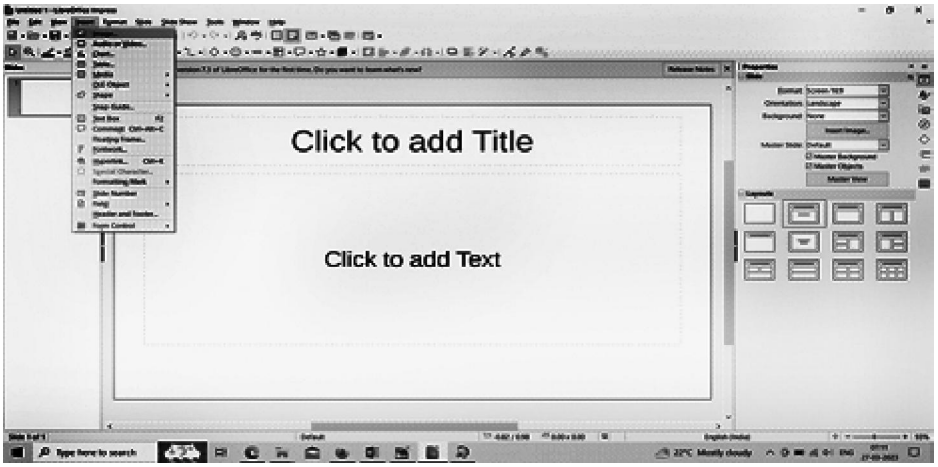



Figure 15.3: Inserting Movie and Sound

By following these steps, you can add images, audio, and video to a presentation in LibreOffice Impress to create a dynamic and engaging slideshow.

Libre Office Impres will let you insert audio files or movie files. The audio and movie files can be inserted by clicking Insert Movie and Sounds opotion from the Insert menu.

Same as inserting images here also, a dialog box will be opened. Select the audio or movie file form the specified location and open. It will be opened in the slide. The movie or audio file inserted will be played during the slide show by clicking the mouse over it.




Figure 15.4 :Selecting the Movie / Sound file styles

## 15.4 CREATING AND MODIFYING ANIMATIONS TO ENHANCE VISUAL EFFECTS

Libre Office Impress allows users to create and modify animations to enhance visual effects and make presentations more dynamic. Here are the steps to create and modify animations in LibreOffice Impress:

Creating Animations:

1. Open your presentation in LibreOffice Impress.
2. Select the slide object (text box, image, shape, etc.) to which you want to apply an animation.
3. Go to the “Slide” menu and select “Custom Animation” or click on the “Custom Animation” icon in the sidebar.
4. In the “Custom Animation” pane, click on the “Add” button to add a new animation to the selected object.
5. Choose the animation effect you want to apply from the list. You can select from options such as entrance, emphasis, exit, or motion paths.
6. Set the animation options, such as duration, delay, and direction, by using the controls in the “Custom Animation” pane.
7. Click on the “Play” button to preview the animation.
8. To add more animations to the same object, repeat steps 4-7.

To apply animations to other objects on the slide, select the object and repeat steps 4-8.

Modifying Animations:

1. Select the slide object with the animation you want to modify.
2. Go to the “Slide” menu and select “Custom Animation” or click on the “Custom Animation” icon in the sidebar.
3. In the “Custom Animation” pane, select the animation you want to modify.

4. Adjust the animation options, such as duration, delay, or timing, by using the controls in the “Custom Animation” pane.

5. To change the order of animations, use the up and down arrows in the “Custom Animation” pane to rearrange them.

6. To remove an animation, select it in the “Custom Animation” pane and click on the “Remove” button.

7. Click on the “Play” button to preview the modified animation.

8. To modify animations on other objects, select the object and repeat steps 3-7.

Click on the “Close” button to exit the “Custom Animation” pane.

By following these steps, you can create and modify animations in LibreOffice Impress to enhance the visual effects and make your presentations more engaging.

## 15.5 USING IMPRESS’S BULTING TOOLS FOR RECORDING AND REHEARING PRESENTATION

Libre Office Impress does not have built-in tools specifically for recording and rehearsing presentations. However, you can still achieve similar functionality using external screen recording and rehearsal tools. Here is a general approach you can follow:

**Recording Presentations:**

1. Set up a screen recording tool on your computer. There are several third-party screen recording software available, such as OBS Studio, Camtasia, or QuickTime Player (for Mac users).

2. Open your presentation in LibreOffice Impress and start the screen recording tool.

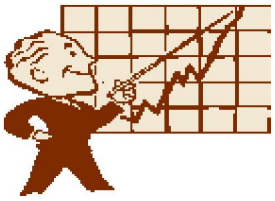
3. Begin presenting your slides in LibreOffice Impress while the screen recording tool captures your screen and audio.

4. Go through your entire presentation, and the screen recording tool will record your presentation as a video file.

**Rehearsing Presentations:**

1. Set up a rehearsal environment where you can practice your presentation comfortably.
2. Open your presentation in LibreOffice Impress.
3. Start a timer or use a stopwatch to time your presentation.
4. Practice presenting your slides, paying attention to your timing, delivery, and overall performance.
5. Make note of any areas where you stumble or need improvement, and consider making revisions to your presentation accordingly.
6. Repeat the rehearsal process until you feel confident with your presentation.

While LibreOffice Impress does not have built-in features for recording and rehearsing, you can utilize external tools for these purposes.



## CHECK YOUR PROGRESS

Q.1 How can you add image or picture inyour presentation in Impress? Explain.

Q.2: How can you add audio or video in your presentation in Impress?Explain.



## 15.6 LET US SUM UP

- Libre Office Impress allows users to add images, audio, and video to make presentations more lively.
- Libre Office Impress allows users to create and modify animations to enhance visual effects and make presentations more dynamic.



## 15.7 ANSWERS TO CHECK YOUR PROGRESS

**Answer to Q No 1** :See the section 15.3

**Answer to Q No 2** :See the section 15.3



## 15.8 FURTHER READING

1) Gupta, Vikas. Comdex Linux and Open Office Course Kit, New Delhi: Dreamtech Press, 2010. Print.

2) Wikipedia, the Free Encyclopedia (2012). OpenOffice.org. Web. 15 April 2013. <http://en.wikipedia.org/wiki/OpenOffice.org \>.

3) The Document Foundation. LibreOffice 4.0 Getting Started Guide. 2013. Web. 20 April 2013. <http://www.libreoffice.org/get-help/documentation>.



## 15.9 MODEL QUESTIONS

Q.1: What do you mean by custom animation? Write down the steps for applying an animation effect.

Q.2: What are the different kinds of animation effects?

Q.3: Are the slide transition effect and custom animation effect means the same? Explain your answer.

Q.4: Create a Impress about your institute and animation effects and transitions effects to the contents of the slides and the slides respectively. Make at least 5 slides for the presentation.

Q.5: How do you add animations to objects in my presentation?

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# UNIT 16: INTRODUCTION TO BASE

## UNIT STRUCTURE


16.1 Learning Objectives

16.2 Introduction

16.3 Overview of Base

- 16.3.1 What is Base?
- 16.3.2 Features of Base

16.4 Launching Base and creating a new database

- 16.4.1 Opening Base
- 16.4.2 Creating a new database

16.5 Creating tables

- 16.5.1 What are tables?
- 16.5.2 Creating a table using the Table Design View
- 16.5.3 Entering data into a table

16.6 Creating forms

- 16.6.1 What are forms?
- 16.6.2 Creating a form using the Form Design View
- 16.6.3 Adding fields to a form

16.7 Creating queries

- 16.7.1 What are queries?
- 16.7.2 Creating a query using the Query Design View
- 16.7.3 Adding criteria to a query

16.8 Creating reports

- 16.8.1 What are reports?
- 16.8.2 Creating a report using the Report Design View
- 16.8.3 Adding fields to a report

16.9 Let Us Sum Up

16.10 Answers to Check Your Progress

16.11 Further Reading

16.12 Model Questions

## 16.1 LEARNING OBJECTIVES

After going through this unit, you will be able to

- understand the purpose and features of Base as a database management system.
- learn how to launch Base and create a new database.
- understand the concept of tables and learn how to create tables using the Table Design View.
- learn how to enter data into a table and manipulate table data.
- understand the concept of forms and learn how to create forms using the Form Design View.
- learn how to add fields to a form and manipulate form data.
- understand the concept of queries and learn how to create queries using the Query Design View.
- learn how to add criteria to a query and retrieve specific data from tables.
- understand the concept of reports and learn how to create reports using the Report Design View.
- learn how to add fields to a report and manipulate report data.

## 16.2 INTRODUCTION

Base is a powerful database management system (DBMS) that is included in the LibreOffice suite of productivity software. With Base, users can create, edit, and manage databases that can store a wide range of information, from simple lists to complex relational data. It offers features such as creating tables, forms, queries, and reports, and it can connect to various database engines. In this article, we will explore the basic features and functionality of Base, including how to create a new database, design tables, create forms, queries, and reports. By the end of this article, you will have a basic understanding of Base and be able to start creating your own databases.

## 16.3 OVERVIEW OF BASE

### 16.3.1 What is Base?

LibreOffice Base is a database management system (DBMS) that is included in the LibreOffice suite of productivity software. It provides a user-friendly interface for creating and managing databases, allowing users to store, organize, and retrieve various types of data. Base allows users to create tables, forms, queries, and reports, and it can connect to various database engines such as MySQL, PostgreSQL, and Microsoft Access. Base is open-source software, which means that it is free to download, use, and distribute. It is available for Windows, macOS, and Linux operating systems, making it a versatile and accessible tool for managing databases across different platforms.

### 16.3.2 Features of Base

The features of LibreOffice Base, a database management system, are:

(a) Creating and managing databases: Users can create and manage multiple databases within Base. They can connect to various database engines such as MySQL, PostgreSQL, and Microsoft Access.

(b) Designing Tables: Users can design tables with multiple fields and data types, set primary keys, and set relationships between tables.

(c) Creating Forms: Base allows users to create forms to enter, edit, and view data in tables. Users can customize the form layouts, create sub-forms, and add controls such as buttons and drop-down lists.

(d) Creating Queries: Base allows users to create queries to retrieve specific data from one or multiple tables. Users can filter, sort, and calculate data using queries.

(e) Creating Reports: Users can create reports to present data in a visually appealing format. Users can customize the report layout, add charts, graphs, and other design elements.

(f) Importing and Exporting Data: Base allows users to import and export data from various formats, such as CSV, Excel, and Access.

Overall, LibreOffice Base provides a powerful and flexible platform for creating, managing, and analyzing data in a variety of contexts, from personal data tracking to complex business operations.

## 16.4 LAUNCHING BASE AND CREATING A NEW DATABASE

### 16.4.1 Opening Base

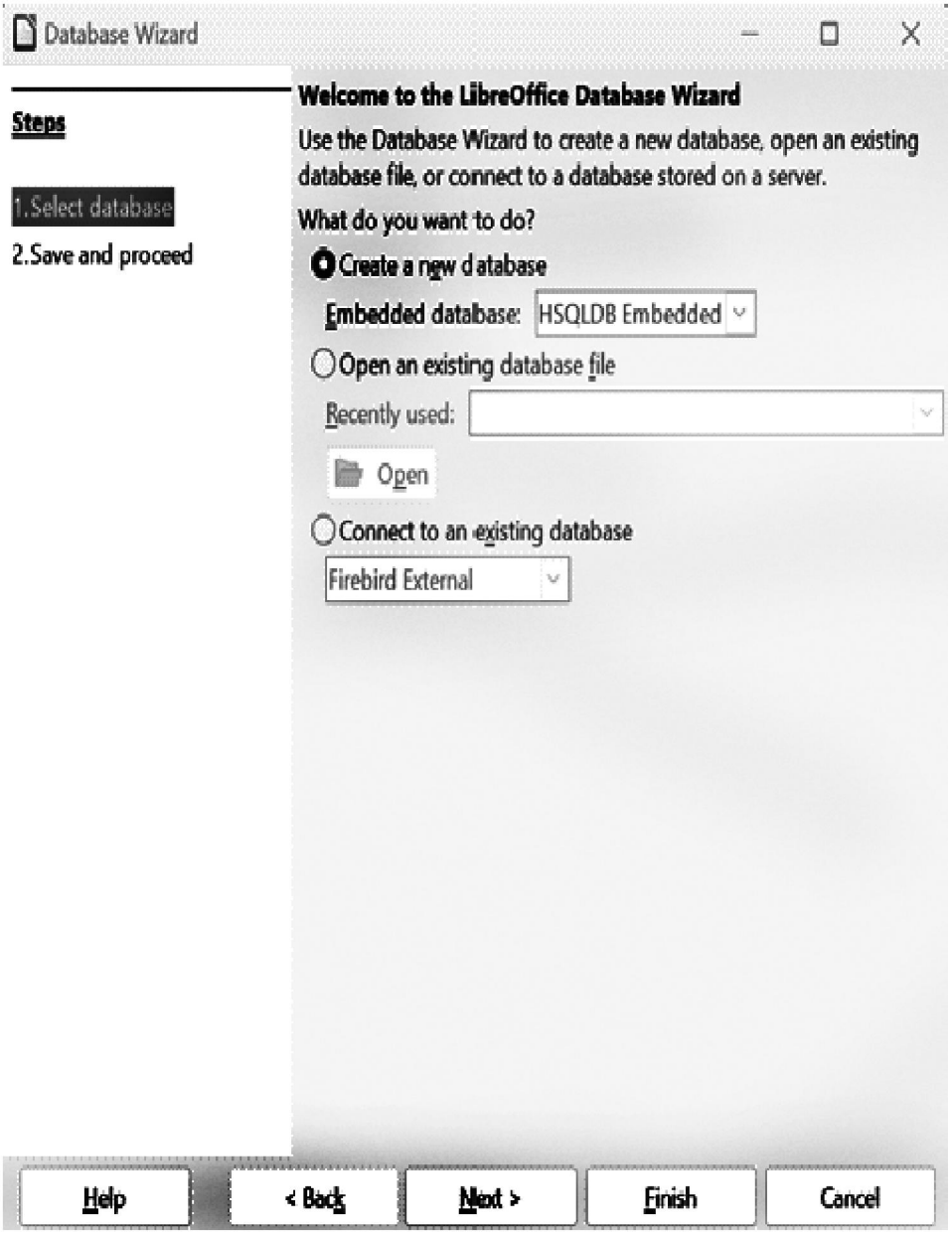
To open LibreOffice Base, you can follow these steps:

1. Click on the “Start” menu button on your computer’s desktop.
2. Type “LibreOffice” in the search bar to locate the application.
3. Click on the “LibreOffice” icon to launch the LibreOffice suite.
4. From the LibreOffice Welcome screen, click on the “Base” icon to launch LibreOffice Base.

### 16.4.2 Creating a new database

Here is the step-by-step procedure to create a new database in LibreOffice Base:

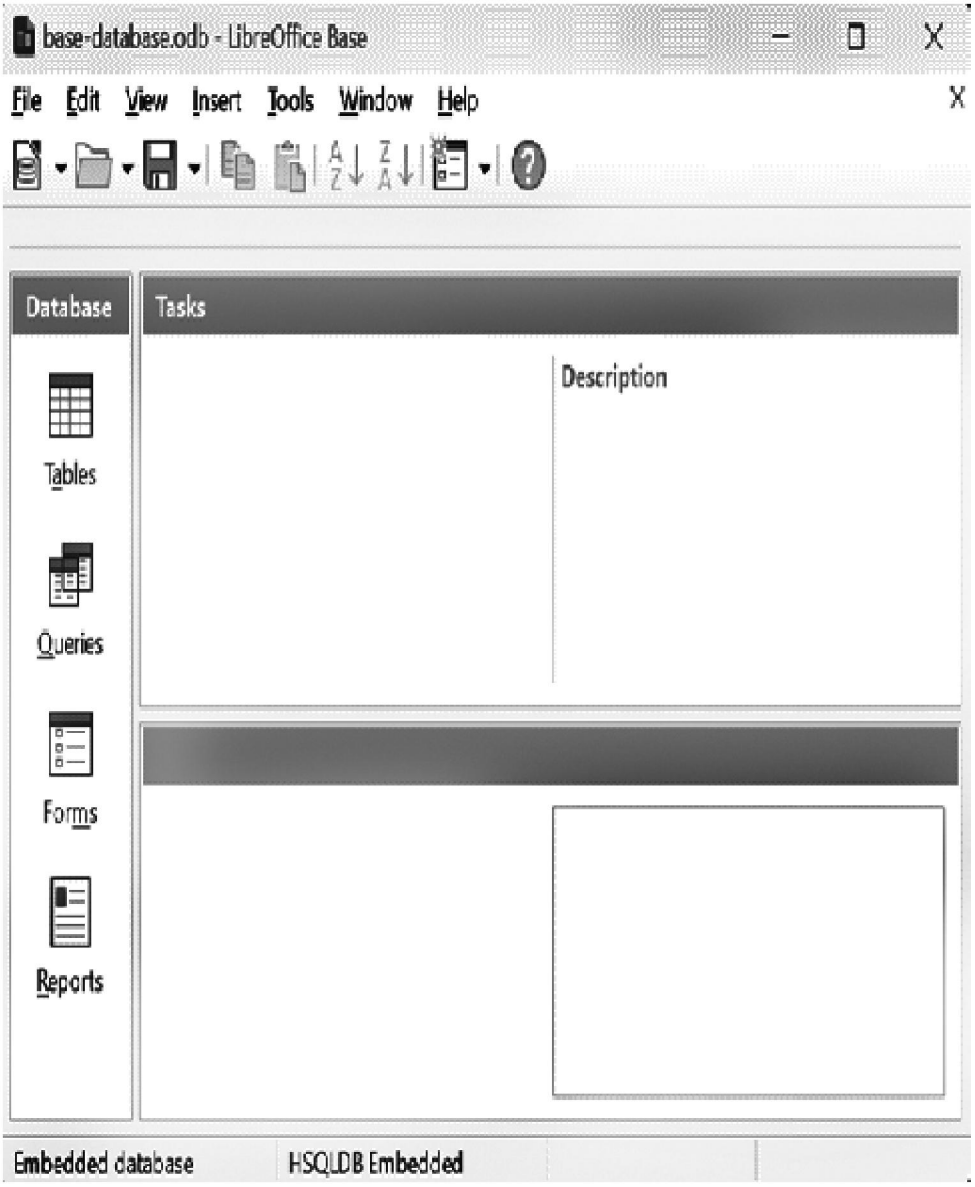
1. Create a new database: In the LibreOffice Base window, click on the “Create a new database” option.




2. Select the database type: Choose the type of database you want to create. You can select from the following options:
   - “Connect to an existing database”: Connect to an existing database file.
   - “Create a new database”: Create a new database file.
   - “Open anexisting database file”: Open an existing database file.

3. Choose the location and name of the database: In the “Save As” dialog box, select the location where you want to save the database file, give it a name, and click “Save.”
4. Select the database engine: Choose the database engine you want to use. The default is “HSQLDB Embedded,” which is suitable for small to medium-sized databases. For larger databases, you may want to consider using a different database engine such as MySQL or PostgreSQL.
5. Set up the database: In the “Set up the database” dialog box, choose the options you want for your database, such as the default table type, default character set, and default collation. Click “Next” when you’re done.
6. Choose the user authentication method: Choose the user authentication method you want to use. The default is “User-defined,” which means you can create your own usernames and passwords. You can also choose “System” to use the system login information or “No authentication” to have no authentication at all.
7. Create the database: Review your database settings and click “Create” to create the new database. Once the database is created, you can start designing tables, forms, queries, and reports.

   Following is the screenshot of “creating a new database” which is saved with database name “base-database”




## 16.5 CREATING TABLES

### 16.5.1 What are tables?

In LibreOffice Base, a table is a collection of related data organized into rows and columns. It is similar to a table in a spreadsheet program like LibreOffice Calc or Microsoft Excel, but in Base, tables are used to store data in a database.

Tables in Base have the following properties:

Columns: Each table has a set of columns that define the type of

data that can be stored in each field. For example, a column might be defined as text, date, or number.

Rows: The data stored in a table is organized into rows, with each row representing a separate record. Each row contains data that corresponds to the columns in the table.

Keys: A table can have one or more columns designated as keys, which are used to uniquely identify each record in the table.

Relationships: Tables can be related to one another through common columns, allowing data to be shared between them.

Tables are the foundation of any database in LibreOffice Base, and they are used to store and organize all of the data in the database. Other database objects, such as forms and queries, are built on top of tables, making them an essential component of any database application.Top of Form

## 16.5.2 Creating a table using the Table Design View

The step-by-step procedure to create a table using the Table Design View:

1. Open LibreOffice Base and create a new database or open an existing one.
2. In the main window of LibreOffice Base, click on the “Tables” icon in the left-hand panel.
3. Click the “Create Table in Design View” button at the bottom of the window.
4. In the “Table Design” dialog box, enter a name for your table in the “Table Name” field.
5. In the “Field Name” column, enter a name for the first field in your table.
6. In the “Type” column, select the data type for the first field. You can choose from options such as “Text”, “Number”, “Date”, etc.
7. If you want to specify any additional options for the field, such as a default value or maximum length, you can do so in the “Properties” column.

8. Repeat steps 5-7 for each additional field you want to add to your table.
9. If you want to set a primary key for your table, select the field or fields that will be part of the key and click the “Primary Key” button at the top of the window.
10. Click the “Save” button to save your new table.
11. In the “Save As” dialog box, choose a location to save the table and enter a name for the table.
12. Click “OK” to save the table and close the “Table Design” dialog box.

Your new table will now be listed in the “Tables” section of the LibreOffice Base window. You can open the table to view and edit the data stored in it, or use it as the basis for creating forms, queries, and reports in LibreOffice Base.

### 16.5.3 Entering data into a table

Here’s a step-by-step procedure to enter data into a table:

1. Open LibreOffice Base and create a new database file or open an existing one.
2. In the main menu, click on “Tables” and select the table you want to add data to.
3. Click on the “Edit” button to open the table in edit mode.
4. You should see an empty grid with the column names of your table. Start by typing the data for the first row in the appropriate cells.
5. You can use the Tab key to move to the next cell or the Enter key to move to the next row.
6. Keep entering data until you have filled in all the necessary rows and columns.
7. Once you are done, click on the “Save” button to save your changes to the table.
8. Close the table edit mode by clicking on the “Close” button.

9. You can now view the data you entered by going to the “Forms” or “Queries” section, selecting the appropriate form or query, and opening it.

## 16.6 CREATING FORMS

### 16.6.1 What are forms?

Forms in LibreOffice Base are graphical user interfaces that allow you to view, input, modify, and delete data in a database. Forms are a fundamental feature of any database application, as they allow users to interact with the database in a more user-friendly way than working directly with the raw data in tables.

Forms in LibreOffice Base can be created using a wizard or by designing them manually using the Form Design view. Once created, forms can be customized to suit your needs by adding controls such as text boxes, drop-down lists, and buttons, as well as applying formatting and validation rules to ensure data is entered correctly.

### 16.6.2 Creating a form using the Form Design View

Here are the step-by-step procedure for creating a form using the Form Design View in LibreOffice Base:

1. Open LibreOffice Base and select the database you want to create a form for.
2. Click on the “Forms” tab in the main window to display the available forms.
3. Click on the “Use Wizard to Create Form” button to launch the form creation wizard, or select “Create Form in Design View” from the “Forms” drop-down menu to create a form manually.
4. In the Form Design View, click on the “Design Mode On/Off” button in the toolbar to turn on design mode if it is not already on.
5. Use the “Controls” toolbar to add controls such as text boxes, labels, and buttons to the form. You can click and drag the controls to move

them around the form, and resize them by clicking and dragging the handles on the edges.

6. Use the “Properties” panel to customize the properties of each control. For example, you can set the name, data type, and validation rules for a text box.
7. Use the “Form Navigator” panel to add, remove, or rearrange fields on the form. You can also use this panel to create sub-forms or set up master-detail relationships between tables.
8. Use the “Form Design Toolbar” to customize the appearance of the form. You can change the font, color, and style of the form elements, as well as set up conditional formatting to highlight certain data.
9. When you are satisfied with the form design, click on the “Save” button in the toolbar to save the form. You can give the form a name and choose where to save it in the database.
10. To test the form, switch to “Form Design Off” mode by clicking on the “Design Mode On/Off” button in the toolbar. You can then use the form to view, input, modify, or delete data in the database.

With these steps, you should be able to create a form using the Form Design View in LibreOffice Base.

### 16.6.3 Adding fields to a form

Here are the step-by-step procedures to add fields to a form in LibreOffice Base:

1. Open LibreOffice Base and open the database containing the table to which you want to add fields to the form.
2. Click on the Forms tab at the bottom of the LibreOffice Base window to open the Forms section.
3. Click on the Create Form in Design View option to create a new form in the design view.
4. In the Form Design view, select the Controls icon in the left-hand sidebar, then select the type of control you want to add to the form from the list. For example, select Text Box for a field that will accept text input.

5. Click and drag the control onto the form where you want to place it.
6. Right-click on the new control and select Control Properties from the context menu.
7. In the Control Properties dialog box, select the Data tab.
8. In the Data tab, select the table to which you want to bind the control from the Table drop-down menu.
9. Select the field from the table that you want to associate with the control from the Field drop-down menu.
10. Adjust any other settings or properties for the control as desired, such as default values or validation rules.
11. Repeat the above steps to add additional fields to the form as needed.
12. Save the form when finished by selecting File > Save from the menu bar or by using the keyboard shortcut Ctrl + S.

Your form should now be updated with the new fields, and you can use it to input, view, or modify data in your database.

## 16.7 CREATING QUERIES

### 16.7.1 What are queries?

Queries in LibreOffice Base are a powerful tool for retrieving specific data from a database. A query is essentially a search that you perform on the data in your database to extract only the information that meets specific criteria.

Queries can be saved and reused, which makes them a useful tool for generating reports or answering recurring questions. By creating a query once, you can extract the information you need quickly and easily each time you need it, without having to manually search through the entire database.

### 16.7.2 Creating a query using the Query Design View

Here's a step-by-step procedure to create a query using the Query Design View in LibreOffice Base:

1. Open LibreOffice Base and open the database you want to work with.
2. Click on the “Queries” icon in the left-hand pane of the main window.
3. Click on the “Create Query in Design View” button in the toolbar.
4. In the “Tables” pane, select the tables or queries you want to include in the query by double-clicking on them or dragging them to the main pane.
5. Drag the fields you want to include in the query from the “Tables” pane to the main pane. You can also use the “Add Field” button in the toolbar.
6. If you want to include criteria for the query, use the “Criteria” row in the main pane. For example, if you only want to include records where the value in a certain field is greater than a specific number, you would enter “> [number]” in the Criteria row for that field.
7. If you want to sort the results of the query, use the “Sort” row in the main pane. You can specify ascending or descending order for each field.
8. Click the “Run Query” button in the toolbar to preview the results of the query. You can also use the “Run” menu and select “Run Query”.
9. If the query is returning the results you want, save it by clicking the “Save” button in the toolbar or using the “File” menu.
10. Give the query a name and click “OK”. The query will be saved and can be run or edited in the future.

### 16.7.3 Adding criteria to a query

Here are the step-by-step procedures to add criteria to a query in LibreOffice Base:

1. Open LibreOffice Base and select the database that contains the table you want to query.
2. Click on the “Queries” icon in the left sidebar to open the Queries section.

3. Click on the “Create Query in SQL View” button to create a new query.
4. In the Query Design View, click on the “Criteria” row in the grid that corresponds to the field you want to filter.
5. Type the criteria you want to use to filter the field. For example, if you want to find all records where the “Age” field is greater than 25, you would enter “>25” in the Criteria cell.
6. Repeat steps 4-5 for each field you want to filter.
7. Click on the “Run Query” button to view the results of your query.
8. If necessary, refine your criteria until you get the desired results. You can do this by changing the values in the Criteria cells or by adding additional criteria.
9. When you’re satisfied with your query, save it by clicking on the “Save” button in the toolbar.
10. You can now reuse your query whenever you need to retrieve data that meets your criteria by opening it from the Queries section in the left sidebar.

Overall, adding criteria to a query in LibreOffice Base is a simple process that allows you to extract specific data from your database quickly and efficiently. By refining your criteria, you can further narrow down your search and get the information you need with ease.

## 16.8 CREATING REPORTS

### 16.8.1 What are reports?

In LibreOffice Base, a report is a document that presents data from a database in a structured and formatted manner. Reports can be used to create professional-looking documents such as invoices, letters, or other business documents. Reports can be based on queries or tables, and can include data from multiple tables or queries.

### 16.8.2 Creating a report using the Report Design View

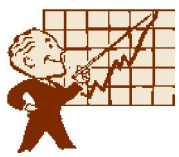
Followings are step-by-step procedure to create a report using the Report Design View in LibreOffice Base:

1. Open LibreOffice Base and select the database that contains the table or query you want to base your report on.
2. Click on the “Reports” icon in the left-hand panel to open the reports section.
3. Right-click on an empty space in the reports section and select “Create Report in Design View” from the context menu.
4. In the “Select Database Tables” dialog box, select the table or query you want to base your report on and click “Add”.
5. In the “Report Design” view, you will see the “Report Navigator” pane on the left, and the “Design” pane on the right. The “Design” pane is where you will create your report layout.
6. Drag and drop the fields from the “Table Field List” pane onto the “Design” pane to add them to your report. You can also use the “Report Wizard” to guide you through this process.
7. To format your report, select the field or section you want to format, and use the formatting options in the “Properties” pane on the right.
8. To add headers, footers, or page numbers to your report, right-click on the corresponding section in the “Report Navigator” pane, and select “Edit”.
9. Preview your report by clicking the “Preview” button in the toolbar. You can also print your report or export it to a different format.
10. Save your report by clicking on “File” and selecting “Save” or “Save As”.

### 16.8.3 Adding fields to a report

Followings are step-by-step procedure to add fields to a report in LibreOffice Base:

1. Open your database in LibreOffice Base and click on the “Reports” icon in the main window.
2. Select the report you want to modify from the list of available reports and click “Edit.”
3. In the report editor, click on the “Design View” button to switch to design mode.
4. To add a new field to the report, click on the “Insert Field” button in the toolbar. This will open the “Insert Field” dialog box.
5. In the “Insert Field” dialog box, select the table or query that contains the field you want to add to the report.
6. Choose the field you want to add from the list of available fields, and click “OK.”
7. The new field will now be added to the report, and you can position it by dragging it to the desired location on the report.
8. To modify the formatting of the field, right-click on the field and select “Properties.” This will open the “Properties” dialog box, where you can change the font, color, alignment, and other formatting options for the field.
9. Repeat steps 4-8 to add any additional fields you want to include in the report.
10. Once you have added all the desired fields and modified their formatting, save the report by clicking on the “Save” button in the toolbar.
11. To view the report with the new fields, click on the “Preview” button in the toolbar. This will generate a preview of the report that you can view and print.



## CHECK YOUR PROGRESS

Choose the correct option:

1. What is LibreOffice Base?

A. A spreadsheet program

B. A database management system

C. A word processing program

D. An email client

2. What types of data can be stored in a table in Base?

A. Text, images, and videos

B. Numbers, dates, and times

C. Music, movies, and podcasts

D. All of the above

3. Which of the following is NOT a feature of Base?

A. Creating and managing databases

B. Designing tables

C. Creating animations

D. Importing and exporting data

4. Which operating systems is Base available on?

A. Windows and Linux

B. macOS and Windows

C. macOS and Linux

D. iOS and Android

5. What is a key in a table?

A. A tool used to open the table

B. A column used to uniquely identify each record in the table

C. A type of data that can be stored in the table

D. A relationship between tables

6. What is the purpose of a query in Base?

A. To create charts and graphs

B. To filter and sort data from one or multiple tables

C. To create sub-forms

D. To create reports

7. What is a query in LibreOffice Base?

A. A tool for retrieving specific data from a database

B. A tool for creating professional-looking documents

C. A tool for formatting data in a structured manner

D. A tool for creating tables and fields in a database

8. What is the purpose of creating a query in LibreOffice Base?

A. To create reports

B. To create tables

C. To extract specific data from a database

D. To format data in a structured manner

9. Which view is used to create a query in LibreOffice Base?

A. Report Design View

B. Table Design View

C. Form Design View

D. Query Design View

10. How can you add criteria to a query in LibreOffice Base?

A. By using the Report Design View

B. By using the Table Design View

C. By using the Form Design View

D. By using the Query Design View

11. What is a report in LibreOffice Base?

A. A tool for retrieving specific data from a database

B. A tool for creating professional-looking documents

C. A tool for formatting data in a structured manner

D. A tool for creating tables and fields in a database

12. Which view is used to create a report in LibreOffice Base?

A. Report Design View

B. Table Design View

C. Form Design View

D. Query Design View



## 16.9 LET US SUM UP

- Base provides various features such as creating and managing databases, designing tables, creating forms, queries, and reports, importing and exporting data, etc.
- To create a new database in LibreOffice Base, users can follow a simple step-by-step process that involves selecting the database type, location, name, database engine, and user authentication method.
- Tables are a fundamental component of a database in Base and consist of columns, rows, keys, and relationships that help store and organize data.
- Queries are a powerful tool in LibreOffice Base used for retrieving specific data from a database by searching and extracting information that meets specific criteria.
- Queries can be saved and reused, which makes them useful for generating reports or answering recurring questions.
- Criteria can be added to a query to further narrow down the search for specific data, and the query can be refined until the desired results are obtained.
- Reports in LibreOffice Base are structured and formatted documents that present data from a database and can be based on queries or tables.
- Reports can be created using the Report Design View, which provides tools for adding fields, formatting options, and sections such as headers, footers, and page numbers.
- Reports can be previewed and saved, and can be used to create professional-looking documents such as invoices, letters, or other business documents.



## 16.10 ANSWERS TO CHECK YOUR PROGRESS

1.B 2.B 3.C 4.B 5.B 6.B 7.A 8.C 9.D
10.D 11.B 12.A



## 16.11 FURTHER READING

1. "Getting Started with LibreOffice Writer," The Document Foundation, accessed March 11, 2023, https://documentation.libreoffice.org/en/english-documentation/getting-started-writer/.
2. "LibreOffice Writer Guide," The Document Foundation, accessed March 11, 2023, https://documentation.libreoffice.org/en/english-documentation/writer-guide/.
3. "LibreOffice Writer Tutorial," Tutorials Point, accessed March 11, 2023, https://www.tutorialspoint.com/libreoffice/libreoffice_writer_tutorial.htm.



## 14.12 MODEL QUESTIONS

**Q.No.1:** What is LibreOffice Base, and what are its main features?

**Q.No.2:** How do you launch LibreOffice Base, and what are the steps involved in creating a new database?

**Q.No.3:** What are tables in LibreOffice Base, and what properties do they have?

**Q.No.4:** How do you design tables in LibreOffice Base, and what are some of the options available for customizing their structure and properties?

**Q.No.5:** What are forms in LibreOffice Base and how do they enhance user interaction with the database?

**Q.No.6:** What are the two ways to create a form in LibreOffice Base, and what are the advantages of each approach?

**Q.No.7:** What are the basic steps involved in creating a form using the Form Design View in LibreOffice Base, and what are some of the key features and tools available in this view?

**Q.No.8:** How do you add fields to a form in LibreOffice Base, and what are some of the options and settings you can configure for these fields?

**Q.No.9:** What are queries in LibreOffice Base, and how do they help you extract specific information from a database? What are the basic steps involved in creating a query using the Query Design View, and what are some of the tools and options available in this view?

**Q.No.10:** What is a report in LibreOffice Base?

**Q.No.11:** What are the steps to create a report using the Report Design View in LibreOffice Base?

**Q.No.12:** How do you add fields to a report in LibreOffice Base?

**Q.No.13:** Can reports be based on multiple tables or queries in LibreOffice Base?

**Q.No.14:** How do you modify the formatting of a field in a report in LibreOffice Base?

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