FUNDAMENTALS OF COMPUTER-7BSOA1

UNIT-I

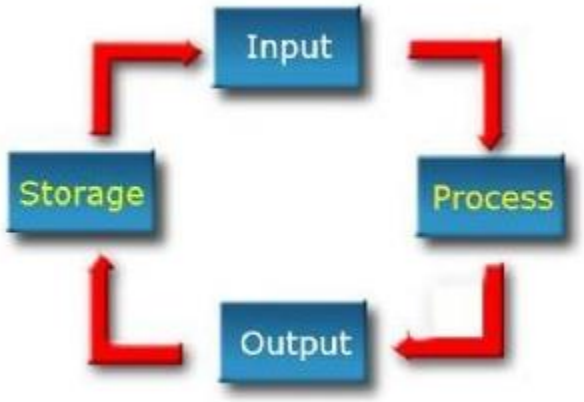
- COMPUTER: DEFINITION,
- CHARACTERSTICS OF COMPONENTS,
- BASIC APPLICATION OF COMPUTERS.
- COMPONENTS OF COMPUTER SYSTEM: CENTRAL PROCESSING UNIT (CPU),
- INPUT/OUTPUT DEVICES,
- COMPUTER MEMORY: PRIMARY AND SECONDARY MEMORY,
- MAGNETC AND OPTICAL STORAGE DEVICES,
- CONCEPTS OF HARDWARE AND SOFTWARE.

1.1 DEFINITION OF COMPUTER

Computer is an electronic device that takes input data from the user and processes these data under the control of set of instructions (program) and gives the desired result as output and may saves output for the future use.

Functions of Computer

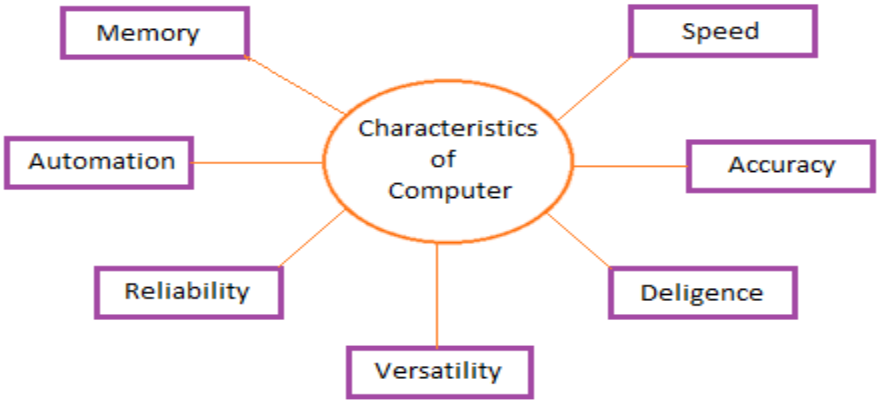
1. Accepts data (Input).
2. Processes data (Processing).
3. Produces result (Output).
4. stores results (Storage)



1.2 CHARACTERISTICS OF COMPUTERS

Computer has the following characteristics

- **Accuracy**
- **Diligence**
- **Versatility**
- **Reliability**
- **Automation**
- **Storage**



Speed

- A computer works with much higher speed compared to humans
- Computers can process millions of instructions per second.
- The time taken by computers for their operations is microseconds and nanoseconds.

Accuracy

- Computers perform calculations with 100% accuracy.
- Errors that may occur can almost always be attributed to human error.
- Inaccurate data, poorly designed system or faulty programs written by the programmer

Diligence

- Computers are highly consistent.
- They do not suffer from human traits of boredom and tiredness, lack of concentration.
- Computers can perform voluminous and repetitive jobs.

Versatility

- Computers are versatile machines and are capable of performing any task as long as it can be broken down into a series of logical steps.
- Computer to perform different kinds of works with same accuracy and efficiency.

Reliability

- A computer is reliable as it gives consistent result for similar set of data
- we give same set of input any number of times, we will get the same result.

Automation

- Computer performs all the tasks automatically.It performs tasks without manual intervention.

Memory/Storage

- Computers can store large volumes of data.
- A piece of information once recorded (or stored) in the computer, can never be forgotten and can be retrieved almost instantaneously.

1.3 APPLICATION OF COMPUTER

The computer used in various application area inthe world.

1. Business
2. Education
3. Marketing
4. Banking
5. Insurance
6. Communication
7. Health Care
8. Military
9. Engineering Design

› Business

A computer has an integrated part in all business or non-business organizations.
Ex: Payroll calculations, Sales analysis, Budgeting, Financial forecasting, Managing employees database and Maintenance of stocks etc.

› Education

Computers have its dominant use in the education field to enhance performance in learning. Even distance learning is made effective through internet and video-based classes. Researchers have massive usage of these computers in their scholarly work.

› Marketing

Advertising marketing with computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.

Computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers. the computer used to prints the magazines, , newspapers, books and many others.

› Banking

Today banking is almost totally dependent on computer. Banks provide online accounting facility, which includes current balances, deposits, overdrafts, interest charges, shares, and trustee records.
ATM machines are making it even easier for customers to deal with banks.

› Insurance

Insurance companies are keeping all records up-to-date with the help of computers. The insurance companies, finance houses and stock broking firms are widely using computers for their concerns.

› *Communication*
Communication means to convey a message, an idea, a picture or speech that is received and understood clearly and correctly by the person for whom it is meant for. Some main areas in this category are: Chatting, E-mail, Usenet, FTP, Video-conferencing and Telnet.

› *Health Care*
Most of the medical information can now be digitized from the prescription to reports. Computation in the field of medicine allows us tooffer varied miraculous therapies to the patients. software used to examine the internal organs of the human body. ECG's, radiotherapy done with the help of computers.

› *Military*
Computer builds the links between the soldiers and commanders through the satellite. Construction of weapons and controlling their function is not possible without the aid of computers. The list of the criminals and the records of the cops are maintained regularly in the system.

› *Engineering Design*
computers aid in designing buildings, automobiles, electrical and electronics. The construction layouts are designed beautifully on system using different tools and software's.

1.4 GENERATION OF COMPUTER

The history of the computer goes back several decades. CharlesBabbage is known as father of computer he has invented first analytical computer in year 1822.however, and there are five definable generations of computers.Each generation is defined by a significant technological development that changes fundamentally how computers operate – leading to more compact, less expensive, but more powerful, efficient and robust machines.

1. First Generation (1946 - 1959)
2. Second Generation (1959 - 1965)
3. Third Generation (1965 - 1971)
4. Fourth Generation (1971 - 1980)
5. Fifth Generation (1980 onwards)

FIRST GENERATION- Vacuum Tubes(1946-1959)

1. These early computers used vacuum tubes as circuitry and magnetic drums for memory.
2. These computers relied on 'machine language.
3. These computers could calculate in milliseconds.
4. The two notable machines of this era were the UNIVAC and ENIAC machines
5. These were very big in size, costly.Need a cooling system.

SECOND GENERATION-Transistors1959-1965

1. Due to the presence of transistors instead of vacuum tubes,.
2. This reducing the size of a computer.
3. Assembly language and punch cards were used for input.
4. Better speed, portability. calculate data in microseconds.
5. A cooling system, Constant maintenance was required.

THIRD GENERATION– Integrated Circuits1965-1971

1. the transistors were now being miniaturized and put on silicon chips (called semiconductors).
2. These computers were cheaper as compared to second-generation computers.
3. they were fast and reliable. small size of the computer big storage capacity.
4. IC not only reduce the size of the computer but it also improves the performance of the computer as compared to previous computers.
5. Instead of punch cards, mouse and keyboard are used for input.
6. They used an operating system for better resource management and used the concept of time-sharing and multiple programming.
7. These computers reduce the computational time from microseconds to nanoseconds.
8. IC chips are difficult to maintain. Air conditioning is required.

FOURTH GENERATIONMicroprocessors1971-1980.

1. Fastest in computation and size get reduced as compared to the previous generation of computer.
2. Small in size as compared to previous generation computers.
3. Less maintenance is required.
4. All types of high-level language can be used in this type of computers.
5. The Microprocessor design and fabrication are very complex.
6. Air conditioning is required in many cases due to the presence of ICs.

FIFTH GENERATIONArtificial Intelligence1980-onwards

1. Computer devices with artificial intelligence are still in development,
2. AI is a reality made possible by using parallel processing and superconductors. It is support voice recognition. quantum computation, molecular and nano technology.
3. Which can process and respond to natural language, and have capability to learn and organise themselves.
4. this generation is based on ULSI(Ultra Large Scale Integration) technology resulting in the production of microprocessor chips having ten million electronic component
5. It is more reliable and works faster.
6. It is available in different sizes and unique features.
7. It provides computers with more user-friendly interfaces with multimedia features.

1.5 TYPES OF COMPUTER

Computers vary widely in terms of their size and purpose they serve. There are very small computers that can be held on a palm. There are also large computers that take a whole room to occupy.

1. **Micro Computer**
2. Mini Computer
3. Mainframe Computer
4. Super computer
5. Workstations

» Micro Computer

Microcomputer is at the lowest end of the computer range in terms of speed and storage capacity. Its CPU is a microprocessor. The first microcomputers were built of 8-bit microprocessor chips. The most common application of personal computers (PC) is in this category. The PC supports a number of input and output devices.
Microcomputers include (a) portable computers and (b) desktop computers.

(a) Portable Computer

Portable computer is a very small, easy to use microcomputer. The users can carry it wherever they go. This group includes personal digital assistant, pen-based computer, hand-held computer, notebook computer and laptop computer.

(b) Personal Computer or Desktop Computer

Personal computer is a microprocessor based, single user computer. The peripherals for personal computer include a keyboard and a mouse as input devices, monitor to display information and a hard disk for storage.

» Mini Computer

Minicomputer is a medium sized computer that is costlier and more powerful than a microcomputer. It is in fact a scaled down version of mainframe computer. This can support up to a few hundred users at a time with multi-terminal, time-sharing system. They are mainly used as departmental computers in large and medium-sized organisations. They are also used in government departments, universities and R and D establishments.

» Mainframe Computer

The earliest computers were callpd mainframes due to their size. The term is still used for the large computers of today. They have large storage capacities, very high speed of processing (compared to micros and minis) and can support a large number of terminals (Many hundreds to thousands) for use by a variety of users simultaneously. They are kept in air-conditioned environment in a special computer room. They are used by big companies, banks, government departments, etc. as their main computer.

» Super computer

It is the fastest and the most expensive computer. This has extremely large storage capacities and computing speeds that are at least ten times faster than that of other computers. It can perform hundreds of millions of instructions per second. The super computer is used for specialised applications such as large-scale numerical problems in scientific and engineering disciplines. These include applications in electronics, petroleum engineering, weather forecasting, medicine and nuclear energy research.

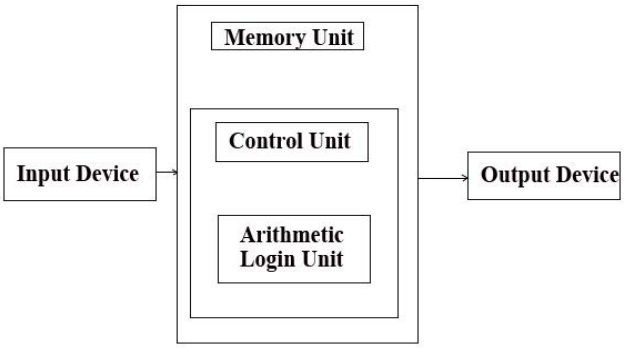
» Workstations

Workstation is a powerful computer which in terms of power is between personal computer and minicomputer. It has high resolution graphics monitor, large RAM and secondary storage. Although it is a standalone system, usually it forms part of a network and it uses Unix or Windows NT as operating system. Workstations are used for specialized applications such as desktop publishing, software development and engineering designs.

1.6 COMPONENTS OF COMPUTER SYSTEM

The computer hasthree parts.

1. Input Unit
2. Central Processing Unit (CPU)
3. Output Unit



Any digital computer carries out five functions.

1. Takes data as input. (Input)
2. Stores the data/instructions in its memory and use them when required. (Memory Unit)
3. Processes the data and converts it into useful information. (ALU)
4. Controls all the above four steps (Control Unit)
5. Generates the output (Output)

› InputUnit

This unit contains devices with the help of which we enter data into computer. This unit makes link between user and computer. An Input device accept data and instructions from the user and convert information or data in to a form which can be understood by the computer.

Central Processing Unit (CPU)

CPU is considered as the brain of the computer. CPU performs all types of data processing operations. It stores data, intermediate results and instructions(program).It controls the operation of all parts of computer.

CPU has following three components

- ALU(Arithmetic Logic Unit)
- Memory Unit
- Control Unit

- **ALU(Arithmetic Logic Unit)**

Function of arithmetic section is to perform arithmetic operations like addition, subtraction, multiplication and division and logical section perform logic operations such as comparing, selecting, matching and merging of data. The major operations performed by the ALU .

- **Memory Unit**

This unit can store instructions, data and intermediate results. This unit supplies information to the other units of the computer when needed.

- **Control Unit:**

The process of input, output, processing and storage is performed under the supervision of a unit called 'Control Unit'. It decides when to start receiving data, when to stop it, where to store data, etc. It takes care of step -by-step processing of all operations inside the computer.

› Output unit
This is the process of producing results from the data for getting useful information.

1.7 INPUT DEVICES
This unit contains devices with the help of which we enter data into computer. This unit makes link between user and computer. An Input device accept data and instructions from the user and convert information or data in to a form which can be understood by the computer.

Important input devices
1. Keyboard
2. Mouse
3. Light Pen
4. Trackball
5. Joystick
6. Scanners
7. Optical Mark Reader
8. Optical Character Reader
9. Barcode Reader
10. Magnetic Ink Character Recognition
11. Voice Recognition Systems
12. Digital Cameras

Keyboard
Keyboard is the most popular input device for direct entry of data and instructions into computer.The computer keyboard is very much like the electronic typewriter keyboard. But it has additional keys. now keyboards with 104 keys or 108 keys are also available for Windows and internet.

keyboard has following types of keys :
1**. Typing Keys-** digit keys (0-9) and letter keys (A-Z).
2. Numeric Keypad- set of 17 keys
3. Function Keys- The twelve function keys
4. Control Keys-These keys provide cursor and screen control. It includes four directional arrow keys. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).
5. Special Purpose Keys- Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

Mouse

A mouse is a small hand-held 'point and click' device that is connected to the CPU through a cable. Douglas Engelbart invented mouse in 1963 at Stanford Research Institute. Xerox Corporation's Palo Alto Research Center enhanced its capabilities by adding analogue to digital conversion..It rolls on a small ball and has two or three buttons on the top. When you roll the mouse across a flat surface the screen censors the mouse in the direction of mouse movement. The cursor moves very fast with mouse giving you more freedom to work in any direction. It is easier and faster to move through a mouse.

There are three types of mouse:

1. Mechanical Mouse
2. Optomechanical Mouse
3. Optical Mouse

1. Mechanical Mouse

Mechanical Mouse has a trackball at its bottom. It can be rolled across a flat and smooth surface to control the position of the cursor on the screen. By pointing and clicking on icons and menu options displayed on the screen, it is easy for the user to control the computer with a mouse. Mechanical sensors within the mouse detect the direction the ball is rolling and move the screen pointer accordingly.

2.Optomechanical Mouse

The Optomechanical mouse is more or less the same as the mechanical mouse, but it uses optical sensors to detect motion of the ball.

3.Optical Mouse

Optical mouse uses a laser to detect the mouse movement. The mouse requires to be moved along a special mat with a grid so that the optical mechanism has a frame of reference. Optical mouse is more expensive than the other two.

Light Pen

Light pen consists of a stylus connected by a cable to the computer terminal. When the stylus is brought into contact with the screen, a dot appears there on the screen. By moving the stylus on the screen, lines and curves can be drawn on the screen that can be stored and used as input.
An Light Pen utilizes a light-sensitive detector to select objects on a display screen. A light pen is similar to a mouse, except that with a light pen you can move the pointer and select objects on the display screen by directly pointing to the objects with the pen.

Trackball

Trackball was originally built into the keyboard. Running a hand over the trackball made the cursor on the screen to move. The cursor is used to make selection from a menu displayed on the computer screen.In addition, you can place a trackball on any type of surface, including your lap. For both these reasons, trackballs are popular pointing devices for portable computers.

Joystick

Joystick is a small vertical stick attached to a trackball for easier mechanical movements. It is used mainly in game programs.

Scanners

Scanners are direct-entry input devices. As the data entry is automatic, the scanners ensure more accurate data entry. These scanners include optical scanners and magnetic ink character readers. The optical scanners use light for sensing input and they include OCR, OMR and Barcode reader.

Optical Mark Reader

Optical mark reader (OMR) reads the presence or absence of a mark on a paper optically. Light is directed on to the paper and the reflected light is analysed for the detection of a mark. If a mark is there on the surface of the paper, that area sends back lesser light are to the OMR. It is

used to read multiple choice answers in a test and the data are transferred to a computer for processing.

Optical Character Reader

Optical character reader (OCR) detects shape, and can identify characters. It can examine each character as if it were made up of a collection of minute spots. Once the whole character has been scanned, the pattern detected is matched against a set of patterns stored in the computer. The pattern that matches or nearly matches is taken to be the character read. Patterns that cannot be identified are rejected. It is used in mail sorting and credit card billing.

Barcode Reader

Barcode is a set of small bars of varying thickness and spacing printed on the packages of products, on the back coverpages of books, tags etc. The barcode reader uses an optical scanner to read product code and converts it into electrical pulses. The device is connected to a computer and the information read is passed to the computer in digital form for automatic bill generation and updating of files. Thus, it is a direct data entry device and there is no need for an operator to key in sales transaction data.

Magnetic Ink Character Recognition

Magnetic Ink Character Recognition (MICR) uses highly stylised character shapes printed in a special ink containing particles that can be magnetied. This ink induces a current in a reading circuit, which is proportional to the area of ink being scanned. The patterns of the varying

currents can be compared with and selected as bit patterns of the selected number e.g., the number on a cheque). The MICR reader can only identify characters. Banking industry uses this device for sorting of cheques. The MICR codes read from the cheques are transmitted to an online computer for sorting and processing automatically.

Voice Recognition Systems

A special microphone is used to capture voice as input. It converts the voice into electrical pulses and then into digital signals for onward transmission to a computer for processing. A voice recognition system is provided with digital patterns of a limited vocabulary of words and phrases. The system operating in a training mode learns to recognize voice patterns by comparing the spoken input with the stored digital patterns. After identifying the input, the voice system generates appropriate code for the machine to accept input and operate. Voice recognition systems are very useful in offices for word processing. A manager can directly dictate letters and notes to a word processor through a speech recognition system. Similarly, the system can accept oral commands and execute them. These systems are yet to become popular.

Digital Cameras

Digital cameras are used to capture images and they can record the images on reusable floppy disks. Images are used with a digitiser for input to the computer. Once the image input is stored in computer, the image can be used in any application.

1.8 OUTPUT DEVICES

Output device displays result of the computer processing. A Output devices return processed data that is information, back to the user.

Some of the commonly used output devices are :
1. Monitor (Visual Display Unit)
2. Printers
3. Plotter
4. Speakers

Monitor (Visual Display Unit)

Visual display units (VDUs) are television-like screens that provide the user-interface in the form of display of text, numbers and images. The VDUs may be monochrome or colour. The support of monochrome or colour and clarity of display depend on the type of video monitor and the video adapter installed in the microcomputer.
Two basic types of monitors are used with microcomputers :
1. Cathode Ray Tube (CRT)
2. Flat panel Displays (LCD,LED)

- **Cathode Ray Tube (CRT)**

CRT or Cathode Ray Tube Monitor is the typical monitor that you see on a desktop computer. It looks a lot like a television screen, and works the same way. This type uses a large vacuum tube, called cathode ray tube (CRT).

- **Flat panel Displays (LCD,LED)**

This type of monitors are also known as flat panel monitor. Most of these employ liquid crystal displays (LCDs) to render images. These days LCD monitor are very popular.

Printer

Printers are purely output devices. They produce hard copy output. Computer printers vary widely in their technologies and capabilities. They can be classified in a number of ways. First, they can be classified into three broad groups: character printers, line printers and page printers. The character printers print one character at a time. Dot matrix printer (DMP), daisy wheel printer, thermal printer and inkjet printer are the various types of character printers. Drum printer and chain printer are line printers. Laser printer and magnetic printer are page printers.

Some of the most commonly used printers are :
1. Laser Printer
2. Ink Jet Printer
3. Dot Matrix Printer
4. Line Printer

- **Laser Printer**

A laser printer produces high quality print that one normally finds in publishing. It is extremely fast and quiet. Moreover, the operation of a laser printer is easy with automatic paper loading and no smudging or messing up of ink ribbons. The fastest laser printer can print up to 200 pages per minute in monochrome (black and white) and up to 100 pages per minute in colour.

- **Ink-Jet Printer**

An ink-jet printer creates an image directly on paper by spraying ink through as many as 64 tiny nozzles. Although the image it produces is not generally quite as sharp as the output of a laser printer, the quality of ink-jet images is still high.
In general, ink-jet printer offers an excellent middle ground between dot matrix and laser printer. Like laser printer, an ink-jet printer is quiet and convenient, but not particularly fast. Typically, an ink-jet printer is more expensive than a dot-matrix printer, but costs only half as much as a laser printer.

- **Dot Matrix Printer**

The dot matrix printer was very popular at one point of time. It is a very versatile and inexpensive output device. In dot matrix printer the print head physically "hits" the paper through the ribbon and produces text (or images) by combinations of dots; hence the name dot matrix printer. Its speed is measured in characters per second (CPS). Although it is less expensive, it is louder, slower and produces lower print quality.

- **Line Printer**

A line printer is generally used with large computer systems to produce text based data processing reports. Line printers are high-speed printers with speeds ranging anywhere from 100 to about 3800 lines per minute. In the past, print quality on line printers was not high. Developments in technology are improving the print quality on line printers. These are in the cost range of lacs of Rupees.

Plotter

A plotter is a special kind of output device that like a printer produces images on paper but does so in a different way. Plotters are designed to produce large drawings or images, such as construction plans for buildings or blueprints for mechanical objects. A plotter can be connected to the port normally used by a printer.

An array of different colored pens in a clip rack and a robotic arm is part of plotter. The instructions that a plotter receives from a computer consist of a color, and beginning and ending coordinates for a line. With that information, the plotter picks up the appropriate pen through its arm, positions it at the beginning coordinates drops the pen down to the surface of the paper and draws to the ending coordinates. Plotters draw curves by creating a sequence of very short straight lines.

Plotters usually come in two designs :
1. Flat Bed
2. Drum

- **Flat Bed**

Plotters of small size to be kept on table with restriction of paper size.

- **Drum**

These plotters are of big size using rolls of paper of unlimited length.

Speaker

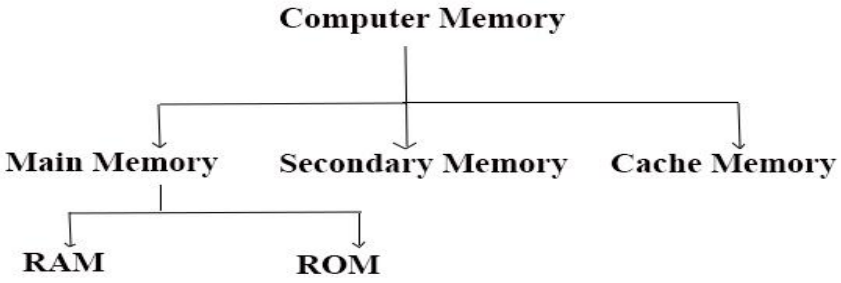
A Speakers are another type of output device which allow you to listen to voice like music and conversation with people.

1.9 COMPUTER MEMORY

A computer memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in computer where data is to be processed and instructions required for processing are stored. memory is divided into large number of small parts called cells. Each location or cell has a unique address which varies from zero to memory size minus one.

Computer storage can be divided into primary memory, secondary memory and cache memory. Primary memory or main memory in the computer provides fast access memory. The processor can access it directly for data and instructions. Frequently used files and programs are stored in the primary memory. Since primary storage is expensive, only a limited amount can be stored therein. Cache memory is another memory device. CPU can access it much faster than main memory. But it is very expensive. The secondary memory is used for bulk storage of data and instructions. Large files and databases are stored on secondary storage devices. These devices include hard disk, optical disks, magnetic tapes and floppy disks. Data and instructions from secondary storage devices are transferred to main memory and cache memory in small measures for the CPU to access them for processing.

Computer Memory are three types :
1. Primary Memory/Main Memory
2. Secondary Memory
3. Cache Memory



Primary Memory or Main Memory

The main memory is used to store data and instructions currently required for processing. These memories are manufactured by using integrated electronic circuits or semiconductor device. It has limited capacity and data is lost when power is switched off. Both RAM and ROM are random access memories and both can be used for reading purposes. The distinguishing feature is RAM's ability to alter data stored in it, which is not possible with ROM. Typically ROM is used to store system instructions which are relatively permanent in nature. RAM is volatile; that is, it loses its contents if the device is electrically disconnected.

Primary Memory are divided into two subcategories :
1. Random Access Memory (RAM)
2. Read Only Memory (ROM)

- **Random Access Memory (RAM)**

The word 'random' means that the computer can access any memory cell without accessing all cells sequentially. That is, a memory is said to be random access memory if any part of it can be accessed directly (randomly) for reading or writing data in the same time irrespective of its location. In other words, access to this memory is independent of physical storage location of information on the medium. RAM is volatile as any interruption in power supply results in loss of data in RAM. The contents of the memory remain there as long as electrical current is available to sustain the memory's pattern of positive and negative charges which represent the two bits 1 and O.lf power fails, all the contents in the memory will be lost.
Types of RAM :
• Dynamic RAM (DRAM)
• Static RAM

- **Read Only Memory (ROM)**

This memory uses MetaL Oxide Semiconductor TechnoLogy. RAM is read-write memory whereas ROM is Read-OnLy-Memory. This memory is used to store frequently used programs in the system.
Types of ROM :
• Programmable read-only memory (PROM)
• Erasable programmable read-only memory (EPROM)
• Electrically erasable programmable read-only-memory (EEPROM)

Secondary Memory

This type of memory is also known as external memory or non-volatile. It is slower than main memory. These are used for storing data/Information permanently. CPU directly does not access these memories instead they are accessed via input-output routines. Contents of secondary memories are first transferred to main memory, and then CPU can access it.

In this type of memory the cost per bit of storage is low. However, the operating speed is slower than that of the primary storage. Huge volume of data are stored here on permanent basis and transferred to the primary storage as and when required.

Main secoundry memory are:
1. Magnetic Disk
2. Floppy Disk
3. Hard Disk
4. Optical Disks

Magnetic Disk The Magnetic Disk is Flat, circular platter with metallic coating that is rotated beneath read/write heads. It is a Random access device; read/write head can be moved to any location on the platter

Floppy Disk These are small removable disks that are plastic coated with magnetic recording

material. Floppy disks are typically 3.5″ in size (diameter) and can hold 1.44 MB of data. This portable storage device is a rewritable media and can be reused a number of times. Floppy disks are commonly used to move files between different computers. The main disadvantage of floppy disks is that they can be damaged easily and, therefore, are not very reliable. The following figure shows an example of the floppy disk. Figure 3 shows a picture of the floppy disk.

Hard Disk Another form of auxiliary storage is a hard disk. A hard disk consists of one or more rigid metal plates coated with a metal oxide material that allows data to be magnetically recorded on the surface of the platters. The hard disk platters spin at 5 a high rate of speed, typically 5400 to 7200 revolutions per minute (RPM).Storage capacities of hard disks for personal computers range from 10 GB to 120 GB (one billion bytes are called a gigabyte).

Optical Disks Optical Mass Storage Devices Store bit values as variations in light reflection. They have higher area density & longer data life than magnetic storage. They are also Standardized and relatively inexpensive. Their Uses: read-only storage with low performance requirements, applications with high capacity requirements & where portability in a standardized format is needed.

Types of Optical Disk

1. CD-ROM (read only)
2. CD-R: (record) to a CD
3. CD-RW: can write and erase CD to reuse it (re-writable)
4. DVD(Digital Video Disk)

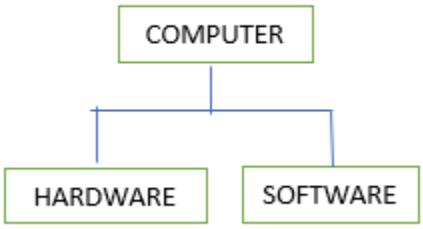
Cache Memory

Input- Output operations are very slow. CPU speeds are quite high compared to the access time of main memory. Thus the processor performance is limited by the slow speed of the main memory. To speed up fetching of instructions to CPU, a buffer or cache (pronounced as cash) is used. Normal RAM is expensive and is not fast enough to match the speed of CPU. To reduce the processing time, certain computers use costlier and higher speed memory devices to form a buffer or cache. This technique uses a small memory with extremely fast access speed close to the processing speed of the CPU. This memory is called cache and it stores data and instructions currently required for processing. Cache memory thus makes main memory appear much faster and larger than it really is. It improves the memory transfer rates and thus raises the effective processor speead.

The CPU searches cache before it searches main memory for data and instructions. Cache is physically located close to the CPU and hence access to cache is faster than to any other memory.

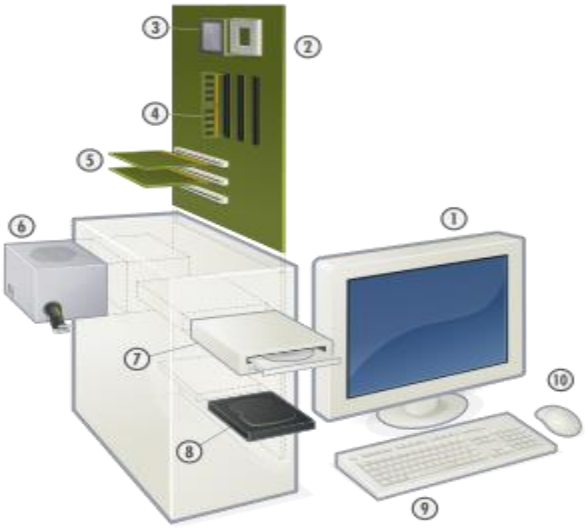
1.10. CONCEPT OF HARDWARE

Hardware: The physical parts of a computer. the system is a group of various components that work together to achieve a specific goal or target...the computer mainly consists of hardware and software



The term hardware is used to refer to all the components inside or outside the computer. The hardware that are used to supply input to computer are called as input devices. The hardware that are used to process the data are called as processing devices and the devices that are used to present output of computer are called as output devices

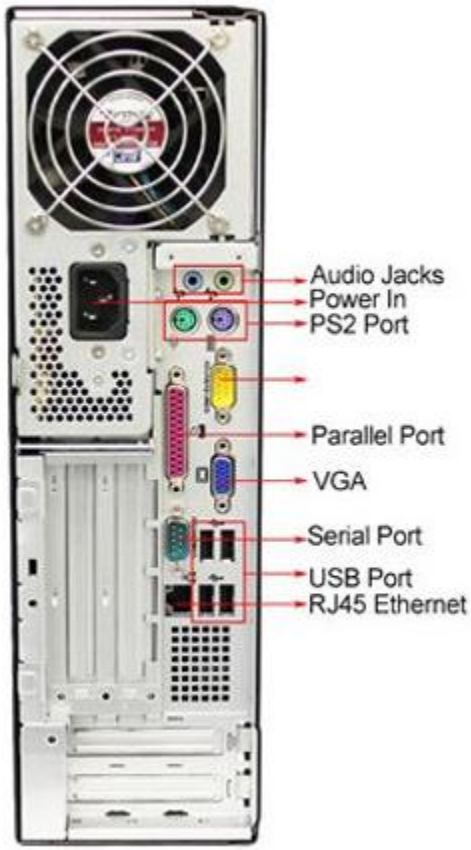
- **The System Unit**- the system unit is also known as case.
    - Front side
    - Back side
        - Ports
        - Expansion Slots
    - Inside
        - Motherboard (System Board)
        - CPU (Central Processing Unit)
        - Memory, such as RAM, ROM, Cache, and Flash
    - Outside
        - Input /output
        - Communication device
- **Storage**-the motherboard in the cabinet,the memory chip are installed and secondary storage is connected to it.different memory drives are connected to the motherbard by a flat cable(ribbon cable).
- **Input / Output Devices**- The input hardware devices are used to put data into computer. The output hardware devices are translating the processed information to the human
- **Communication Devices**-peripheral device that extends a computer input, storage ,output cababilities.



Components Of System Unit

the system unit is also known as case.it is the house the all the computer components and their connections switches in front back and inside.

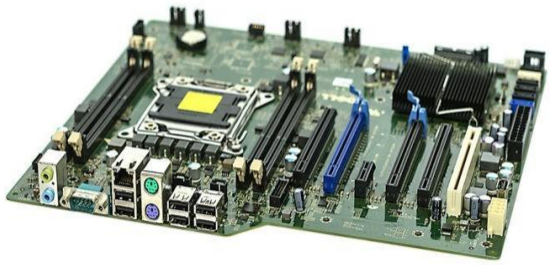
Backside



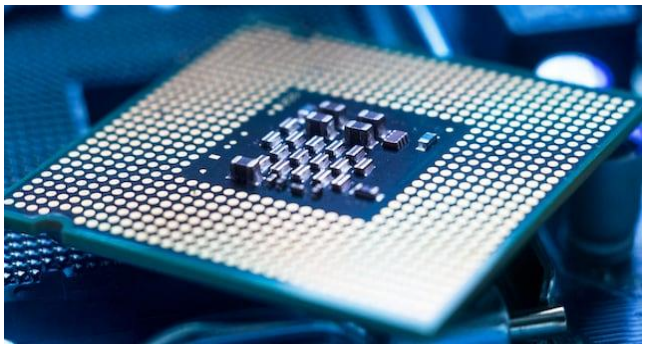
- **Ports** are sockets that are on the outside othe system unit, meaning you can easily plug a cable into a port without opening the system unit.
    - **Serial** ports transmit one bit of data at a time.
    - **Parallel** ports transmit 8 bits of data at a time.
    - **Universal Serial Bus** (**USB**) ports are *much* faster than serial or parallel ports and allow multiple devices to be connected to the same port.
    - **Scsi ports-**Small Computer System Interface (SCSI)used primarily as a connection interface for tape drives and hard disk drives.
    - **Power sockets- for connecting power to power supplyfrom external source**
- **Expansion Slots** are sockets on the motherboard that you can plug *expansion cards* into. To plug a card into a slot, you must open the system unit. A card contain a socket on its end that sticks out from the system unit so a cable can be plugged into it. Common types of cards are graphics, sound, and network cards.

Inside

- The **Motherboard** is the main circuit board for the computer, containing both soldered, nonremovable components along with sockets or slots for components that can be removed. The motherboard holds the CPU, RAM and ROM chips, etc.



- The **Central Processing Unit** (**CPU**) is the "brain" of the computer. It executes instructions (from software) and tells other components what to do. There are 2 parts of the CPU: The ALU and Control Unit.



  - The **Arithmetic Logic Unit** (**ALU**) performs arithmetic operations (such as addition and subtraction) and logical operations (such as comparing two values).
  - The **Control Unit** deciphers and carries out instructions.

- The **System Clock** is an "electrical pulse generator" that sends out a pulse of electricity at regular intervals. The electronic components of the computer need these electric pulses in order to perform work.

- **Power Supply -**The power supply as its name might suggest is the device that supplies power to all the components in the computer. Its case holds a transformer, voltage control, and (usually) a cooling fan. **uninterruptible power source** (**UPS**) is an electrical

apparatus that provides emergency power to a load when the input power source or mains power fails

- **Bus Lines** are "electrical data roadways" (i.e. wires) through which bits of information are transmitted between the CPU and other components. The **bus size** denotes how many bits can be transmitted at once. In general, this should be the same as the CPU word size.

Memory Unit

- **Bit** (**Binary Digit**): Can only have a value of either 0 or 1.**Byte**: 8 bits (also known as a **Character**).
- **Kilobyte**: 1024 bytes (or 2^10 bytes).
- **Megabyte**: 1024 * 1024 bytes (or 2^20 bytes). Roughly one million bytes.
- **Gigabyte**: 1024 * 1024 * 1024 bytes (or 2^30 bytes). Roughly one billion bytes.
- **Terabyte**: 1024 * 1024 * 1024 * 1024 bytes (or 2^40 bytes). Roughly one trillion bytes.

    - **Random Access Memory** (**RAM**), also known as Main Memory or Primary Storage, is used to hold instructions *and* data *while they are being used*. RAM is volatile, meaning its contents are lost when the power goes off.
    - **Read Only Memory** (**ROM**) chips are non-volatile memory that generally contains instructions for "booting" the computer (i.e. loading the operating system when the computer starts up).
    - **CMOS** chips are powered by a battery and contain so-called "flexible information" such as the type of hard drive your computer is using and the current date and time.
    - **Flash** chips do not require electricity or a battery yet are non-volatile.
    - **Cache** memory is special high-speed memory that temporarily stores instructions and data the CPU is likely to use frequently.

- **Secondary Storage-**Devices that "permanently" hold data and information (i.e. programs).
- Non-volatile memory; when the power goes off, contents are still saved (unless there is an error).Used to store instructions *and* data *while they are **not** being used*.
- A **floppy disk** is a removable (i.e. portable) platter made of mylar plastic that is magnetized. Bits of information are stored in concentric rings called **tracks** on either side of the platter. The current floppy disk standard is a 3 1/2" platter in a hard plastic case that holds 1.44 Megabytes of information. A **Zip** disk, on the other hand, can hold up to 250 Megabytes.

- A **hard disk** is similar to a floppy disk but uses metal platters to store information. Hard disks are not only much faster than floppy disks but can hold huge amounts of data (hundreds of gigabytes).

- Both floppy and hard drives use a **read/write** head, which is basically a magnet, to read/write information from/to tracks on a platter. In a hard drive, the read/write head and platter(s) are enclosed together in an air-tight package, making hard drives less susceptible to damage. The read/write head hovers above the platter but should not touch it. If touched, the platter can be damaged, resulting in the loss of some or all the data on the platter. This is known as a *head crash*.
- **Magnetic tape** is used mostly for backups. These are very slow because you have to fast forward or rewind to the right spot. However, they are very reliable.

- **Optical discs** use optical technology (i.e. lasers) instead of magnetic technology to store information.

  - **CD-ROM** stands for Compact Disc - Read Only Memory.
  - **CD-R** stands for Compact Disc - Recordable and can be written to only once. (Also known as **CD-WORM**: Compact Disc - Write Once, Read Many.)
  - **CD-RW** stands for Compact Disc - Re-writeable (or Read/Write).
  - **DVD-ROM** stands for Digital Versatile Disc - Read Only Memory.
  - **DVD-R** stands for Digital Versatile Disc - Recordable and can be written to only once.
    (Also known as **DVD-WORM**: Digital Versatile Disc - Write Once, Read Many.)
  - **DVD-RW** stands for Digital Versatile Disc - Re-writeable (or Read/Write).
  - CD's can hold approximately 650 Megabytes of data while DVD's can hold up to 17 Gigabytes.

Front Side

- **Power switch:** The power on/off switch is used to turn on or off the power to the PC.
- **Reset button:** This button helps you restart your computer without disconnecting the power supply.
- **Lights:** The front panel of the system unit may display a variety of colored indicator lights. These lights are used to indicate whether the hard disk, the floppy disk or the CD-ROM is being read or written.
- **Floppy Disk drive:** The floppy disk drive is used to read the information stored in floppy disks (also called a diskette).
- **DVD/CD Combo Drive:** A simple combo drive allows you to save data on CD and look at data in a DVD but not let you save any data on DVD. For saving data on DVD you need an enhanced version of combo drive which includes functionality to save data on DVD.

Input / Output Devices

- **Input** devices translate data into a form the computer can understand.
    - The **keyboard** is the most common input device, but this type of data entry is very slow and error-prone.
    - **Direct input** devices are much faster and less error-prone.
        - **Pointing devices** such as the *mouse*, *trackball*, and *touchpad* allow you to manipulate a cursor on the screen.
        - **Scanning devices** read data directly. For example, *OMR* (*Optical Mark Recognition*) devices (such as a scantron machine) can sense marks on paper. Even more advanced are *OCR* (*Optical Characgter Recognition*) devices, which attempt to read letters. *Bar Code Readers* are often used in grocery stores to scan items.
- **Output** devices translate information into a form humans can understand.
    - The **Monitor** (or Display Screen) is the most common type of output device. It produces *softcopy* (i.e. temporary) output on a screen.
    - The **Printer** is the most second most common type of output device. It produces *hardcopy* (i.e. "permanent") output on paper.
        - A **Laser Printer** uses a photoelectric drum and powdered ink, similar to a copying machine, to produce output.
        - An **Inkjet Printer** produces output by spraying droplets of liquid ink onto the paper from small nozzles. It is the most common type of printer in use today and is generally very inexpensive.

Communications Devices

- These allow your computer to send/receive data to/from other computers.
- A **modem** sends information over a phone line. Modems are slow and susceptible to problems such as phone line static.

- A **network card** sends information over a network cable. These can be used to hook up a computer to a local area network (LAN) or to an Internet Service Provider via a cable modem or DSL (for Internet access).

1.11 CONCEPT OF COMPUTER SOFTWARE

As you know, the hardware devices need user instructions to function. A set of instructions that achieve a single outcome are called program or procedure. Many programs functioning together to do a task make a **software**.

There are different categories of software −

- System Software
- Application Software
- Utility Software

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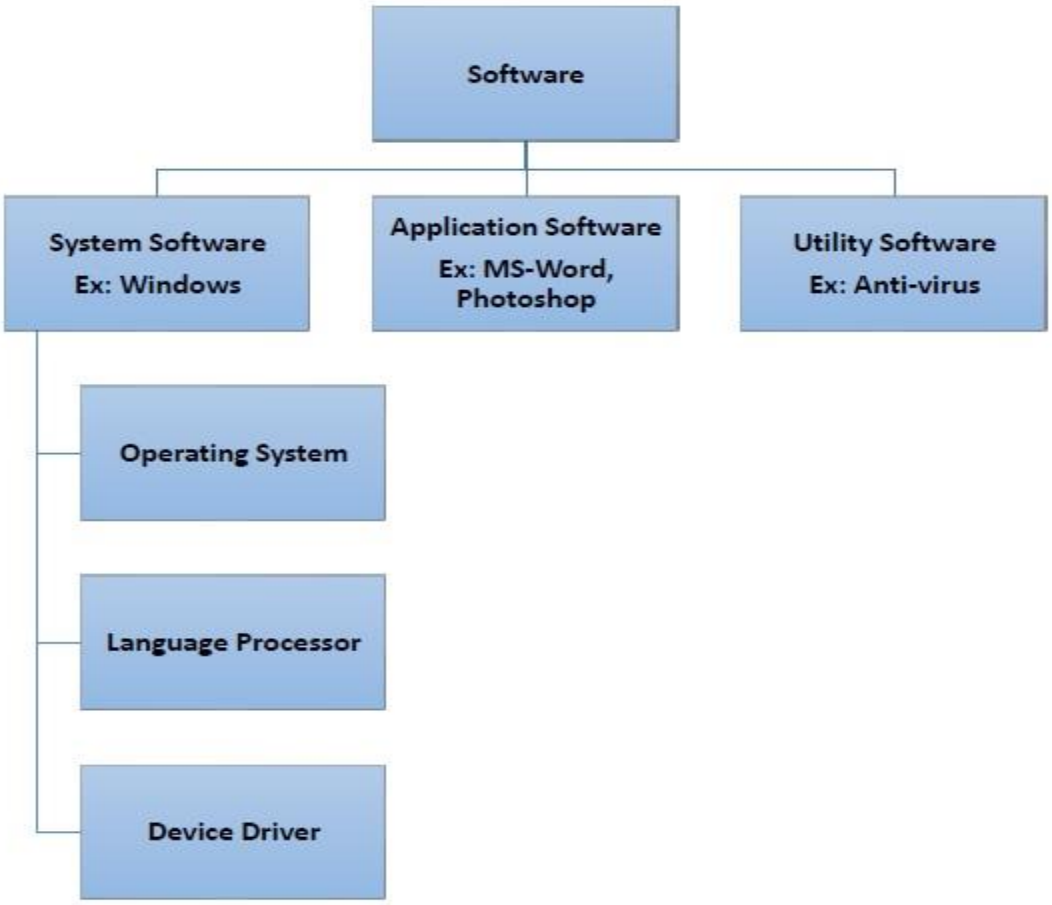


System Software

Software required to run the hardware parts of the computer and other application software are called **system software**. System software acts as **interface** between hardware and user applications.

Machines understand only binary language i.e. 0 (absence of electric signal) and 1 (presence of electric signal). Software is required to convert all human instructions into machine understandable instructions.

- Operating System
- Language Processor
- Device Drivers

- **Operating System**

System software that is responsible for functioning of all hardware parts and their interoperability to carry out tasks successfully is called **operating system (OS)**. OS is the first software to be loaded into computer memory when the computer is switched on and this is called **booting**. OS manages a computer's basic functions like storing data in memory, retrieving files from storage devices, scheduling tasks based on priority, etc.

- **Language Processor**

system software is to convert all user instructions into machine understandable language.

  - **Machine-level language** − This language is nothing but a string of 0s and 1s that the machines can understand. It is completely machine dependent.
  - **Assembly-level language** − This language introduces a layer of abstraction by defining **mnemonics**. **Mnemonics** are English like words or symbols used to denote a long string of 0s and 1s. The complete **instruction** will also tell the memory address. Assembly level language is **machine dependent**.
  - **High level language** − This language uses English like statements and is completely independent of machines. Programs written using high level languages are easy to create, read and understand.

Program written in high level programming languages like Java, C++, etc. is called **source code**. Set of instructions in machine readable form is called **object code** or **machine code**. **System software** that converts source code to object code is called **language processor**. There are three types of language interpreters−

  - **Assembler** − Converts assembly level program into machine level program.
  - **Interpreter** − Converts high level programs into machine level program line by line.
  - **Compiler** − Converts high level programs into machine level programs at one go rather than line by line.

- **Device Drivers**

System software that controls and monitors functioning of a specific device on computer is called **device driver**. Each device like printer, scanner, microphone, speaker, etc. that needs to be attached externally to the system has a specific driver associated with it. When you attach a new device, you need to install its driver so that the OS knows how it needs to be managed.

Application Software

A software that performs a single task and nothing else is called **application software**. Application software are very specialized in their function and approach to solving a problem.

- **Commercial software -**commercial software: these programs available as an online download. Once the trial period is over, the user can pay for the program directly on the Web site and download an official copy
- **Public domain software -**Public domain software is not copyrighted. It is released without any conditions upon its use, and may be used without restriction. This type of software generally has the lowest level of support available.
- **Freeware -**Freeware has no cost and can be downloaded from the Internet without any charges.
- **Shareware -**This is a software that can be used on a trial basis. Once the time limit of shareware expires, the user is asked to pay for continuation of the services.

Types	Definition
Commercial software	Copyrighted. If you don't pay for it, you can be prosecuted.
Public-domain software	Not copyrighted. You can copy it for free without fear of prosecution.
Shareware	Copyrighted. Available free, but you should pay to continue using it.
Freeware	Copyrighted. Available free.

Application software tools

1) Word Processing Software: Word Processing software is used to manipulate, format the text, to create memos, letters, faxes and documents. **For example** Microsoft Word, Lotus Word Pro, Word pad and Corel WordPerfect.

2) Spreadsheet Software: Spreadsheet software is used to perform manipulate and calculations. In spreadsheet software data is stored in intersection row and column. The intersection of row and column is known as a cell. For example Microsoft Excel, lotus 1-2-3 for windows and number for MAC OS.

3) Database Software: Database is a collection of data related to any applications. When we operate the application data is accessed from the database, and after manipulation, it gets back stored in the database.For example Database Management System (DBMS) software tool used for storing, modifying extracting and searching for information within a database. MySQL, MS Access, Microsoft SQL Server and Oracle is the example of database application Software.

4)Business software These programs are built to facilitate certain business functions, improving the accuracy, efficiency, and effectiveness of operations. Business application software programs achieve measurable objectives such as saving work time and enhancing productivity. Below are some popular examples of business applications that are commonly used by organization

5)Presentation Software: Presentation program is a program to show the information in the form of slides. The software has three components:1) Text editor for inputting and formatting text.2) Inserting graphics, text, video and other multimedia files.3) Slideshow to display the information.We can add text, graphics video and images to slides to make them more informative. Presentation software helps the presenter to present their ideas with ease and visual information easy to understand. **Example of presentation software:** Microsoft's PowerPoint and Apple's Keynote.

6)Education and Reference Software: These types of software are specifically designed to facilitate learning on a particular subject. There are various kinds of tutorial software that fall under this category. They are also termed as academic software. Some examples are:DeltaDrawing,GCompris, Jumpstart titles,KidPix, MindPlay,Tux Paint

7)Games/Entertainment: This area deal with the general public, media and telecommunication. With the growth entertainment mode, many application is available for mobile phone as well as the system. Like Music and video entertainment app, navigation app, social networking application, news and weather application, educational apps and e-book reader's app for preparation of any type of exams.

8)Web Browsers: These applications are used to browse the internet. They help the user in locating and retrieving data across the web. Some examples of web browsers are:GoogleChrome,InternetExplorer,MicrosoftEdge,MozillaFirefox,Opera,Safari,UC Browser

9) Authoring/Multimedia Software: Multimedia is a combination of text, graphics, audio and Multimedia software used in the editing of video, audio and text. Multimedia software used in the growth of business, educations, information, remote system and entertainment.

10.Graphics Software: As the name suggests, Graphics Software has been devised to work with graphics as it helps the user to edit or make changes in visual data or images. It comprises of picture editors and illustration software. Some examples are:Adobe Photoshop, Autodesk Maya, Blender ,Carrara,CorelDRAW,GIMP,Modo,PaintShop Pro

11.Web-based applications: While most application software can be installed directly to a machine, many allow users to access tools through web browsers and some only exist in web format. Not only do these services free up space on a user's hard drive or network, being web-based means they can be accessed from anywhere in the world at any time, with data being stored in the cloud. This also means the application is kept up-to-date automatically, without the risk of a user running an insecure version.

Utility Software

Application software that assist system software in doing their work is called **utility software**. Thus, utility software is actually a cross between system software and application software. Examples of utility software include −

- Antivirus software
- File management tools
- Compression tools
- Disk management tools
- Backup tools

- **Antivirus:**It is used to protect a computer from the virus. It detects a virus and notify the user and take action to secure the computer. The virus are kept in different location called vault where it has different file system due to which virus effect it. User can itself instruct antivirus to delete malicious program, put it in vault or even ignore it. These days most come in GUI form.

- **File Management Tool:**The software is used to manage files stored in a file system. It can be used to create, group file. File management tool is a data structure used to store file in a OS while later is used to perform task on file stored in the file System.Like Windows File Explorer is a file management tool.

- **Compression Tool:**These tool are used to reduce the size of a file based on the selected algorithm.Most operating systems include tools for compressing and uncompressing files.Linux has tools for both .tar.gz and .zip. Other compressed files, like .7z and .rar, require a third-party compression utility to be installed.

- **Disk Management Tool:** It enables us to view or managed the disk drives installed in their computer and the partition associated with those drives. Disk Management is used to managed the drives installed in a computer- like hard disk drives, and flash drives. It can be used to partition drives, assign drive letters and much more.

  1.Disk Cleanup Tool : It allows user to remove files that are no longer needed or that can be safely deleted. Removing unnecessary files, including temporary files, can help to improve the functioning and increase the free space of the computer. Running Disk Cleanup at least once a month is an excellent maintenance task. Disk Cleanup tool can delete temporary internet files, old check disk files, compress old filesand offline webpages. Disk cleanup also allows you to empty the Recycle Bin, delete temporary files, and delete Thumbnails.

  2.Disk Defragmenter: It is a utility in Microsoft Windows designed to increase access speed by rearranging file stored on a disk to occupy contiguous storage locations, a technique is calledDefragmentation.Defragmenting a disk minimizes head travel, which reduces the time it takes to read files from and write files to the disk.The defragmenter will search your hard drive partition and move data from one location to other location, so that the files stored there are one contiguous piece, instead of being throughout multiple locations on the harddrives partition.

- **Backup :**Backup utility enables backing up of files, folders, databases or complete disks. Backups are taken so that data may be restored in case of data loss. Backup is a service provided by all operating systems. In stand-alone systems backup may be taken in the same or different drive. In case of networked systems backup may be done on backup servers.

QUESTIONS

1. Define: computer.
2. List out some applications of computer.
3. Discuss about volatile and nonvolatile memory.
4. What is hardware and software
5. Write a short note on CPU.
6. Briefly explain the input devices.
7. Briefly explain the output devices
8. Discuss about the concept of hardware.
9. Discuss about the concept of software
10. Discuss about computer memory devices in brief.
11. Explain computer components in detail.

UNIT-II

- DATA PROCESSING:
- CONCEPTS OF DATA PROCESSING,
- DEFININTION OF INFORMATION AND DATA,
- BASIC DATA TYPES,
- STORAGE OF DATA/INFORMATION AS FILES,
- (NUMBER SYSTEM- REPRESENTATION OF DATA/INFORMATION.

2.1. DATA PROCESSING: INTRODUCTION

Data are raw facts. Tuning data into information. Data processing occurs when data is collected and translated into usable information. Data processing starts with data in its raw form and converts it into a more readable format (graphs, documents, etc.),

2.2. CONCEPT OF DATA PROCESSING

DATA

Data are raw facts that are processed into information. Data refers to the raw facts that do not have much meaning to the user and may include numbers, letters, symbols, sound or images.

INFORMATION

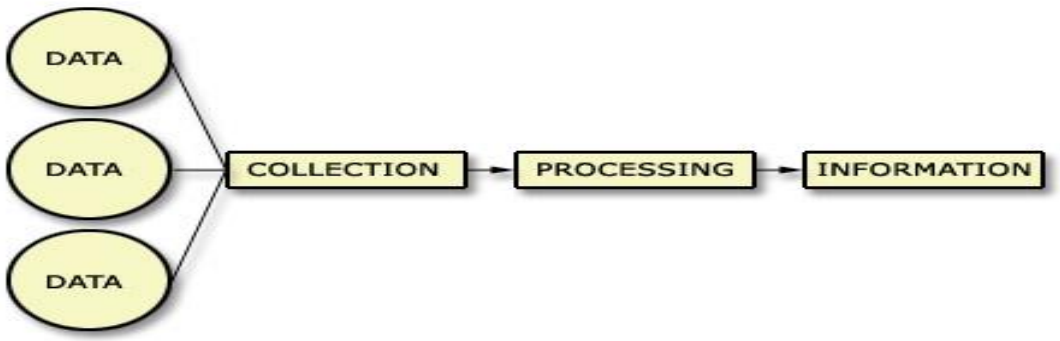
Information is data that has been summarized or manipulated for use in decision making. Information refers to the meaningful output obtained after processing the data.

DATA PROCESSING

Data in range of forms from various sources entered into the computer and manipulated to produce useful information. Data processing therefore refers to the process of transforming raw data into meaningful output i.e. information.

Data processing can be done manually using pen and paper. Mechanically using simple devices like typewriters or electronically using modern data processing tools such as computers.

Figure 1. Data processing flowchart



2.3. DATA PROCESSING STEPS.

1. Data coding
2. Data input
3. Data editing
4. Data manipulation

DATACODING

Data coding involves labeling the responses in unique and abbreviated way(simple numeric codes).ex: coding done by interviewers

Closed questions – fixed number of predetermined responses allowed

Open questions -any response coding is difficult.

DATA INPUT

The keyboard of computer is the data entry devices. Punched Cards, scanners, barcode reader etc.

DATA EDITING

Check the accuracy to eliminating the problems are disorganized incorrect information

Validity check-it ensure that data fall within set limit

Verification check – it checks the accuracy of entered data by entering it again and comparing the two results.

Consistency check – it checks the logical consistency of answers.

DATA MANIPULATION

The data manipulation stage data may be manipulated by computer to produce the desired output. The software used to manipulate data will depend on the form of output required.

Spread sheet – are used to create formulas that automatically add columns or rows

Database-systematically stored data for easy access to produce summaries stock reports.

Charts-can be created from a table of numbers and displayed in a number of ways. (bar chart, linecharts, pie chats ect).

Data	Information
1. It is the collection of facts and figures.	1. It is the collection of final result.
2. It is in unorganized form.	2. It is in organized form.
3. It is not in directly useful form.	3. It is in directly useful form.
4. It needs processing.	4. It does not need processing.
5. It is also termed as input.	5. It is also termed as output.

2.4 BASIC DATA TYPES

Computer systems work with different types of digital data. In the early days of computing, data consisted primarily of text and numbers, but in modern-day computing, there are lots of different multimedia data types, such as audio, images, graphics and video. Ultimately, however, all data types are stored as binary digits. For each data type, there are very specific techniques to convert between the binary language of computers and how we interpret data using our senses, such as sight and sound.

Character Strings

One of the most basic data types is plain text. In database terminology, this is referred to as a character string, or simply a string. A string represents alphanumeric data. This means that a string can contain many different characters, but that they are all considered as if they were text and not put into calculations, even if the characters are numbers.

Numeric Data Types

The second most important data type is numeric data. As a general rule, you store numbers only as a numeric data type

Integer

There are several different types of numeric data. An integer is a numeric value without a decimal. Integers are whole numbers and can be positive or negative.

Float

A number with a decimal is referred to as a decimal, a float or a double. The terminology varies somewhat with the software being used. The term float comes from 'floating point,' which means you can control where the decimal point is located. The term double refers to using double the amount of storage relative to a float.

2.5. STORAGE OF DATA / INFORMATION AS FILES

Types of computer files

i) Report file- It contains a set of relatively permanent records extracted from the data in a master file.

They are used to prepare reports, which can ve printed at a later date, e.g. report on student's class performance in the term, extract of students who have not cleared their school fees, report on

absentees

ii) Backup file- Used to backup data or to hold duplicate copies of data/information from the computer's fixed storage or main file for security purposes e.g. a copy of all the students admitted in a school fees, report on absentees

iii) Reference file - Used for reference purposes. It contains records that are fairly permanent or semi-permanent, e.g. Deductions in caution money, wage rates, tax deductions, employees address, price lists etc.

iv) Sort file – used to sort/rank data according to a given order, e.g. ranking position in a class of students.

v) Transaction file - Is used to hold input data during transaction processing. It is later used to update master files and audits daily, weekly or monthly transaction.

File organization methods

File organization refers to the way data is stored in a file. File organization is very important because it determines the methods of access, efficiency, flexibility and storage devices to use. There are four methods of organizing files on a storage media. This include:

- **Sequential,**
- **Random,**
- **Serial**
- **Indexed-sequential**

Sequential file organization-

records are stored in a sorted order using a key field, Records are stored and accessed in a particular order sorted using a key field. Retrieval requires searching sequentially through the entire file record by record to the end.

Random or direct file organization

Records are stored randomly but accessed directly.To access a file stored randomly, a record key is used to determine where a record is stored on the storage media.Magnetic and optical disks allow data to be stored and accessed randomly.

Serial file organization

Records in a file are stored and accessed one after another.The records are not stored in any way on the storage medium this type of organization is mainly used on magnetic tapes.

Indexed-sequential file organization method

Almost similar to sequential method only that, an index is used to enable the computer to locate individual records on the storage media. For example, on a magnetic drum, records are stored sequential on the tracks. However, each record is assigned an index that can be used to access it directly.

2.6.NUMBER SYSTEM

The knowledge of number systems is essential for understanding of computers. The useful number systems discussed are :

1. *Binary Number System.*
2. *Octal Number System.*
3. *Decimal Number System.*
4. *Hexadecimal Number System.*

1. Binary Number System

The **Binary Number System,** as the name suggests, consists of two digits namely, 0 and 1. These binary digits are called **BITS.** Thus, the word **BIT** stands for either of the binary digits, namely 0 or 1. Since this system uses two digits only, it has the **base** or **radix** 2. It may be noted that the base digit namely 2, is not the fundamental or basic digit of the system. Thus, all the numbers in binary system are written with the help of these two digits namely, 0 and 1. The positional value or place value of each digit in a binary number is twice the positional value of the digit on its right. This number system is identical to decimal number system with the base replaced by 2. The binary numbers are usually written with the base indicated as a subscript on the least significant digit (LSD). *For example,*

$$(101101.1011)_2$$

It can be represented as shown below :

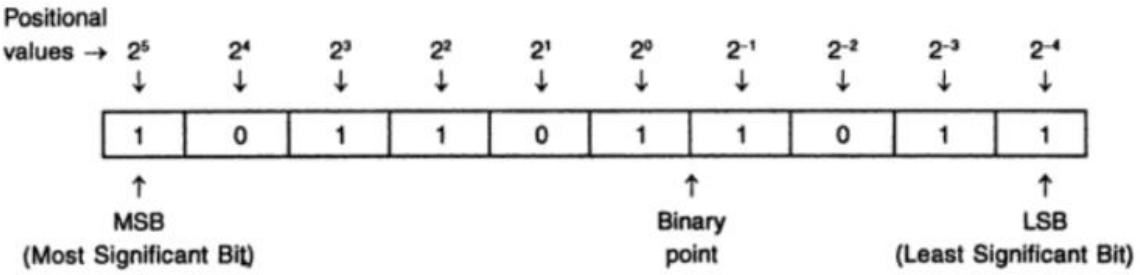


Fig. 1. Binary number shown with positional values.

Here, the places to the left of the binary point are positive powers of 2 and places to the right are negative powers of 2.

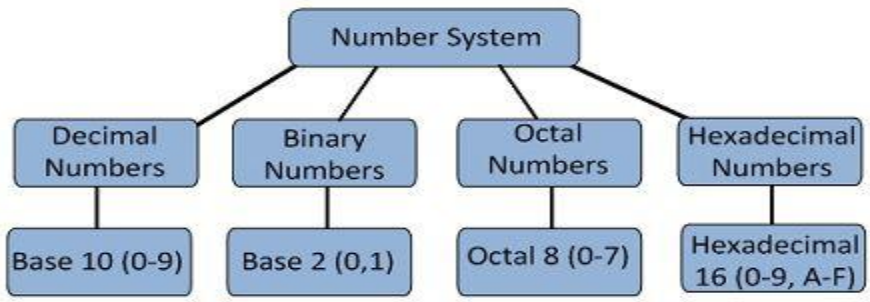
The commonly used terms in coding of data in computer terminology are :

BIT (BInary digiT). A binary digit is logical 0 or 1.

Nibble. A group of four bits (binary digits) is called a Nibble. It is useful in coding the numeric data to hexadecimal form.

Byte. A group of 8 bits make a byte. A byte is the smallest unit which can represent a data item or a character.

Computer Word. A computer word, like a byte, is a group of fixed number of bits which varies from computer to computer but is fixed for each computer. The number of bits in a computer word is known as the **word size** or **word length.**



2. Octal Number System

This number system has **base** or **radix** 8. The basic digits of this system are 0, 1, 2, 3, 4, 5, 6 and 7. It may be noted that the base 8 is not the basic digit of the system. It is commonly used as a shorthand way of expressing binary quantities. Also the numbers represented in octal number system can be used directly for input and output operations.

The octal number system is also a positional value system, wherein each octal digit has its own value or weight expressed as a power of 8. *For example,*

$$(157246.3174)_8$$

It can be represented as shown below :

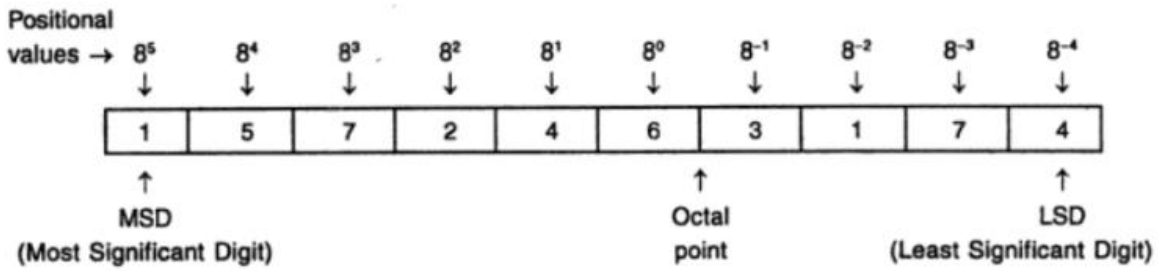


Fig. 2. Octal number shown with positional values.

Here, the places to the left of the octal point are positive powers of 8 and places to the right are negative powers of 8.

3. Decimal Number System

The decimal number system consists of 10 digits namely 0 to 9. A number written using these digits is called a decimal number. For example, the numbers 12876, –1024, 58.74, +768 are decimal numbers. Apart from these digits, the decimal point and ± signs may also be used in writing decimal numbers. The **base** or **radix** of the number system is the number of digits used in it. Since the decimal number system consists of 10 digits, the base of this system is 10. In a number system the base is not the fundamental digit of the system because fundamental digits in this system are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

It can be represented as shown below :

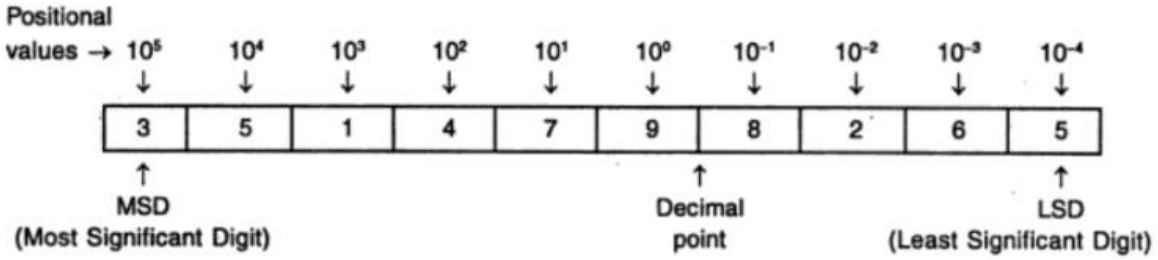


Fig. 3. Decimal number shown with positional values.

Here, the places to the left of the decimal point are positive powers of 10 and places to the right are negative powers of 10.

The part of the number before the decimal point is called **integral part** and the one after the decimal point is called the **fractional part.**

4. Hexadecimal Number System

The Hexadecimal Number System, popularly known as Hex System, has sixteen symbols and therefore has the **base** or **radix** as **16** or **H.** It is very well suited for big computers. The hexadecimal number system represents an information in the concise form. The sixteen symbols used in this system are :

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

The equivalence between hex-numbers (hexadecimal numbers) and decimal numbers is given below :

Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Hexadecimal	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Hexadecimal number system is also a positional value system, wherein each hexadecimal digit/letter has its own value or weight expressed as a power of 16. *For example,*

$$(6A9E83.C5BD)_{16}$$

It can be represented as shown below :

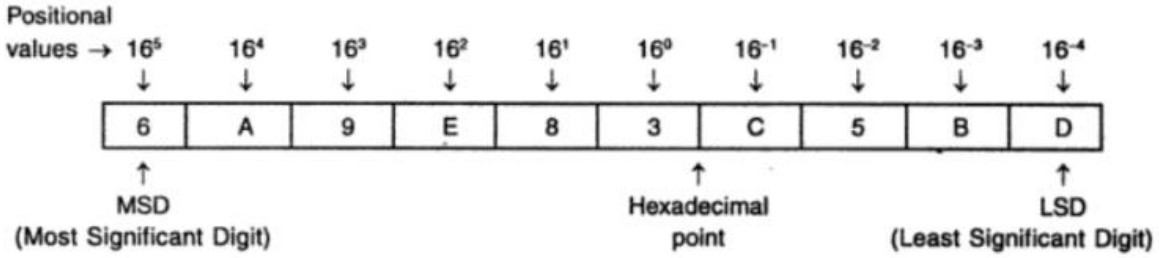


Fig. 4. Hexadecimal number shown with positional values.

Here, the places to the left of hexadecimal point are positive powers of 16 and places to the right are negative powers of 16.

The following table illustrates the relation between binary, octal, decimal and hexadecimal number systems :

Decimal	Binary	Octal	Hexadecimal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

Conversion between two different number systems

The decimal number system is known as **International System** of numbers. This base (base 10) was used initially perhaps for the reason that man has 10 fingers. However, this system is unsuitable for computers because a computer uses electrical and electronical components which can exist only in two states. Hence, for computers the binary number system is required. But, the binary number system at the moment is indispensable for computers as it suffers from the defect of expansion. For example, a number in decimal system requiring only one digit for its representation may require more than one bits in binary form.

To overcome this problem various other number systems such as Octal (base 8) and Hexadecimal (base 16 or H) were developed. A base greater than 10 is preferred because it will require even lesser number of digits. The choices of bases 8 and 16 are useful because of their being multiple of two.

Conversion from Binary to Decimal

A binary number can be converted to its decimal equivalent by adding the weights of the various positions in it which have a 1.

Example 1. *Find the decimal equivalent of the following binary numbers :*
(i) 10110 (ii) 101011 (iii) 11011100.

Solution :

(*i*) $(10110)_2 = 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$
$= 16 + 0 + 4 + 2 + 0$
$= (22)_{10}$.

(*ii*) $(101011)_2 = 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$
$= 32 + 0 + 8 + 0 + 2 + 1$
$= (43)_{10}$
$= 43.$

(*iii*) $(11011100)_2 = 1 \times 2^7 + 1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 0 \times 2^0$
$= 128 + 64 + 0 + 16 + 8 + 4 + 0 + 0$
$= (220)_{10}$
$= 220.$

Example 2. *Convert the following binary fractions to their decimal equivalents :*
(i) $(0.111)_2$

Solution :

(*i*) $(0.111)_2 = 1 \times 2^{-1} + 1 \times 2^{-2} + 1 \times 2^{-3}$
$= 1/2 + 1/4 + 1/8$
$= 0.5 + 0.25 + 0.125$
$= (0.875)_{10}$
$= 0.875$

$\therefore$ $(0.111)_2 = (0.875)_{10}$

Example 3. *Find the decimal equivalent of the following binary numbers :*
(i) $(110010.1011)_2$

Solution :

(*i*) $$(110010.1011)_2 = (1 \times 2^5) + (1 \times 2^4) + (0 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (0 + 2^0) + (1 \times 2^{-1}) + (0 \times 2^{-2}) + (1 \times 2^{-3}) + (1 \times 2^{-4})$$
$$= 32 + 16 + 0 + 0 + 2 + 0 + 0.5 + 0 + 0.125 + 0.0625$$
$$= (50.6875)_{10}$$
$$= 50.6875$$

Conversion from Decimal to Binary

A positive decimal integer can be converted to binary form by successive division by 2. The procedure is given below :

Divide the given number N by 2 and let the quotient be q_1 and the remainder be R_1. Again divide the quotient q_1 by 2 and let the remainder be R_2. Continue the procedure of division till the quotient becomes 0 and in this case let the remainder be R_n.

Example 1. *Convert the following decimal integers into their binary equivalents :*
(i) 25 (ii) 283 (iii) 5280.

Solution : (*i*) Start dividing 25 by 2 and continue the procedure till the quotient is 0. The procedure is shown below.

2 |	25	
2 |	12 – 1	$(=R_1)$ ↑
2 |	6 – 0	$(=R_2)$ |
2 |	3 – 0	$(=R_3)$ |
2 |	1 – 1	$(=R_4)$ |
|	0 – 1	$(=R_5)$ |

The required number in the binary number system = $R_5 R_4 R_3 R_2 R_1$
= 11001

Thus, $(25)_{10} = (11001)_2$

(*ii*) Start dividing 283 by 2 and continue the procedure till the quotient becomes 0.

2 |	283	
2 |	141 – 1	$(=R_1)$ ↑
2 |	70 – 1	$(=R_2)$ |
2 |	35 – 0	$(=R_3)$ |
2 |	17 – 1	$(=R_4)$ |
2 |	8 – 1	$(=R_5)$ |
2 |	4 – 0	$(=R_6)$ |
2 |	2 – 0	$(=R_7)$ |
2 |	1 – 0	$(=R_8)$ |
|	0 – 1	$(=R_9)$ |

The required binary equivalent of 283 = $R_9 R_8 R_7 R_6 R_5 R_4 R_3 R_2 R_1$
= $(100011011)_2$

Thus, $(283)_{10} = (100011011)_2$

Example 1. *Convert the decimal fractional number 0.8125 into its binary equivalent.*
Solution :

	.8125	
	× 2	
f_1	← [1] . 6250	
	× 2	(Multiply only the fraction part)
f_2	← [1] . 2500	
	× 2	
f_3	← [0] . 5000	
	× 2	
f_4	← [1] . 0000	

Further multiplication gives only zero digits as overflow.

Thus, $(0.8125)_{10} = 0 . f_1 f_2 f_3 f_4$
$= (0.1101)_2$

Example 1. *Convert the decimal number 38.625 into its binary equivalent.*

Solution : The given decimal number has two parts, namely an integral part 38 and a fractional part 0.625. These are to be converted into their binary equivalents separately, as given below :

2	38	
2	19 – 0	$(=R_1)$
2	9 – 1	$(=R_2)$
2	4 – 1	$(=R_3)$
2	2 – 0	$(=R_4)$
2	1 – 0	$(=R_5)$
	0 – 1	$(=R_6)$

Thus, the binary equivalent of $(38)_{10} = R_6 R_5 R_4 R_3 R_2 R_1$
$= (100110)_2$

Also

	.625	
	× 2	
f_1	← [1] . 250	
	× 2	(Multiply only the fraction part)
f_2	← [0] . 500	
	× 2	
f_3	← [1] . 000	

Further multiplication gives only zero digits as overflow.

Thus, $(0.625)_{10} = 0 . f_1 f_2 f_3$
$= (0.101)_2$

Hence, $(38.625)_{10} = (100110.101)_2$

Conversion of Decimal Numbers to Octal Numbers

For converting integer decimal numbers into their equivalent octal numbers, divide the given number repeatedly by 8 till the quotient obtained is zero. The following example illustrates this concept :

Example 1. *Convert the following Decimal numbers into their Octal equivalents :*
(i) 759

Solution : (*i*) Start dividing 759 by 8 and continue the procedure till the quotient is 0. The procedure is shown below :

8 | 759		
8 | 94 – 7	↑	LSD
8 | 11 – 6		
8 | 1 – 3		
0 – 1		MSD

Thus, $(759)_{10} = (1367)_8$

Example 2. *Convert the following decimal fractions to their equivalent octal fractions :*
(i) $(0.125)_{10}$ *(ii)* $(0.175)_{10}$

Solution : (*i*)

$$0.125 \times 8 = \boxed{1}.000$$

Thus, $(0.125)_{10} = (0.1)_8$

(*ii*)

$$0.175 \times 8 = \boxed{1}.400$$
$$.400 \times 8 = \boxed{3}.200 \quad \text{(Multiply only the fraction part)}$$
$$.200 \times 8 = \boxed{1}.600$$
$$.600 \times 8 = \boxed{4}.800$$
$$.800 \times 8 = \boxed{6}.400$$
$$.400 \times 8 = \boxed{3}.200$$
$$.200 \times 8 = \boxed{1}.600$$
$$.600 \times 8 = \boxed{4}.800$$
$$.800 \times 8 = \boxed{6}.400 \quad \text{and so on.}$$

Thus, $(0.175)_{10} = (0.1\ \overline{3146})_8$ recurrence

Here, the bar shows that these digits will be repeated infinitely.

Example 3. *Convert the following mixed decimal numbers to their equivalent octals :*
(i) 22.21875

Solution : (i) $(22.21875)_{10}$

Integral part

8 | 22		
8 | 2 – 6	↑	LSD
0 – 2	↑	MSD

Thus, $(22)_{10} = (26)_8$

Fractional part

0.21875
× 8
1. 75000
× 8
6. 00000

Thus, $(0.21875)_{10} = (0.16)_8$

Hence, $(22.21875)_{10} = (26.16)_8$

Conversion of Octal Numbers to Decimal Numbers

Example 1. *Convert the following octal numbers into their decimal equivalents :*
(i) $(47)_8$

Solution : (i) $(47)_8 = 4 \times 8^1 + 7 \times 8^0$
$= 32 + 7 = 39$
Thus, $(47)_8 = (39)_{10}$

Example 2. *Convert the following octal fractions to their decimal equivalents :*
(i) $(0.34)_8$

Solution : (i) $(0.34)_8 = 3 \times 8^{-1} + 4 \times 8^{-2}$
$= 3 \times 1/8 + 4 \times 1/64$
$= 3 \times 0.125 + 4 \times 0.015625$
$= 0.375 + .062500$
$= (0.4375)_{10}$

Conversion from Octal to Binary

The octal number system is widely used as a shorthand way of expressing binary values. The octal number system groups three binary bits together into one digit (0 to 7) as given below :

Octal	*Binary equivalent*
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

To convert an octal number to its binary equivalent, each digit of the octal number is converted to its 3 bits binary equivalent.

The following examples illustrate this concept :

(*ii*) $(5043)_8 = \frac{101}{5}\ \frac{000}{0}\ \frac{100}{4}\ \frac{011}{3}$

$= (101000100011)_2$

Thus, $(5043)_8 = (101000100011)_2$

Example 2. *Convert the following octal numbers into their binary equivalents :*
(i) $(35.216)_8$ *(ii)* $(417.25)_8$.

Solution : (*i*) $(35.216)_8 = \frac{011}{3}\ \frac{101}{5} \cdot \frac{010}{2}\ \frac{001}{1}\ \frac{110}{6}$

$= (11101.01000111)_2$ (Discarding the leftmost and right most zero)

Thus, $(35.216)_8 = (11101.01000111)_2$

(*ii*) $(417.25)_8 = \frac{100}{4}\ \frac{001}{1}\ \frac{111}{7} \cdot \frac{010}{2}\ \frac{101}{5}$

$= (100001111.010101)_2$

Thus, $(417.25)_8 = (100001111.010101)_2$

Example 1. *Convert the following octal numbers into their binary equivalents :*
(i) $(746)_8$ *(ii)* $(5043)_8$.

Solution : (*i*) $(746)_8 = \frac{111}{7}\ \frac{100}{4}\ \frac{110}{6}$ (Replace each octal digit by its 3 bits binary equivalent)

$= (111100110)_2$

Thus, $(746)_8 = (111100110)_2$

Conversion from Binary to Octal

For converting a binary number into its octal equivalent the following steps are followed :

(*i*) Divide the given binary number before the binary point into groups of three bits each (from right to left) and after the binary point into groups of three bits each (from left to right) by adding 0 bits for completing the groups (if needed).

(*ii*) Replace each group by its octal equivalent.

The following examples illustrate this concept :

Example 1. *Convert the following binary numbers into their octal equivalents :*
(i) $(11101)_2$ *(ii)* $(101010011011.10100011)_2$.

Solution : (*i*) $(11101)_2 = \overleftarrow{\frac{011}{3}\ \frac{101}{5}}$ (Replacing each group by its octal equivalent, 0 added on leftmost position for completing the group)

Thus, $(11101)_2 = (35)_8$

(*ii*) $(101010011011.10100011)_2 = \overleftarrow{\underset{5}{101}\ \underset{2}{010}\ \underset{3}{011}\ \underset{3}{011}} . \overrightarrow{\underset{5}{101}\ \underset{0}{000}\ \underset{6}{110}}$

(Replacing each group by its octal equivalent, 0 added on rightmost position for completing the group).

Thus, $(101010011011.10100011)_2 = (5233.506)_8$

Example 2. *Convert the following binary numbers into their octal equivalents :*

(*i*) $(10110101.11001)_2$

Solution : (*i*) $(10110101.11001)_2 = \overleftarrow{\underset{2}{010}\ \underset{6}{110}\ \underset{5}{101}} . \overrightarrow{\underset{6}{110}\ \underset{2}{010}}$

(Replacing each group by its equivalent, 0 added on leftmost and rightmost position for completing the group).

Thus, $(10110101.11001)_2 = (265.62)_8$

Conversion of Decimal Numbers to Hexadecimal Numbers

For converting integer decimal numbers into their equivalent hexadecimal numbers, divide the given number repeatedly by 16 (if the remainder is greater than or equal to 10 then write its symbol *i.e.,* A to F, otherwise the digit 0 to 9) till the quotient obtained is zero.

The following example illustrates this concept :

Example 1. *Convert the following Decimal numbers into their Hexadecimal equivalents :*

(*i*) $(28)_{10}$ (*ii*) $(1795)_{10}$

Solution : (*i*) Start dividing 28 by 16 and continue the procedure till the quotient is 0. The procedure is given below :

16	28
16	1 – C
	0 – 1

Thus, $(28)_{10} = (1C)_{16}$

(*ii*)

16	1795
16	112 – 3
16	7 – 0
	0 – 7

Thus, $(1795)_{10} = (703)_{16}$

Example 2. *Convert the following decimal functions to their equivalent hexadecimal fractions :*

(*i*) $(0.875)_{10}$

Solution : (*i*)

$$\begin{array}{r} 0.875 \\ \times\ 16 \\ \hline \boxed{14}.000 \\ = \text{E} \end{array}$$

Thus, $(0.875)_{10} = (0.\text{E})_{16}$

Conversion of Hexadecimal Numbers to their Decimal Equivalents

The conversion of hexadecimal numbers to their decimal equivalents is performed by using the concept of the positional value of each digit in the number, whether it is an integer, a fraction or a mixed number. The following examples illustrate this concept :

Example 1. *Convert the following hexadecimal numbers to their decimal equivalents :*
(i) $(9D)_{16}$ *(ii)* $(517)_{16}$.

Solution : *(i)*
$$(9D)_{16} = 9 \times 16^1 + D \times 16^0$$
$$= 144 + 13 \times 1 \qquad (\because D = 13)$$
$$= 144 + 13$$
$$= 157$$
Hence, $(9D)_{16} = (157)_{10}$

(ii)
$$(517)_{16} = 5 \times 16^2 + 1 \times 16^1 + 7 \times 16^0$$
$$= 5 \times 256 + 1 \times 16 + 7 \times 1$$
$$= 1280 + 16 + 7$$
$$= 1303$$
Hence, $(517)_{16} = (1303)_{10}$

Example 2. *Convert the following hexadecimal fractions into their decimal equivalents :*
(i) $(0.48)_{16}$

Solution : *(i)*
$$(0.48)_{16} = 4 \times 16^{-1} + 8 \times 16^{-2}$$
$$= 4 \times 1/16 + 8 \times 1/16^2$$
$$= 4 \times .0625 + 8 \times 0.00390625$$
$$= 0.2500 + .03125000$$
$$= 0.28125000$$
Hence, $(0.48)_{16} = (0.28125)_{10}$

Conversion from Hexadecimal to Binary

For converting a hexadecimal number to its binary equivalent, each digit of the hexadecimal number is converted to its 4–bits binary equivalent. For reading convenience, usually each nibble (4-bit binary equivalent) is written with a little space in between. The following examples illustrate this concept :

Example 1. *Convert the following hexadecimal numbers into their binary equivalents :*
(i) $(59F)_{16}$

Solution : *(i)* $(59F)_{16} = \underset{5}{0101}\ \underset{9}{1001}\ \underset{F}{1111}$ (Replace each hexadecimal digit by its 4 bits binary equivalent)
$$= (0101\ 1001\ 1111)_2$$
Thus, $(59F)_{16} = (0101\ 1001\ 1111)_2$

Example 2. *Convert the following hexadecimal numbers into their binary equivalents :*
(i) $(F3A.CB)_{16}$

Solution : *(i)* $(F3A.CB)_{16} = \underset{F}{1111}\ \underset{3}{0011}\ \underset{A}{1010}\ .\ \underset{C}{1100}\ \underset{B}{1001}$
(Replace each hexadecimal digit by its 4 bits binary equivalent)
$$= (1111\ 0011\ 1010\ .\ 1100\ 1001)_2$$
Thus, $(F3A.CB)_{16} = (1111\ 0011\ 1010\ .\ 1100\ 1001)_2$

Binary Representation of Integers

The different ways of integer representation in computer memory are :

(*i*) *Sign and Magnitude representation*

(*ii*) *One's complement representation*

(*iii*) *Two's complement representation*

(*i*) Sign and Magnitude Representation

It is the conventional form for number representation. Every integer has a sign (+ or –) and a string of digits representing the magnitude.

For example,

+ 241 or 745 are positive integers (+ sign may be omitted)

– 127, – 82 are negative integers

The sign of a number is represented by the MSB (Most Significant Bit). If it stores value 0, the sign is +, and if stores 1, the sign is –.

(*ii*) One's Complement Representation

Using one's complement positive numbers are represented by their binary equivalents (also known as true forms) and negative numbers by their 1's complements (also known as 1's complement forms).

1's complement of a binary number is found by replacing every 0 with 1 and every 1 with 0.

For example,

1's complement of binary number 100111 will be 011000

(*iii*) Two's Complement Representation

Using two's complement positive numbers are represented by their binary equivalents (also known as true forms) and negative numbers by their 2's complement form.

2's complement of a number is found by adding 1 to its 1's complement.

or

For finding the 2's complement of a number, start from the LSB and write the bits as it is till the first 1 appears (**do not** change the first 1 to 0), then write the 1's complement of the remaining bits to the left side of it.

For example, 2's complement of binary number 110001 will be calculated as given below :

1's complement of 1110001 = 0001110

$$\begin{array}{r} 0001110 \\ +\ \ 1 \\ \hline 00001111 \end{array}$$

2's complement of 1110001 = 00001111

Note. *Rules for binary addition are :*

$0 + 0 = 0$

$0 + 1 = 1$

$1 + 0 = 1$

$1 + 1 = 10$

QUESTIONS

1. Define: Data and Information.
2. Write a short note on CPU.
3. How to store data and information as files.

4. Explain the concept of data processing.
5. Briefly explain the binary representation of integers.
6. Convert the following
   i. **$(22.21875)_{10}=(?)_{8}$**
   ii. **$(F3A.CB)_{16}=(?)_{2}$**
   iii. **$(1795)_{10}=(?)_{16}$**

UNIT-III

OPERATING SYSTEM – MS-WINDOWS:

- OPERATING SYSTEM: DEFINITION & FUNCTIONS
- BASICS OF WINDOWS
- BASIC COMPONENTS OF WINDOWS
- TASKBAR, ACTIVATING WINDOWS,USING DESKTOP,TITLE BAR, RUNNING APPLICATIONS,
- ICON-TYPES OF ICONS,
- EXPLORING COMPUTER,
- MANAGING FILES AND FOLDERS,
- COPYING AND MOVING FILES AND FOLDERS.
- CONTROL PANEL
- DISPLAY PROPETIES,
- ADDING AND REMOVING SOFTWARE AND HARDWARE,
- SETTING DATE AND TIME.
- SCREN SAVER AND APPEARANCE.

3.1. OPERATING SYSTEM

An Operating System (OS) is an interface between computer user and computer hardware. An operating system is software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

Some popular Operating Systems include Linux Operating System, Windows Operating System, VMS, OS/400, AIX, z/OS, etc.

3.1.1. DEFINITION

An operating system is a program that acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs.

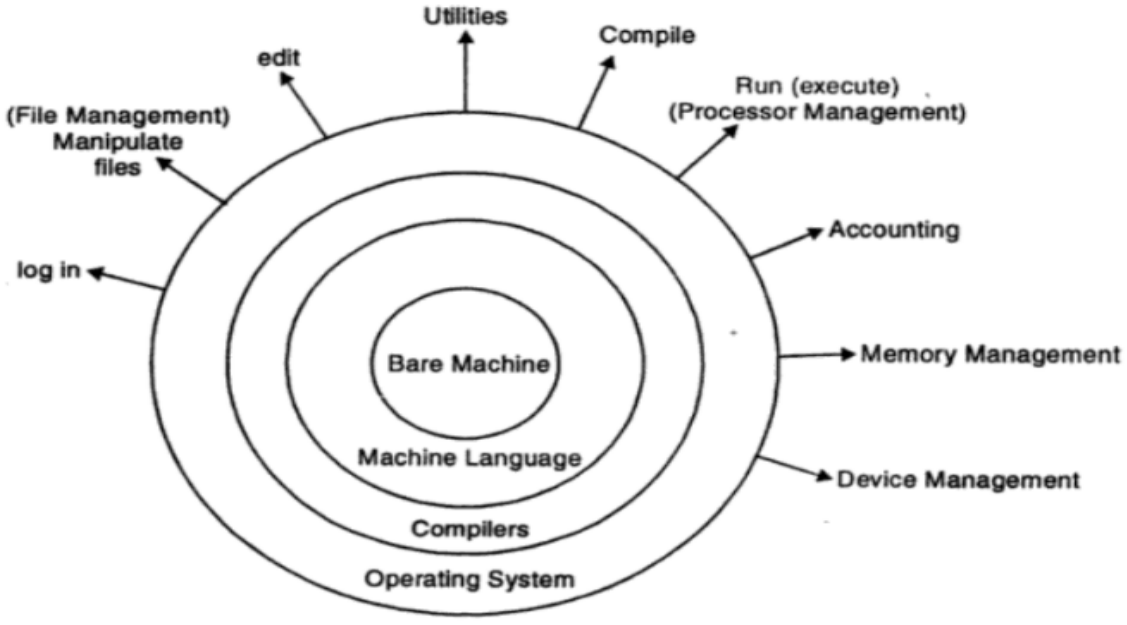


Fig. 1. Illustration of user's virtual (or non-existent) machine.

3.2. FUNCTIONS OF AN OPERATING SYSTEM

Following are some of important functions of an operating System.

- Memory Management
- Processor Management
- Device Management
- File Management
- Security
- Control over system performance
- Job accounting
- Error detecting aids
- Coordination between other software and users

➢ Memory Management

Memory management refers to management of Primary Memory or Main Memory. Main memory is a large array of words or bytes where each word or byte has its own address.

Main memory provides a fast storage that can be accessed directly by the CPU. For a program to be executed, it must in the main memory. An Operating System does the following activities for memory management −

- Keeps tracks of primary memory, i.e., what part of it are in use by whom, what part are not in use.
- In multiprogramming, the OS decides which process will get memory when and how much.
- Allocates the memory when a process requests it to do so.
- De-allocates the memory when a process no longer needs it or has been terminated.

➢ Processor Management

In multiprogramming environment, the OS decides which process gets the processor when and for how much time. This function is called **process scheduling**. An Operating System does the following activities for processor management −

- Keeps tracks of processor and status of process. The program responsible for this task is known as **traffic controller**.
- Allocates the processor (CPU) to a process.
- De-allocates processor when a process is no longer required.

➢ Device Management

An Operating System manages device communication via their respective drivers. It does the following activities for device management −

- Keeps tracks of all devices. Program responsible for this task is known as the **I/O controller**.
- Decides which process gets the device when and for how much time.
- Allocates the device in the efficient way.
- De-allocates devices.

➢ **File Management**

A file system is normally organized into directories for easy navigation and usage. These directories may contain files and other directions.

An Operating System does the following activities for file management −

- Keeps track of information, location, uses, status etc. The collective facilities are often known as **file system**.
- Decides who gets the resources.
- Allocates the resources.
- De-allocates the resources.

➢ **Other Important Activities**

Following are some of the important activities that an Operating System performs −

- **Security** − By means of password and similar other techniques, it prevents unauthorized access to programs and data.
- **Control over system performance** − Recording delays between request for a service and response from the system.
- **Job accounting** − Keeping track of time and resources used by various jobs and users.
- **Error detecting aids** − Production of dumps, traces, error messages, and other debugging and error detecting aids.
- **Coordination between other softwares and users** − Coordination and assignment of compilers, interpreters, assemblers and other software to the various users of the computer systems.

3.3. BASICS OF WINDOWS

Windows is an operating system that manages a personal computer known as a series of programs. It is a Microsoft-developed graphical operating system. This offers a way of data, apps running, playing video games, streaming videos and internet access. Microsoft was first created in November 1985 and has frequently been modified as computer memory expanded, as chips got faster processing and, of course, when the internet was invented. PCs used a set of text commands before Windows. After that, more than a dozen versions, including the latest Windows 10 edition, were released.

➢ **Web Browsers**

Internet Explorer is one of the best-known Internet applications, mostly because many Windows models have bundled it in the last 20 years. The GUI and most common web browser features include your favorite bookmarking pages. Microsoft Edge substitutes for Windows 10 for Internet Explorer but is serving the same function. It has some additional features via Internet Explorer, including the option of easy to read and integrate Web pages with other Windows 10 components.

- **Productivity**

Multiple productivity features, such as handling e-mails and schedules, following directions and organizing notes, are included in Windows 8 and 10. Mail and Calendar are software that links your accounts, for example, to Microsoft, Google and Apple. Within these services, you synchronize your mailboxes and calendars and display them on your computer in a single window.
Maps, a Bing Maps app that allows you to use all the same navigation and search apps. It also introduces a few additional functionalities, such as pinning and saving instructions on all Windows tools.
One Note, which originally came with Microsoft Office, is the advanced notice management program, but now it's a default Windows 10 feature. OneNote helps you to create a notes list, which you can search and share.

- **Settings**

You can change the settings and configurations of your computer in the Control Panel. The Windows 8 Settings app provides you with access for the most part to your device settings, but instead of the traditional Windows, the modern tablet model.

- **Advantages**

Now we will first be going to see the advantages:

Ease to Use: The more modern ones are possibly simple for users familiar with previous versions as well. Perhaps that is due to the uniform look and feel of virtually perhaps the systems and the way the file system has been implemented since the days of MS Windows.

Available Software: It is equipped with a large range of applications. This is both because of and why Microsoft is a world leader in Desktop operating systems and bureau applications. When you are searching for your business program, a Windows version is likely to be available somewhere if the product exists.

Backward Compatibility: If you are currently using the older edition and need more up-to-date details but don't want to compromise the use of any older Window only programs that are important to your business needs, it's possible that such programs will operate with a newer version.

Plug & Play: Windows is also a specialist in plug & play support for PC hardware, as an operating system for the average home user. As long as you install the right drivers, Windows typically does an outstanding job of recognizing new hardware. Many operating systems do have Plug & Play features, but require manual control to a lesser degree and more frequently.

Games: You need Windows if you want the latest innovations in PC Gaming. It provides plenty of gaming games as well as other different supporting gaming hardware. There are also some of the most common games for Linux and some for the Mac, but no comparison really. Nevertheless, all the outdated games written for Windows 95 and 98 aren't going to work with XP, as well.

- **Benefits and Features**

Allows the user to interact with the computer (through the keyboard, mouse, microphone, etc.).

Controls the storage of data (images, files, music).

Controls hardware attached to the computer such as webcams, scanners and printers.

Helps to open and close programs (word processors, games, photo editors, etc.), and gives them part of the computer's memory to allow them to work.

Controls what access to a computer different users have and the computer's security.

Deals with errors and user instructions, and issues simple error messages.

Promotes multitasking by allowing the user to do several things on the computer at once – for example, watch a video while writing a letter.

	1. Windows 1.0	It was released on November 20, 1985 Used Graphical User Interface
	2. Windows 2.0	It was released on December 9, 1987 16 bit Graphic User Interface (GUI) based operating environment Introduced Control Panel, and the first version of MS Word and Excel
	3. Windows 3.0	It was released in 1990 ,It was better at multitasking Used 8086 microprocessors
	4. Window 95	It was the first complete Operating System It was released on August 15, 1995 It merged MS-DOS and Windows products Advanced from 16 bit GUI to 32 bit GUI
	5. Windows 98	It was released to manufacturing on May 15, 1998 It was a 16 bit and 32 bit product based on MS DOS

	6. Windows 2000	It was officially released on February 17, 2000. However, its manufacturing had begun in late 1999 It was considered as one of the most secure OS ever A local disk manager was introduced with these Windows
	7. Windows XP	While the manufacturing started on August 24, 2001, the official product was released on October 25, 2001 Automatic wireless connection support
	8. Windows Vista	It was released on January 30, 2007 It was the first operating system to use DVD-ROM for installation
	9. Windows 7	It was released on October 22, 2009 Libraries were added in the file management system
	10. Windows 8	It was released for retail on October 26, 2012,touch-based Installed in new devices like Laptops, Mobile phones, tablets Online Applications could be directly downloaded
	11. Windows 10	It was released on July 29, 2015 Addresses shortcomings in the user interface first introduced with Windows 8 A virtual desktop system

3.4. BASIC COMPONENTS OF WINDOWS

Windows is an essential part of a Computer. It's the most commonly used Operating System all around the world both individually and commercially. Since the beginning of the creation of Windows, there are many versions of Windows like Windows XP, Vista, 8, 10, etc.

Windows consists of the following components:

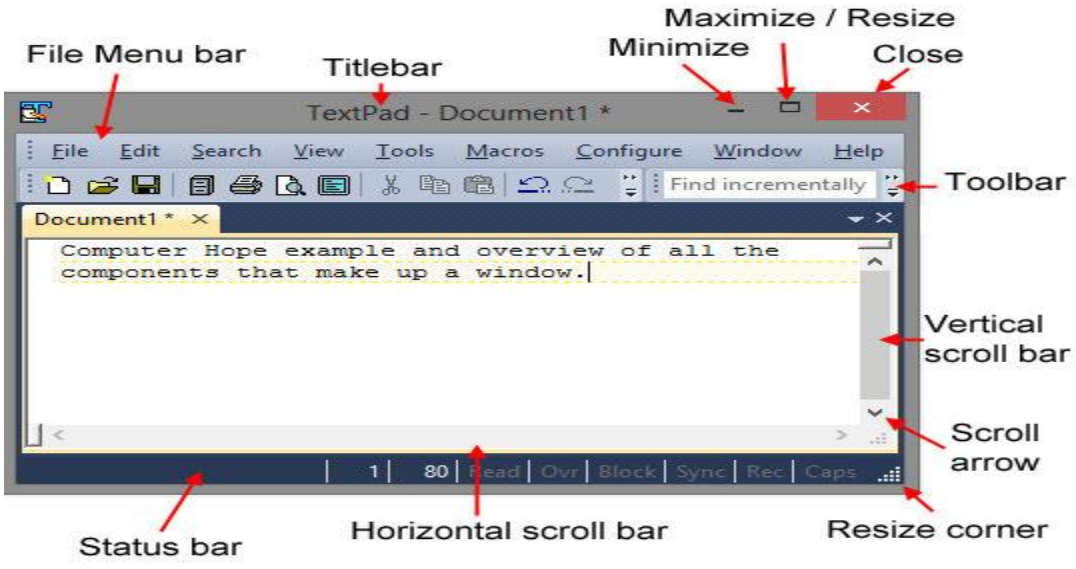
- **Icons** : Icon is a small graphical representation of a program or file. When we double-click an icon, the associated file or program will be opened. For example, if we were to double-click on the My Computer icon, it would open Windows Explorer.

TYPES OF ICONS

a. Disk Drive/ Document Icons
b. Application Icons
c. Toolbar Icons
d. Menu Icons

- **Taskbar:**The taskbar is a simple row at the very bottom of the screen where all currently opened files or applications are listed. It helps you select what you want to keep opened and what you want to close.
- **Desktop:** The desktop is the very first screen we see after windows start. Here, we can see folders like My Computer, Documents, etc. It is the main working area of many of your computer operations. You keep your special files on the desktop so you can access them easily and it gives access to other important functionalities as well such as search bar, taskbar, and file explorer.

▪ **Title Bar :**The title bar is a horizontal bar located at the top of a window in a GUI. It displays the title of the software, name of the current document, or other text identifying the contents of that window. For example, in the picture below, the title bar displays the program name "TextPad" and the document name "Document1" that is currently being edited. Besides giving a description of the open program or window, the title bar may also contain other useful features that depend on the operating system and program showing the title bar.



• **Start Menu:**By clicking the start menu, in the bottom left corner of the screen, a vertical window consisting of the recently opened applications and saved locations will pop-up. Although the Start Menu was a major component of Windows before Windows 8, It was removed from Windows 8 and then brought back in Windows 10.

• **Maximize/Minimize/Close Buttons:**These buttons are located at the top right corner of our opened documents, and the area used to close, minimize or maximize the document window. They help us jump from one task to another fast and let us decide either we want to close an application or resize it's area on the screen or just hide it for a few moments.

• **My Computer:**When we double click on My Computer, We find ourselves looking at a window where we can navigate between Computer Drives and Control Panel tools. It also gives us access to different drives on our computer and the data which lies in those drives.

• **My Computer Right Click Menu:**When we right-click on My Computer or any other file or folder, We get a menu where we can look into different options related to that specific file, for example, Properties, etc.

• **Recycle Bin:**When we delete a file or folder, It goes into the Recycle Bin from where It can either be restored or permanently deleted from the Computer. Once, a file or folder is deleted from the Recycle Bin, It is very difficult to recover it again. Therefore, the utility of the recycle bin is very essential to use properly if you deal with important documents and files on a day to day basis.

• **Shortcut:**A shortcut creates a button or icon which typically is located on the Desktop. By clicking on this Shortcut, We can quickly open the document or application of which it is a shortcut. It helps us save the tedious task of going to the main directory again and again and saves our time.

• **Mouse Functions:**The mouse is an input device which is essential in the working of a computer. It performs several important functions on Windows like Scrolling, Right and Left Clicks, etc. It performs another very important function of modern windows which is pointing towards different things and giving special instructions whenever needed.

• **Highlight:** When we have opened a document, we can easily highlight the required portion of our document by using Mouse. It is essential for documents and helps keep track of useful information.

• **Copy/Cut/Paste:** These options are one of the most essential components of Windows. The copy is used to copy a portion of a document from one document to another or a file or folder from one location to another. The paste is used to paste the copied item on the desired location. While Cut is used to move an item to our desired location in the Computer.

• **Toolbar:** The toolbar is a simple row where we can see different options to customize the look of our opened window. It has two types, Formatting Toolbar, and Standard Toolbar. The standard toolbar consists of options like new documents, save a document, etc. While Formatting Toolbar consists of options like font size, font type, etc.

• **Drag/Drop:** Dragging an object means to move an object (file or folder) from one location to another and when we reach our desired location, then we can drop the object to that location. It is one of the most used features of windows as you have to move files from one location to another.

• **File Extensions:** File extensions are used to define the type of the file. For example an image file will have an extension of .jpg, .jpeg and a Word document will have an extension .docx, .xls, .txt etc. You could have different types of extensions and these extensions help you decide the type of software that will be used to access these files.

• **Multitasking:** The term Multitasking means to run more than one file or application on Windows at the same time. It is a very important component of Windows which saves our time as well as allow us to perform more tasks at the same time.

• **Virtual Keyboard:** A virtual keyboard is a software through which we can see a keyboard on our screen and use it by our Mouse. It is mostly used in the cases when your keyboard is not working properly or you use windows on a touch device.

• **Disk Drives:**Disk Drives are drives used to store applications and files. Hard Drives and Floppy Drives are used for this purpose. They are very important for your instructions as well as your hardware to work properly.

• **Defragmenting Hard Drives:**Defragmenting a Drive means to erase all the data from that drive. It is also another important component of windows as users need to clean up their hard drives from time to time and it also comes as a built-in utility.

- **Windows Explorer :**Windows Explorer is a file manager program that allows you to browse the contents of your hard drive. With Windows Explorer, you can browse your pictures, music, documents and videos from one location. You have three ways you can open Windows Explorer in Windows 7.

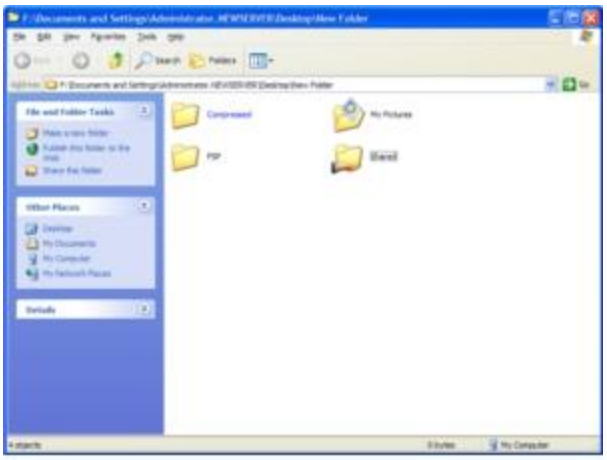
Step 1 - Right-click the "Start" menu and click "Open Windows Explorer." Windows Explorer opens for you to browse your hard drive's contents.

Step 2 - Press the "Windows" and "E" keys on the keyboard and Windows Explorer opens for you to browse your hard drive's contents

step 3 - Click the "Start" menu and type "explorer" in the instant search box. Windows Explorer appears in the list for you to click.

3.5 MANAGING FILES AND FOLDERS:

- Each of these is a folder. They may contain files or other folders (called subfolders) or both. There may be many “nestlings” of folders within folders.



- Files and folders are located on the computer by using a file path.
- The “James” folder is located inside a folder called “Home”, which is located inside a folder called “as-net”, which is located on the “C:” drive. The file path will be “C:\es-net\Home\James”.

3.6 CREATING FILES AND FOLDERS

- This is mercifully easy. Simply right-click on some empty space in any suitable folder or the desktop and choose to create a new object from the choices offered.
- Be careful not to alter the file extension, as this can render the file unreadable. File extensions are usually hidden for this reason.

3.6.1 COPY FILES AND FOLDER

To copy files and folders, select the *Copy* tab and specify the following values:

Parameter	**Description**
Select Action Type	Select the Action from any of the following for HTTP : ***Files*** ***Files as archive*** Select the Action from any of the following for network share: ***Copy a File*** - To copy a file from one location to another ***Copy a File to a Folder*** - To copy a file from one location to a specified folder

	Copy Multiple Files - To copy multiple files to a specified folder ***Copy a Folder*** - To copy a folder from one location to another
Source File	Specify the file that has to be copied. The file can either be in a shared location or in the specified location in the client machines.
Destination Folder	Specify the destination location to copy the files/folders.
Overwrite Existing Files	Select this option to overwrite the existing files.
Create Destination Directory if doesn't Exist	Select this option to create the destination directory, if it does not exist.
Modified, Created, Accessed	Select this option to specify the modified, created or accessed details of the file/folder.

If you wish to copy more files/folders, click **Add More Action** button and repeat step 2. The values gets added to the **List of File Actions** table.

3.6.2 RENAME/MOVE FILES AND FOLDERS

To rename or move the files and folders, select the *Rename/Move* tab and specify the following values:

Parameter	**Description**
Select Action Type	Select the Action from any of the following: Rename/Move a file Rename/Move a folder
Source File/Folder	Specify the file or the folder that has to be copied
Destination File/Folder	Specify the destination file or the folder.

If you wish to copy more files/folders, click **Add More Action** button and repeat step 2. The values gets added to the **List of File Actions** table.

3.6.3. DELETE FILES AND FOLDERS

To delete the files and folders, select the *Delete* tab and specify the following values:

Parameter	Description
Select Action Type	Select the Action from any of the following: Delete a File Delete Multiple Files Delete a Folder
Source File	Specify the files/folders that has to be deleted
Include Read Only Files	Select this option, if you wish to copy the files even if it has only read-only permissions
Include System Files	Select this option if you wish to copy the system files.
Include Hidden Files	Select this option if you wish to copy the hidden files.
Modified, Created, Accessed	Select this option to specify the modified, created or accessed details of the file/folder.

To modify a file action from the **List of File Actions** table, select the appropriate row and click icon and change the required values.
To delete a file action from the **List of File Actions** table, select the appropriate row and click icon.

3.7 CONTROL PANEL

Control Panel is the centralized configuration area in Windows. It changes nearly every aspect of the operating system, including keyboard and mouse function, passwords and users, network settings, power management, desktop backgrounds, sounds, hardware, program installation and removal, speech recognition, and parental control.

Think of Control Panel as *the* place to go in Windows if you want to change something about how it looks or works.

3.7.1 HOW TO ACCESS THE CONTROL PANEL

- In recent versions of Windows, Control Panel resides in the **Windows System** folder or category in the Apps listing.
- In other versions of Windows, click **Start** and then **Control Panel** or **Start**, then **Settings**, then **Control Panel**.
- See How to Open Control Panel for detailed, operating system specific directions.
- Although it's not an "official" way to open and use the options in Control Panel, there's also a special folder you can make in Windows called God Mode that gives you all the same Control Panel features but in a simple one-page folder.

3.7.2 HOW TO USE THE CONTROL PANEL

The Control Panel itself is really just a collection of shortcuts to individual components called control panel. Therefore, to use Control Panel really means to use an individual applet to change some part of how Windows works.

If you're looking for a way to access the areas of Control Panel directly, without first going through Control Panel, see our List of Control Panel Commands in Windows for the commands that start each applet. Since some applets are shortcuts to files with the .CPL file extension, you can point directly to the CPL file to open that component.

For example, **control timedate.cpl** works in some versions of Windows to open the *Date and Time* settings, and **control hdwwiz.cpl** is a shortcut to Device Manager.

The physical location of these CPL files, as well as folders and DLLsthat point to other Control Panel components, are stored in the Windows Registry HKLM hive, under *\SOFTWARE\Microsoft\Windows\Current Version*; the CPL files are found in *\Control Panel\Cpls* and all the rest are in *\Explorer\Control Panel\Namespace*.

3.7.3 CONTROL PANEL VIEWS

The applets in Control Panel display in two major ways: by category or individually. All Control Panel applets are available either way but you may prefer one method of finding an applet over the other:

3.7.4 CONTROL PANEL AVAILABILITY

Control Panel is available in nearly every Microsoft Windows version including Windows 10, Windows 8, Windows 7, Windows Vista, Windows XP, Windows 2000, Windows ME, Windows 98, Windows 95, and more.

Throughout the history of Control Panel, components were added and removed in every newer version of Windows. Some Control Panel components were even moved to the Settings app and PC Settings in Windows 10 and Windows 8, respectively.

Even though Control Panel is available in almost every Windows operating system, significant differences in the number and scope of applets occur from one Windows version to the next.

3.8 DISPLAY PROPERTIES

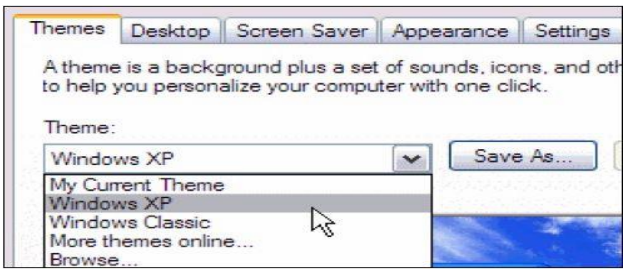
Properties are settings that give information, status, and options for almost every element of the Windows system. Properties are available via the shortcut menu key on the keyboard, or a click of the right mouse button. Properties are different from object to object. For instance, the list of property options for the Windows desktop will be very different than the list of property options for a file.

You can access this area in two different ways:

- Click the **Start Control Panel Display**, or
- Right-click on the desktop background and click **Properties**.

When the **Display Properties** dialog appears there are several tabbed options available. Clicking the **Apply** button after making a change to the desktop allows you to preview the settings you've selected before making them final. You can always click the **Cancel** button to restore your original settings. Below is a description of the options available for each of the tab items:

3.9 THEMES



The options on the **Themes** tab allow you to set the overall desktop theme for the workstation. You can choose from **Windows XP**, **Windows Classic**, and more. There are also more themes available online, but for a fee.

The **Windows XP** theme has the metallic looking start button, and a more modern looking start menu with the option of "pinning" your most frequently used applications to a quick access area.

The **Windows Classic** look is the traditional style window and start menu we've been used to viewing since the **Windows 95/98/NT/2000** operating systems.

3.10 DESKTOP

The **Desktop** tab enables you to select a photo, pattern or clipart to cover the background of the desktop. Windows comes with many preset pictures and patterns to choose from.

1. Select the picture or pattern of your choice from the **Background** list box. (You also have the option to **Browse...** and select a picture stored anywhere on your computer. It will then be added to the scrolling background list.)
2. Decide how to **Position** the image or pattern on the desktop: **Stretch**, **Tile**, or **Canter**.

   Then set a complimentary background **Colour**. (This colour would only display on the background if you selected a **Canter** option for a picture that is smaller than the window size.)

3. If you click the **Customize Desktop...** button, the **Desktop Items** dialog appears...

3.10.1 ADD OR REMOVE PROGRAMS

How to open Add or Remove Programs in Windows XP

Open the Control Panel

1. Double-click **Add or Remove Programs**.
2. A window similar to the one below should appear with a list of all the programs on your computer.
4. To **remove a program**, select it on the list, and then click the **Change/Remove** button.

See the link below for additional help with uninstalling software in Windows.

How to open Add/Remove Programs in Windows ME and 98

1. Open **the** Control Panel
2. Double-click **Add/Remove Programs**.
3. A window should open that allows you to uninstall software in Windows.

"Add/Remove Programs" or "Add or Remove Programs?"

Unless you're talking about very early versions of Microsoft Windows (Windows 98 or Windows ME), this section is called "Add or Remove Programs."

With Windows Vista and Windows 7, if you're writing about uninstalling and managing software in Windows, refer to this section as "Programs and Features." With Windows 8 and Windows 10, it should be referred to as "Apps & features."

3.11. HOW TO SET OR CHANGE A COMPUTER'S DATE AND TIME

Windows XP, 2000, 98, 95, NE, and NT 4

In Windows XP and earlier versions, follow these steps to set the date and time.

1. Navigate to the Windows desktop.
2. Right-click the time in your Systray, usually located at the bottom-right of your screen.
3. Click the **Adjust Date/Time** menu item.
4. This action opens the Date/Time Properties window, where you can adjust the date, time, and time zone.
5. Once the proper date and time are set, click **Apply**, and then **Ok**.

Change screen saver in Windows XP

1. Open the Control Panel.
2. In the Control Panel window, click **Appearance and Personalization**.
3. In the *Display* window, click the **Screen Saver** tab.
4. Under the *Screen saver* section, click the down arrow on the right side of the first box.
5. Once you have selected your screen saver (or, if you don't want to have a screen saver, select **none**) and adjust any other settings to your liking, click **Apply**, then click **OK**.

QUESTIONS

1. Define: operating system.
2. What is desktop?
3. Write about the types of user interface.
4. Write short notes on cut and copy.
5. What is control panel? Explain.
6. How to manage files and folders in MS-Windows.
7. What are the various features of MS-WORD?
8. Explain Macro? Write down the steps to record a new macro.
9. Explain the components of windows operating system in detail.

UNIT-IV

MS-WORD

- INTRODUCTION TO MS-WORD WORKING WITH DOCUMENTS
- USING TABLES
- PICTURE AND CHARTS
- USING MAIL MERGE
- CREATING FORM LETTERS AND LABELS
- COLLABORATING WITH WORKGROUPS
- MODIFYING A REPORT
- MACROS

4.1 BASIC USES OF MICROSOFT WORD: –

You can create, design, and edit letters, resume, bills, reports, applications, forms, birthday cards, business cards, calendars, books, articles, assignments in Microsoft Word and you can share them with your friends and also in public. And you can work with your team members in real-time on the same document. There are pre-designed templates that you can use to create various kinds of personal and official documents.

4.1.1 THERE ARE THREE METHODS YOU CAN FOLLOW TO USE MICROSOFT WORD.

- To create anything such as forms, resume, business cards, applications, and bills, etc. you need to visualize first, what kind of document you want to create. Such as if you want to create business cards in MS-Word then you need to visualize the colours, shapes, text, and alignment, etc. to give it a look you're imagining. Basic knowledge of official documents is important to utilize the features of MS-Word.
- See the samples of existed documents on the Internet and then create similar by seeing the sample. Also, you can watch video tutorials on YouTube. So, you can learn the basics of this method. But more advanced knowledge of Microsoft features and function it's better than you can join an online course if really want to learn quickly.
- You can also download a template related to your documents such as the current account opening application for a bank. After downloading the

template then replace exists text with your own. Save the document by pressing Ctrl+S and Print the document or use Ctrl+P.

- It's not that easy for the beginner or basic course student to learn Microsoft Word faster. But after 2-3 days of practical classes or by watching online videos related to Microsoft word Tutorial you can able to work on Word more frequently and with quality.

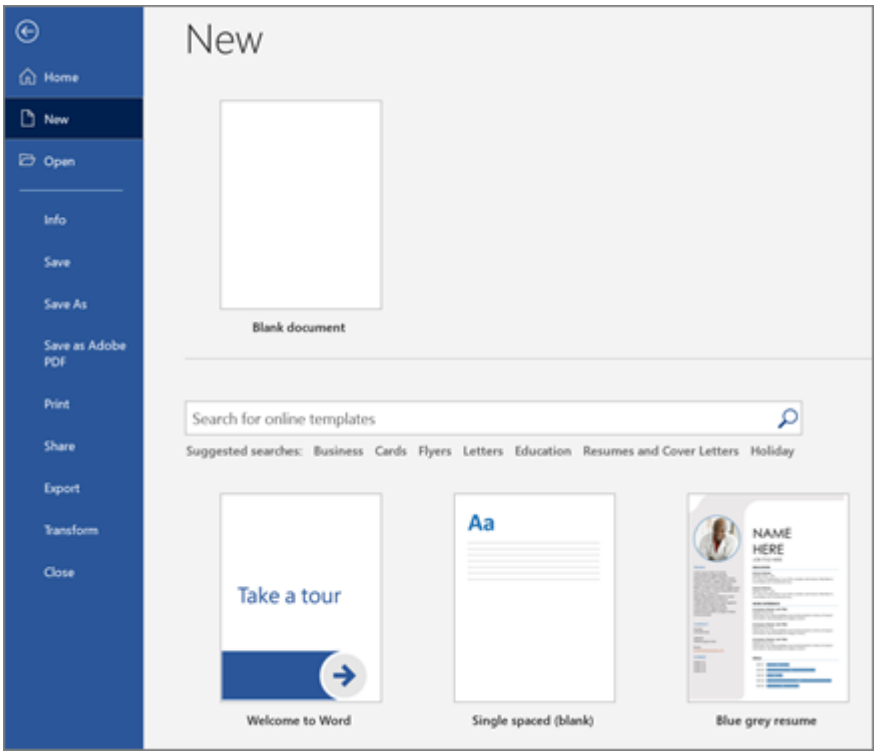
4.2 WORK WITH DOCUMENTS

- Starts you work in Word with these quick instructions how to create, share, and edit documents on your own or with your team.

- To convert your Google Docs to a Word document, go to File > Download > Microsoft Word (.docx). Then, open the file in Word. See more at get started with Docs.

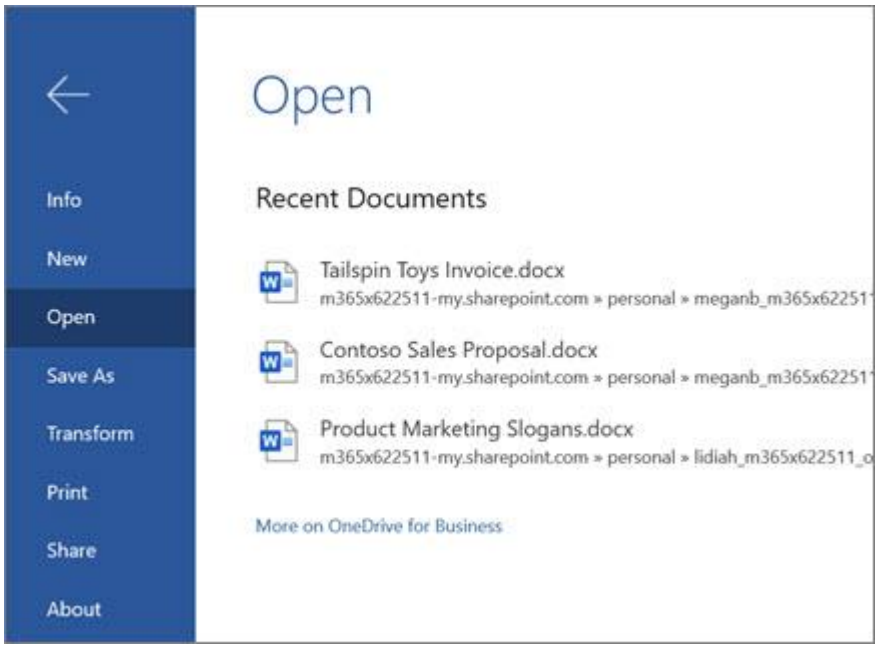
Create a document

1. Select **File** > **Home**.
2. Select **Blank document**, select one of the templates, or open a **Recommended** or **Recent file**.



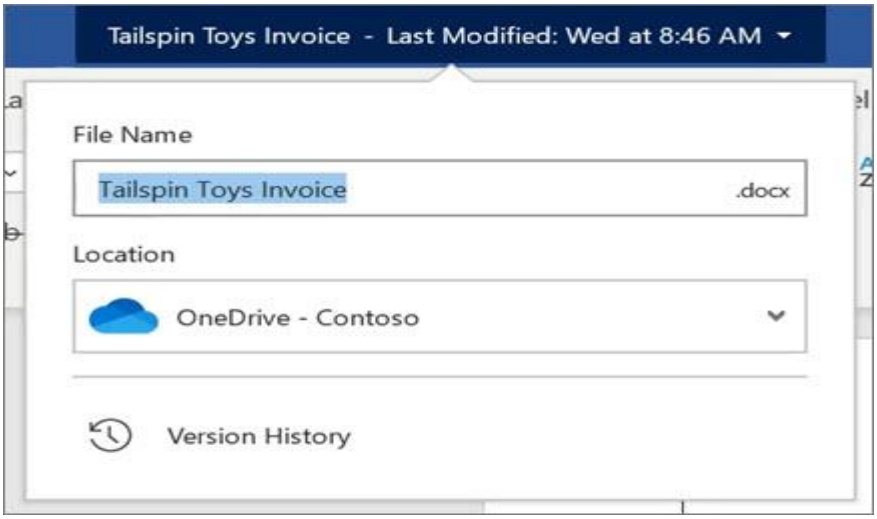
Open a document

- Select **File** > **Open**, and select the document you want.
  - If your files saved to One Drive and you're working offline, your revisions will be saved the next time you connect online**.**



4.2.1 RENAME A DOCUMENT

- If your file's saved to OneDrive, select the file name at the top, and type in what you want.
- Select **File** > **Save As**, choose a location to save to, and rename your file.



CHOOSE A SAVE OPTION

.Select **File** > **Save As**.

1. Select **One Drive**.

2. Type in a name and select **Save**.

Other save options

There are more ways to save your document. First, select **File**:

- To save your file, select **Save**, or select **File** > **Save**.
- To save your file as a PDF, select **File** > **Save as Adobe PDF**.

4.3 HOW TO MAKE A TABLE ON MICROSOFT WORD

Tables help you present information in a clear and organized way. There are three ways to add tables to your documents in Microsoft Word, each taking only a few easy steps. These instructions are based on Microsoft Word 2003, but the process is very similar in other versions of Word. Here's how to make a table from the Tables and Borders toolbar:

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Here's how to make a table from the Tables and Borders toolbar:

Place the cursor where you want to place the table.

Click the Insert Table icon on the Tables and Borders toolbar at the top of the window. Drag the corner of the table until you have the desired number of columns and rows.

- Click the mouse to insert the table.
- Here's how to make a table from the **Insert Table** dialogue box:
- Click on **Table** from the menu bar. Select **Insert**, and then **Table…** A dialogue box will open.
- Enter the desired number of rows and columns.
- Choose **AutoFit behaviour** if you want the table's cells to automatically expand to fit the text inside them. Choose **AutoFormat** if you'd rather select a table with a specific format.
- Click **OK** to insert your table.
- Here's how to draw a table:

- Select **Table** from the menu bar.
- Select **Draw Table**.
- Drag the pencil diagonally across the page to make a rectangle where you want to place your table.
- Draw lines vertically and horizontally to create the columns and rows you need.
- You can modify your table as follows:

- Select your table, or a portion of it.
- Right click your mouse. Choose **Table Properties**. You can also choose **Table Properties** from the **Table** menu in the menu bar.
- Adjust the alignment, as well as the row and column settings. You can also make use of the text wrapping feature. Click **OK** when you've made the desired changes.

Adjust your table's colours and lines, as follows.

1. Click the **Table** tab.
2. Choose **Table Properties**.
3. Click on the **Borders and Shading…**button. Make the desired selections and click **OK**, and then click **OK** again.

4.4 HOW TO CREATE A CHART OR GRAPH IN MICROSOFT WORD

In Microsoft Word, not only can you create documents with text and insert pictures into documents, but you can also create a chart or graph to add visual detail to documents.There are two options for creating a chart or graph in Microsoft Word. Click a link below for details on how to use each option.

Create chart or graph directly in Microsoft Word

Like in Microsoft Excel, Microsoft Word provides the capability of creating a chart or graph and adding to your document. To create and insert a chart or graph directly in Microsoft Word, follow the steps below.

1. Open the Microsoft Word program.
2. In the Ribbon bar at the top, click the **Insert** tab.

3. In the *Illustrations* section, click the **Chart** option.

4. Once the *Insert Chart* window is open, select the **type of chart or graph** you want to create, then click the OK button.

5. A basic version of the selected chart or graph type, with sample data, is added to the document. A *Chart in Microsoft Word* window also opens, which looks like a Microsoft Excel spreadsheet. In the spreadsheet window, **add, remove, or modify** the columns and rows of data to include the data points and values you want your chart to display.

6. As you modify the columns, rows, and values in the spreadsheet window, the chart or graph in Microsoft Word automatically updates and display the new or changed data.

7. When finished modifying the chart, **close** the spreadsheet window.

If you need to update the chart data after closing the spreadsheet window, you can re-open the spreadsheet window by **right-clicking** on the chart and selecting the **Edit Data** option.

4.5 CREATE CHART OR GRAPH IN MICROSOFT EXCEL AND COPY TO MICROSOFT WORD

Microsoft Excel provides more functionality and data manipulation capabilities than Microsoft Word provides when creating a chart or graph. If you need the increased capabilities of Excel to create a chart or graph, and then put it in a Microsoft Word document, follow the steps below.

1. Open the Microsoft Excel and Microsoft Word programs.

2. Create the chart or graph in Microsoft Excel.

3. After the chart or graph is created and ready to be placed in the Word document, select **the entire chart** in Excel.

4. Right-click on the chart or graph and select the **Copy** option. You can also press **Ctrl+C** on your keyboard to copy the chart or graph.

5. In the Word document, **place your mouse cursor** where you want to add the chart or graph.

6. Right-click and select the **Paste** option to place the chart or graph in the document. You can also press **Ctrl+V** on your keyboard to paste the chart or graph.

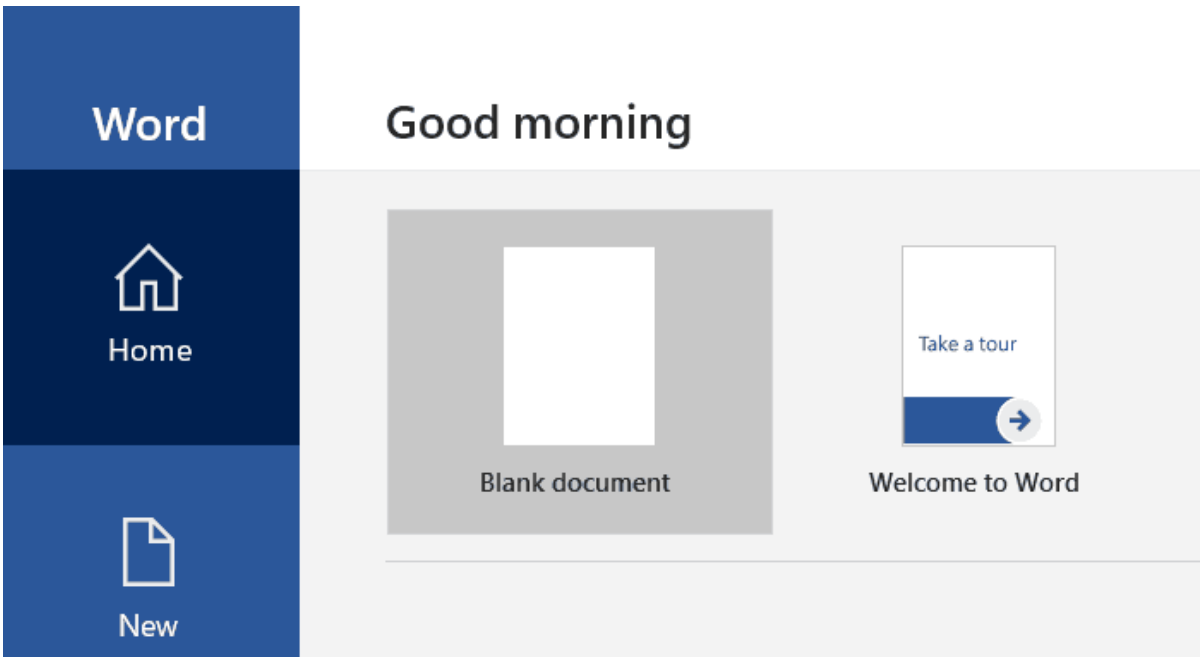
4.6 MAIL MERGE

Creating the main document in MS Word

The next step is to create the form letter template (your main document) in MS Word. Here's a step-by-step guide on how to do this:

Step 1

Open a blank document in Word. This is the main document in your mail merge that will be sent to each recipient.



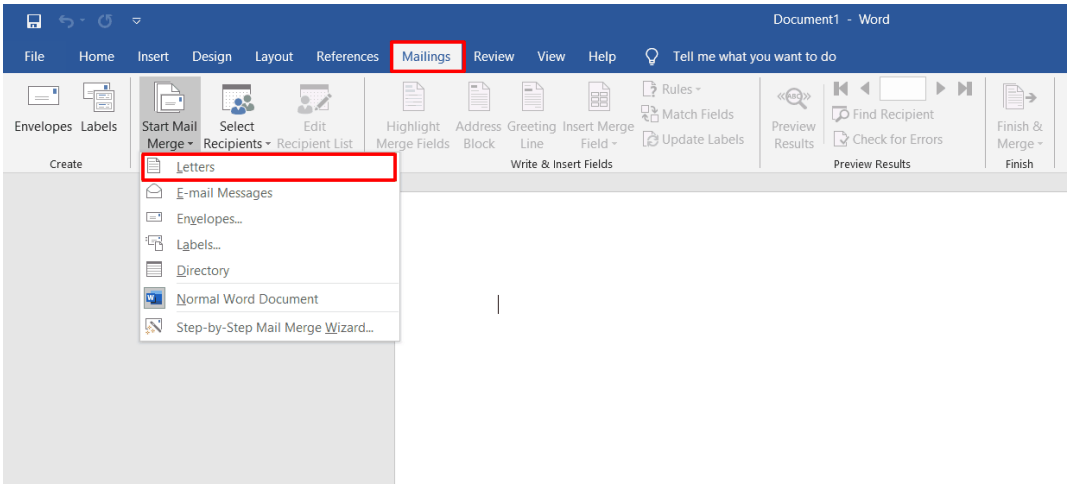
Step 2

Click on the **Mailings** tab and select **Start Mail Merge**.

A drop-down menu displaying every different mail merge document type will appear.

You can select the document type for letters, emails, envelopes, mailing labels, or a directory.

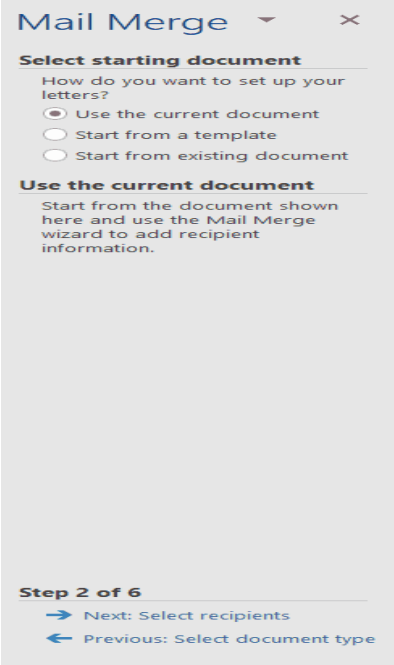
Since we're creating a Word mail merge for sending letters, choose Letters as your merge document.



Step 3 (Optional)

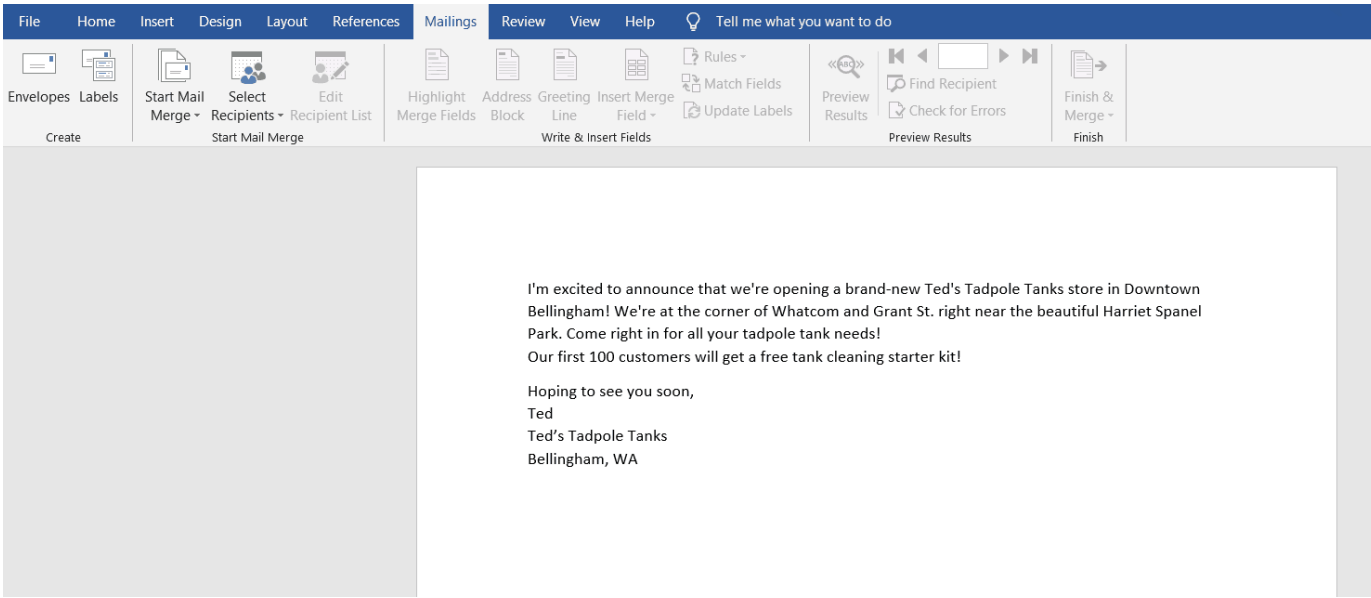
You can also use the **Step-by-Step Mail Merge Wizard** (*from the **Start Mail Merge** drop-down menu*) to streamline the Word mail merge process.

For example, the wizard lets you easily select the starting document for your mail merge. It lets you use the current document, a starter template, or an existing document as your mail merge template.



Step 4

Write the body of the letter. (Don't worry about manually adding placeholders in your letter yet.)



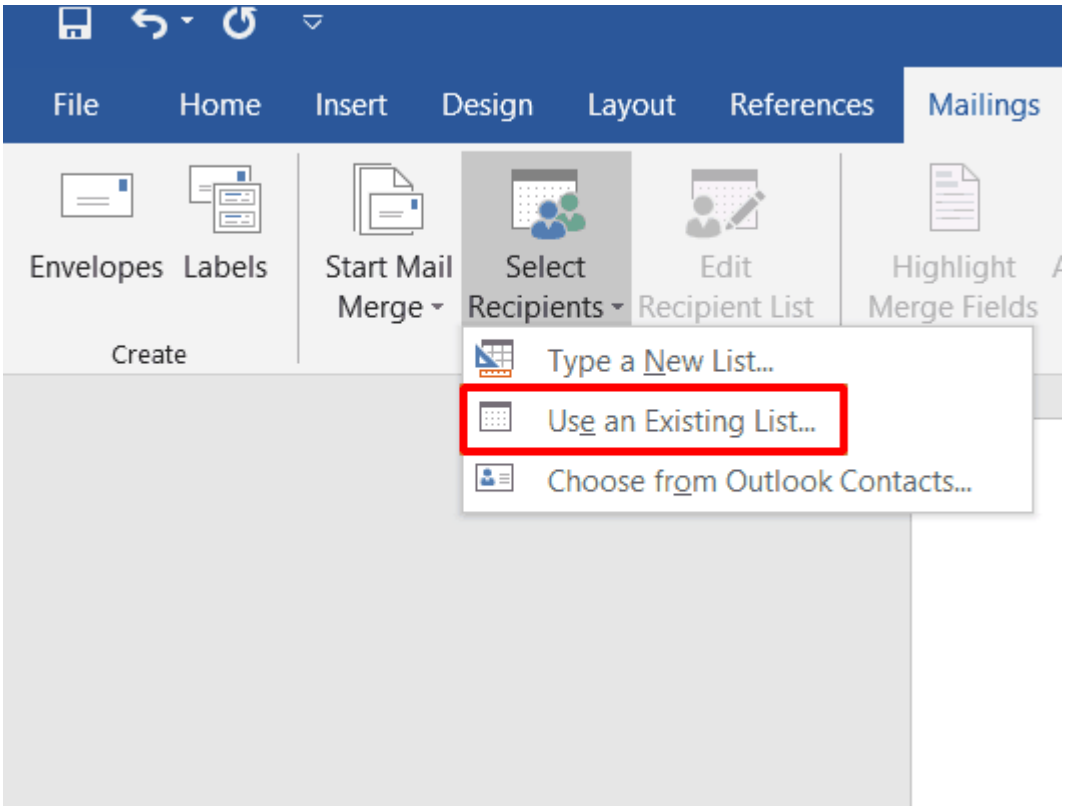
Selecting the recipient list

Now you can select the list of mail merge recipients who will receive your letter. Here's a step-by-step guide on how to do this:

Step 1

Click on the **Select Recipients** option in the **Mailings** tab. A drop-down menu appears, showing different mail merge list sources.

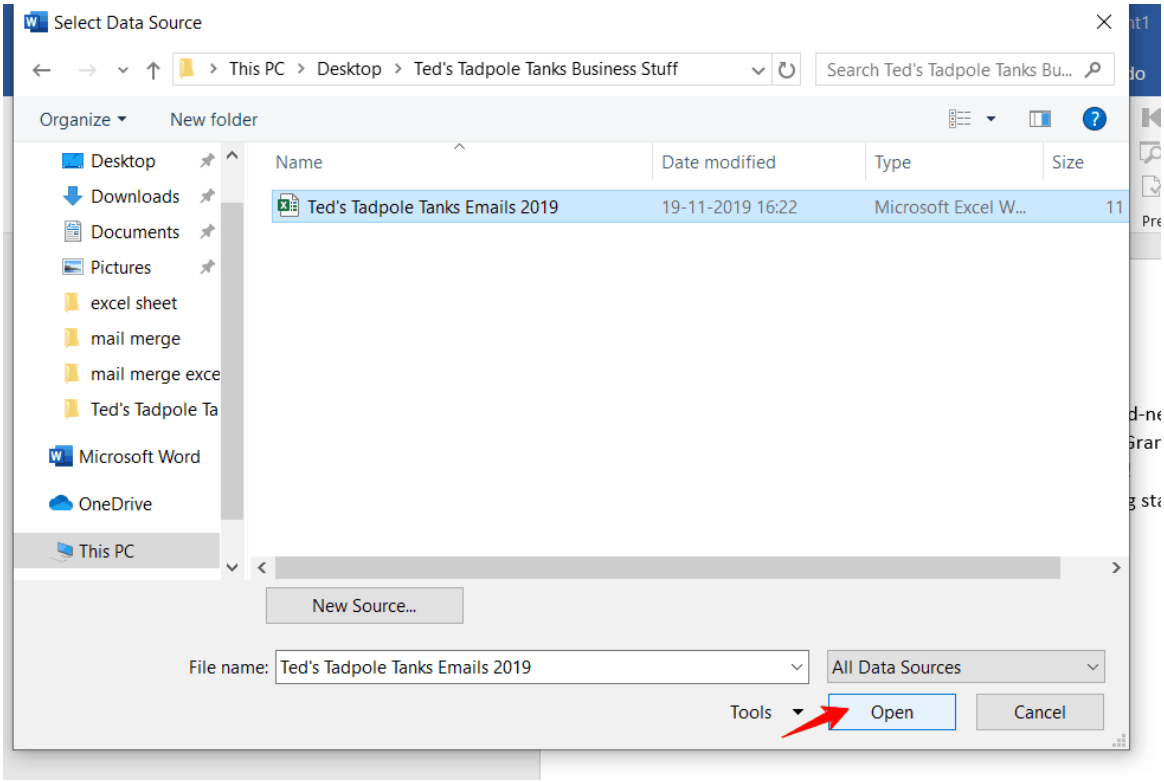
As your contact information is already available as an Excel file, click on **Use an Existing List**.



***Note** – You can also include your Outlook Contacts if you have Outlook connected to Word.*

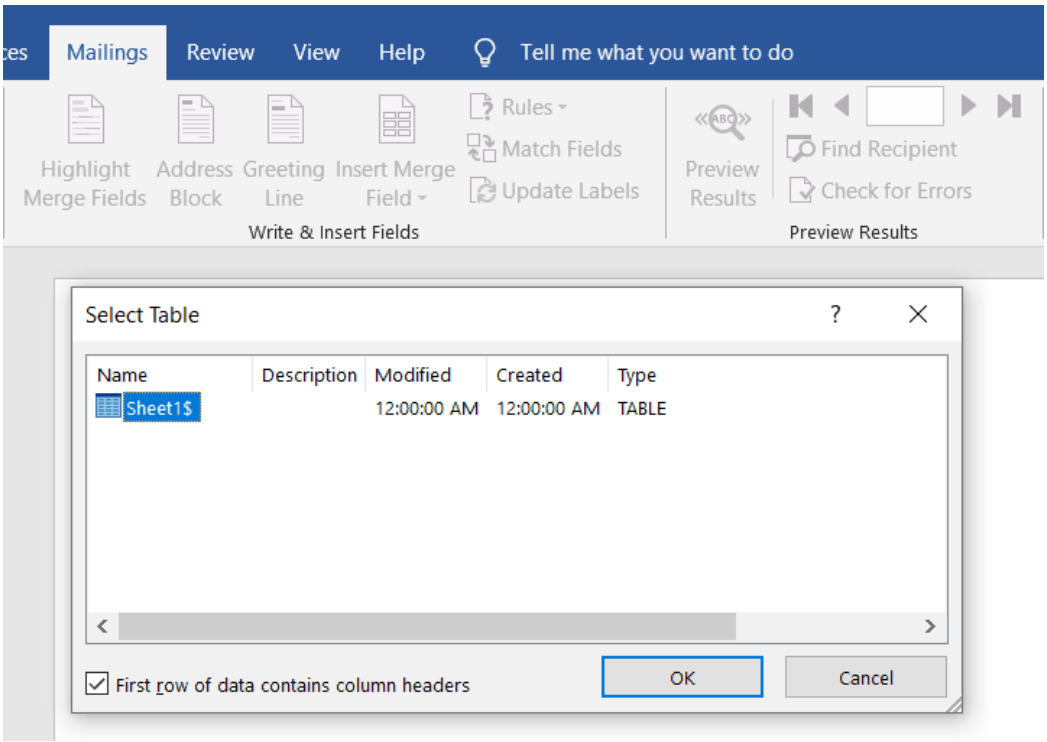
Step 2

In the dialog box that pops-up, select the Excel sheet you created earlier, and click **Open**.



Step 3

A **Select Table** window appears. Choose the Excel worksheet you want to merge with the Word template and click **OK**.

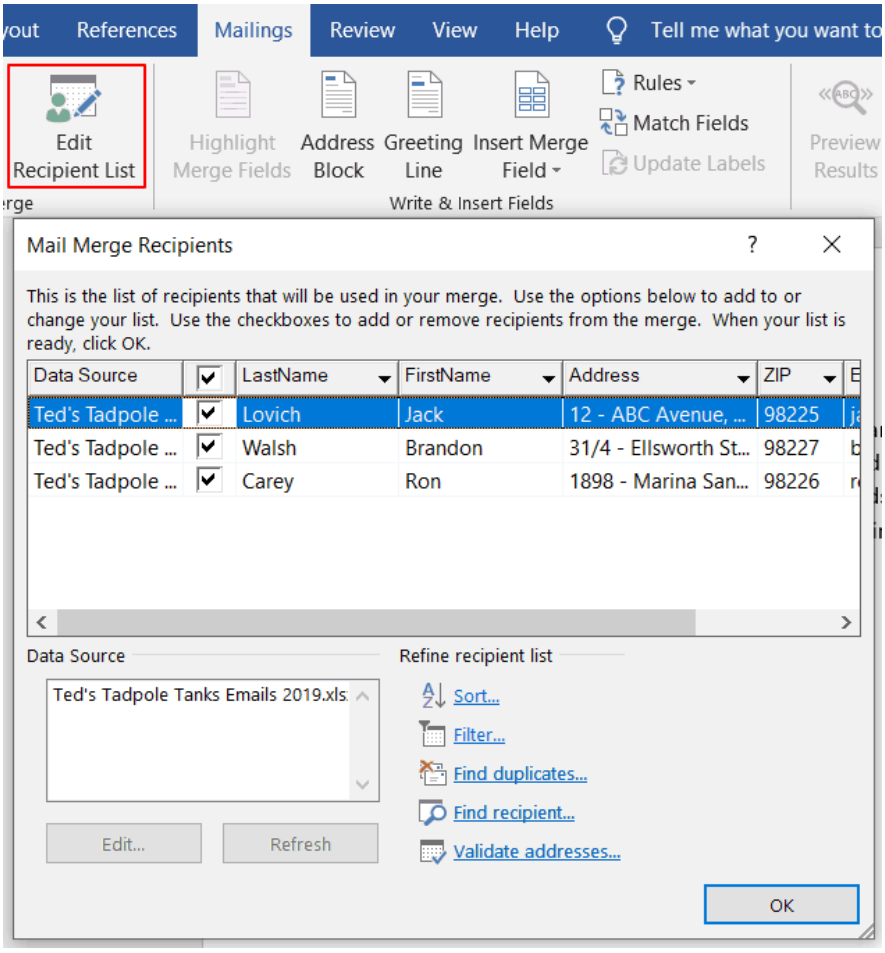


***Note** – If your Excel spreadsheet has only one worksheet, you'll only see **Sheet1** in the **Select Table** window.*

Step 4

If you want to edit your mail merge recipients list, click on the **Edit Recipient List** tab.

In the **Mail Merge Recipients** window that pops-up, clear the checkbox of the person you don't want in your mailing list.



Adding personalized messages

The next step is to add personalized content, like contact names and addresses, to your form letter **template** (Word document).

In Word, you can insert three personalization variables into your document:

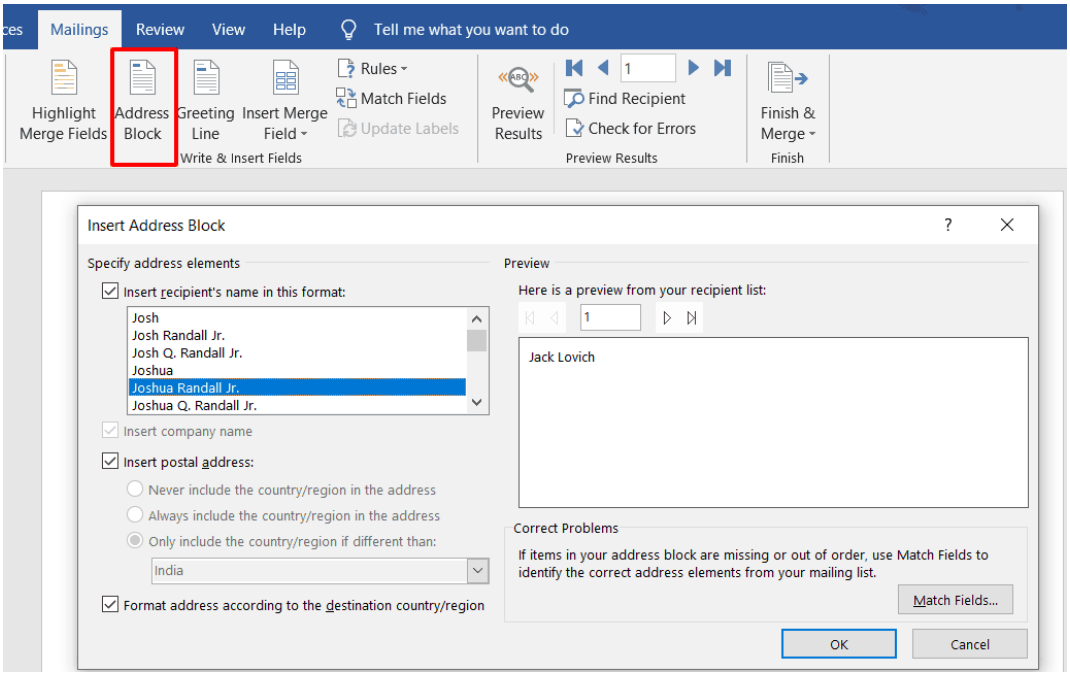
1. **Insert Address Block** – add a recipient's address to your document.
2. **Insert Greeting Line** – include a personalized greeting or salutation in your letter.
3. **Insert Merge Field** – insert other mail merge fields from your Excel file.

Here's a step-by-step guide on how to add all three personalization variables to your merge document (form letter):

Note – *You can add a personalization variable at an insertion point of your choice in the Word document. For example, to add a greeting line before the body of your letter, simply place the text cursor at the point you want to add it.*

Step 1 – Insert address block

To insert a recipient's address from your Excel worksheet, click on **Address Block** from the **Write & Insert Fields** section. In the window that appears, choose an address block format of your choice and click **OK**.



An address placeholder (**«Address Block»**) will be inserted automatically into your letter.

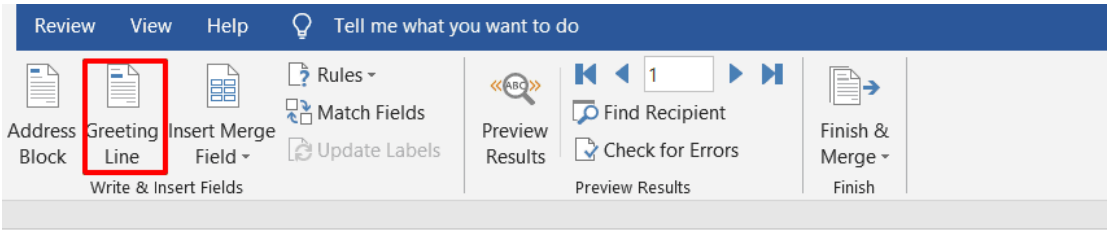
«AddressBlock»

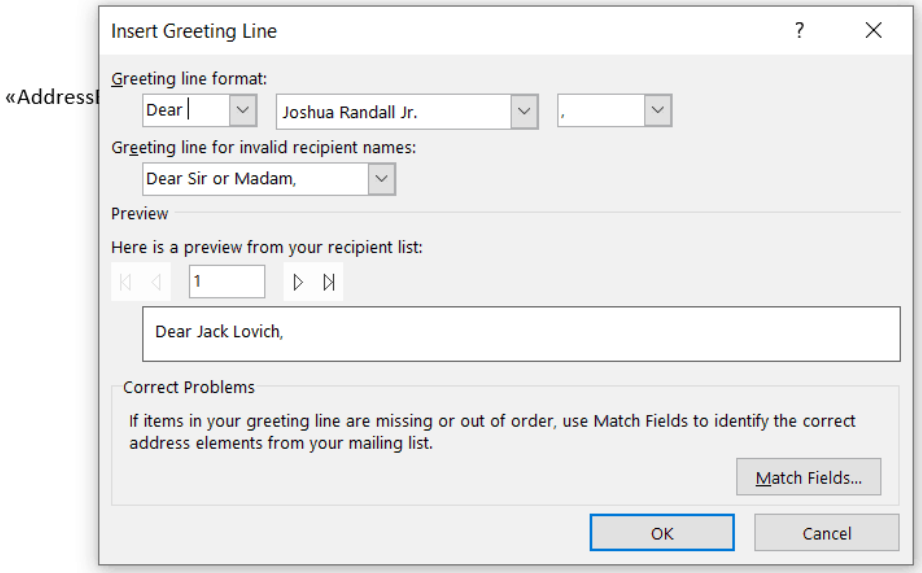
I'm excited to announce that we're opening a brand-new Ted's Tadpole Tanks store in Downtown Bellingham! We're at the corner of Whatcom and Grant St. right near the beautiful Harriet Spanel Park. Come right in for all your tadpole tank needs!
Our first 100 customers will get a free tank cleaning starter kit!

Hoping to see you soon,
Ted
Ted's Tadpole Tanks
Bellingham, WA

Step 2 – Insert greeting line

To insert a greeting line, click on **Greeting Line** from the **Write & Insert fields** section. In the dialog box that pops up, select the format you want to use and click **OK**.





A greeting placeholder (**«Greeting Line»**) will be automatically added to your document.

«AddressBlock»

«GreetingLine»

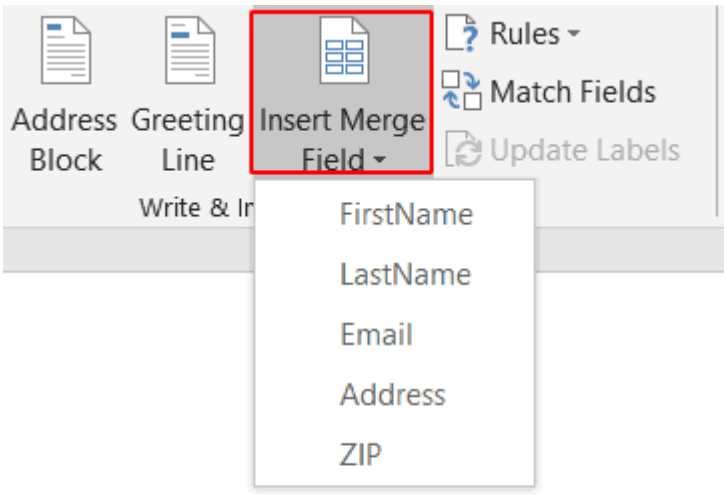
I'm excited to announce that we're opening a brand-new Ted's Tadpole Tanks store in Downtown Bellingham! We're at the corner of Whatcom and Grant St. right near the beautiful Harriet Spanel Park. Come right in for all your tadpole tank needs!
Our first 100 customers will get a free tank cleaning starter kit!

Hoping to see you soon,
Ted
Ted's Tadpole Tanks
Bellingham, WA

Step 3 – Insert merge field

You can also add other mail merge fields — like your contact's first name, company name, email id, etc. — from your Excel worksheet to your Word template. To do this, click on **Insert Merge Field** from the **Write & Insert fields** group.

You can see a drop-down list of some mail merge labels. **These labels are the column names in your Excel spreadsheet**.



Click on the mail merge fields you want to add to your letter.

This is how my form letter looks after inserting the placeholders I needed:

«AddressBlock»
«Email»

«GreetingLine»

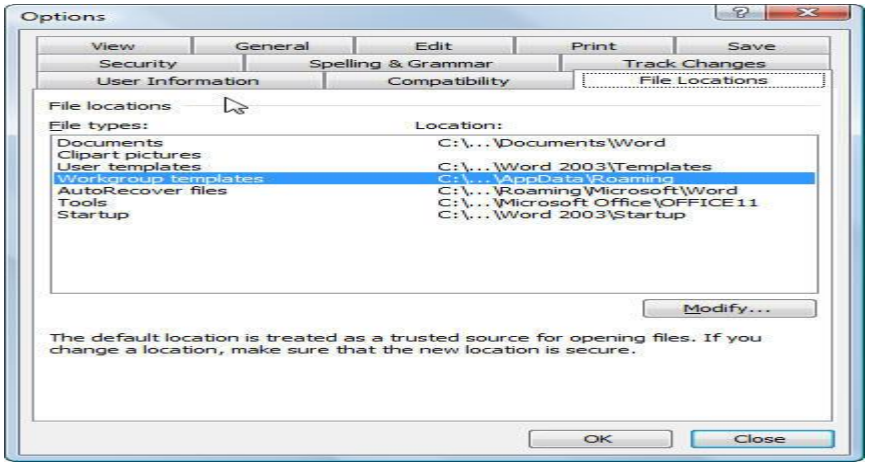
I'm excited to announce that we're opening a brand-new Ted's Tadpole Tanks store in Downtown Bellingham! We're at the corner of Whatcom and Grant St. right near the beautiful Harriet Spanel Park. Come right in for all your tadpole tank needs!
Our first 100 customers will get a free tank cleaning starter kit!

Hoping to see you soon,
Ted
Ted's Tadpole Tanks
Bellingham, WA

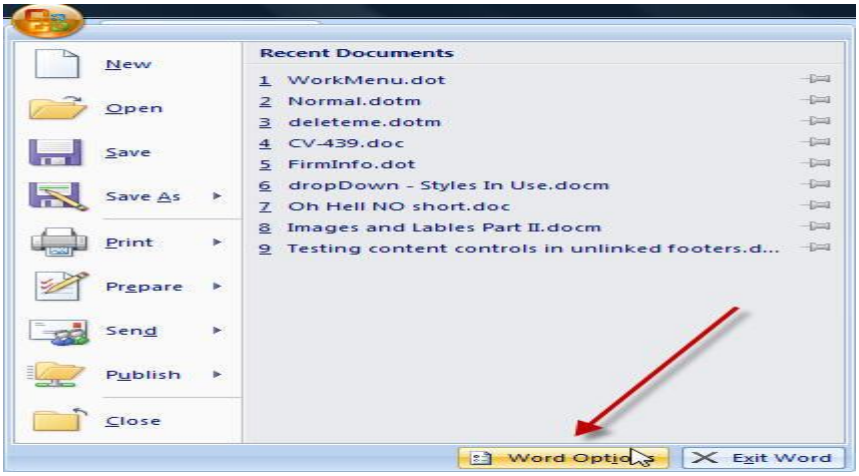
4.7 WORKGROUP IN MICROSOFT WORD

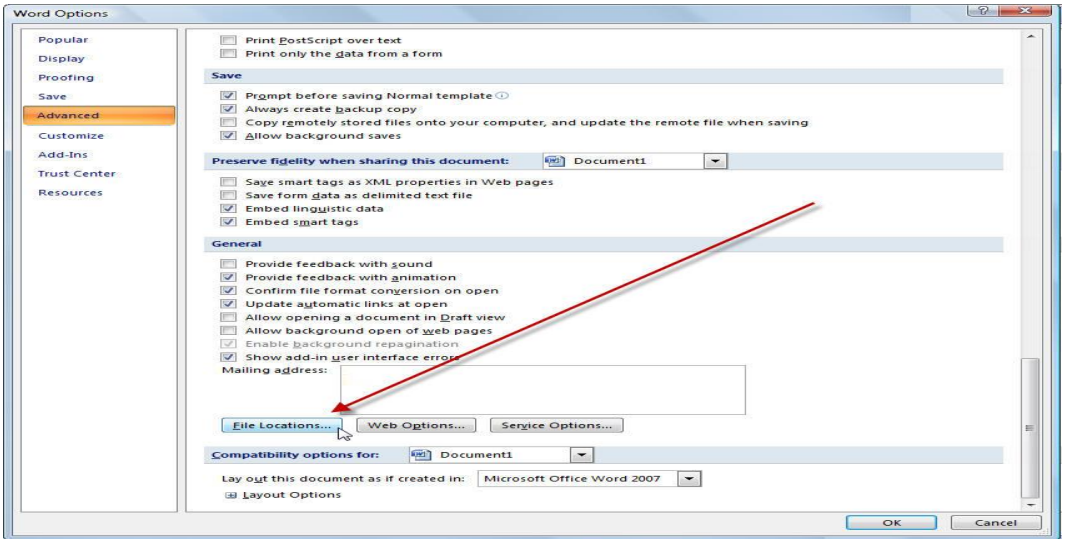
- Workgroup templates are templates set up to be shared by placing them in a separate folder. There is no difference in the structure or content of the templates themselves, merely in the location they are stored. They are intended to be shared by different users of the same computer or on a network. For instance if there are form documents used throughout an office, department, household, or business, they are best stored as Workgroup Templates. Generally the workgroup templates are pre-packaged templates for use by more than one user, often company-wide. They can be used by an individual to distinguish work templates from personal templates or finished templates from development templates.
- Personal templates are kept in the User Templates Folder. The default location for these is described in Normal Template in Microsoft Word - How to Open. The Normal Template is not stored in the Workgroup Templates folder but in the User Templates Folder.
- For more about templates and their location, see Template Basics.
- The location for Workgroup templates is set in Word's options. It can be any folder but should probably be in the User Profile folder rather than in the Documents Folder. There is no default.

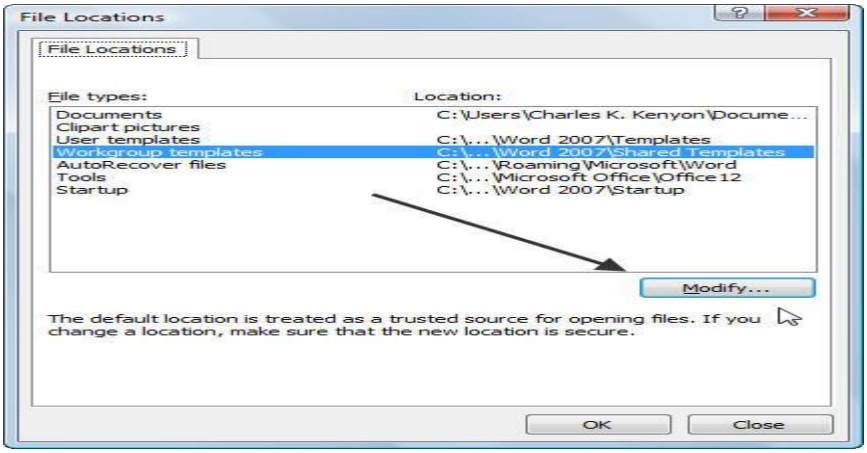
- In Word 97-2003 this location is found/set under Tools > Options > File Locations.



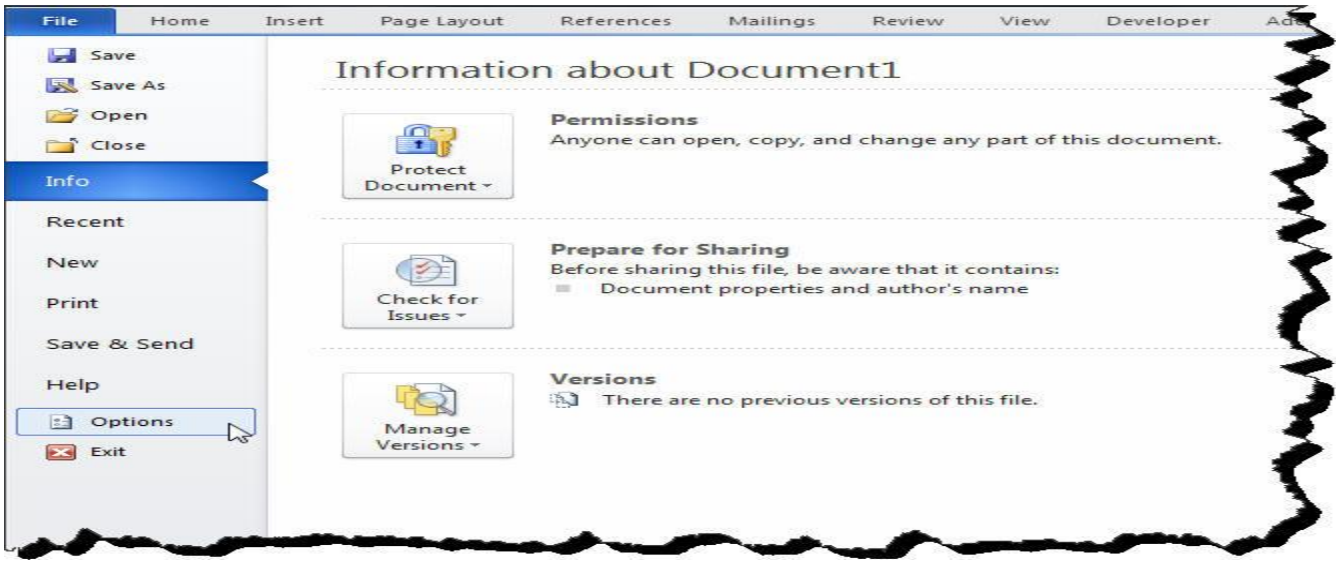
- In Word 2007 this location is found/set under the Office Button > Word Options (button) > Advanced > File Locations (button near bottom)

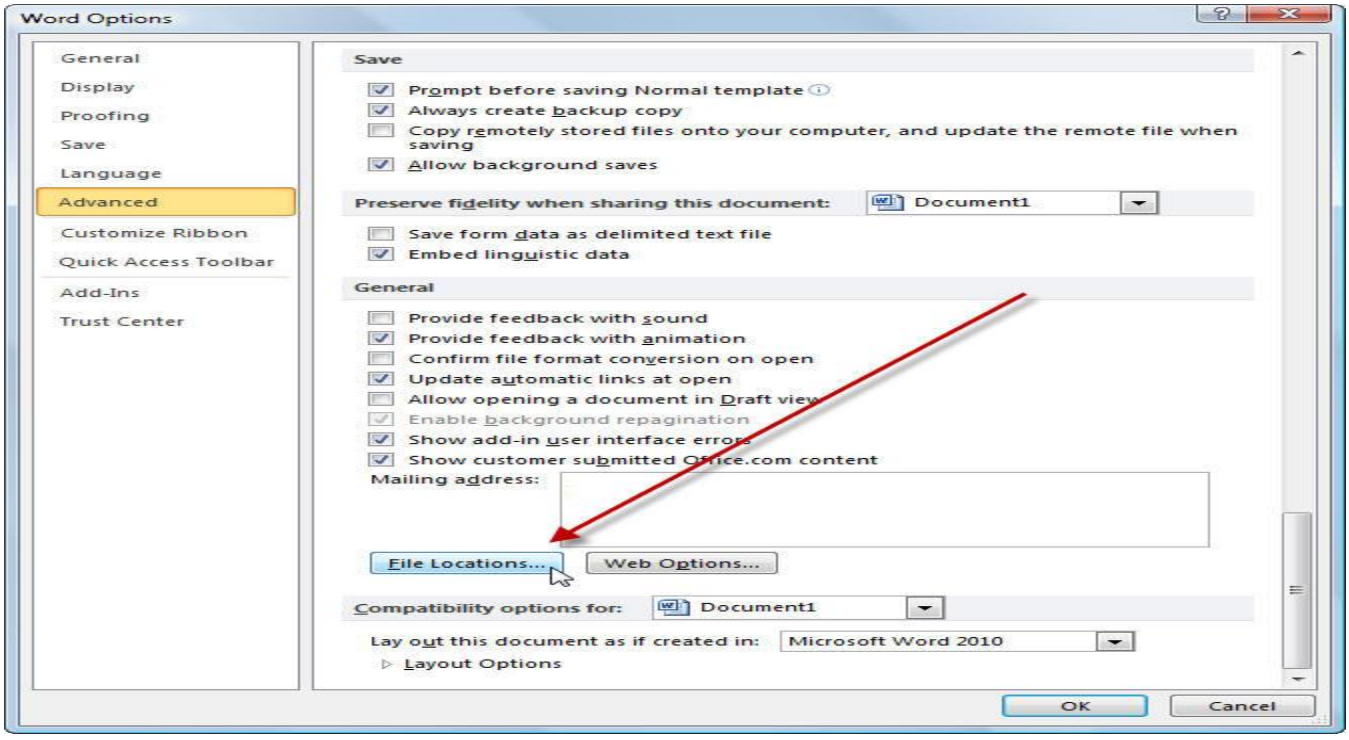


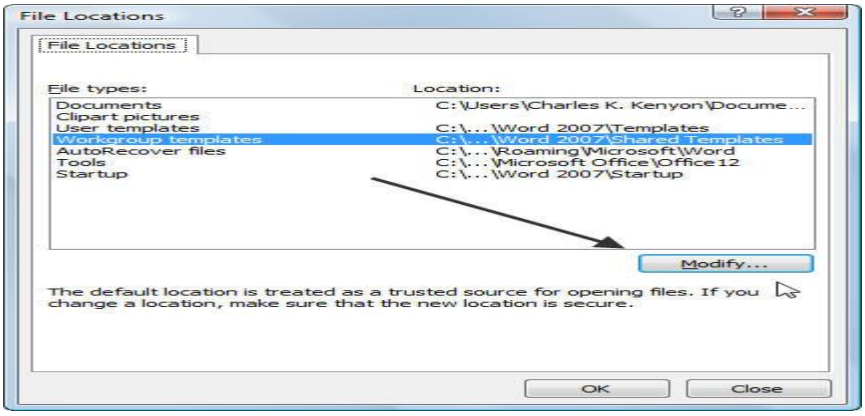




In **Word 2010-2016/365** this is found/set under File > Options > Advanced > File Locations (button near bottom)







- When a template is in the Workgroup templates folder it will be available as a template in Custom under File New or "on my computer" or in "My Templates" to create new documents. If it is in a folder within the Workgroup templates folder, the name of that folder will show up as a tab to sort out templates into categories. Again, see Template Basics.
- When workgroup templates are shared on a network, it is often advisable to copy them to the local computer as a part of the login process rather than share them directly. Otherwise, if a template is being used by any user it cannot be edited by support personnel without locating the user and asking them to close their work. This also gives laptop users access to the workgroup templates.

- If the Workgroup Templates location has already been set, once you've clicked on the Modify button you can find the actual location.
- Once you have the Modify dialog open, go up one level to see the folder that holds the Workgroup Templates folder. Right-click on the Workgroup Templates folder to get its properties. One of those properties is the *location*. This will probably be a longer line than you can read in the properties box. You can select it with your mouse, though, and copy it.
- With that address copied into the Clipboard, close and cancel your way out of the Word Options. Do not modify this location without a good reason.
- Paste the address into the address box in a Windows Explorer window to get to the Workgroup Templates folder.

4.8 MODIFYING A WORD REPORT

This procedure describes how to modify a Word report layout on report from the Microsoft Dynamics NAV Development Environment. A Word report layout determines the content and format of a report when it is viewed and printed from the Dynamics NAV client. When you modify a Word report layout, you specify the fields of the report dataset to include on report and how the fields are arranged. You also define the general format of the report, such as text font and size, margins, and background images. You will typically arrange the content of the report by adding tables to the layout.

You insert dataset fields in the layout by using a custom XML part that is automatically generated for the report when you create the Word report layout. For more information about custom XML parts, see Custom XML Part Overview for Word Report Layouts.

To modify the Word report layout

1. In the development environment, export the Word report layout as a Word document file to your computer or network.

   For more information see To export a Word report layout from a report to a file.

2. Open the Word document file in Word 2013 and make changes.
   - To make basic layout changes, such as adding or removing tables and cells, formatting text, or changing margins, use the editing features of Word.
   - To add fields from the report dataset to the layout, use the custom XML part for the report to add content controls that map to the fields. For more information, see How to: Add Fields from a Report Dataset to a Word Report Layout.

Removing Label and Data Fields

Label and data fields of a report are contained in content controls in Word. The following figure illustrates a content control when it is selected in the Word document.

The name of the label or data field name displays in the content control. In the example, the field name is CompanyAddr1.

To remove a label or data field

1. Right-click the field that you want to delete, and then choose **Remove Content Control**.
2. The content control is removed, but the field name remains as text.
3. Delete the remaining text as needed.

4.9.HOW TO CREATE MACROS IN MICROSOFT WORD

A macro is a series of commands that is recorded so it can be played back (executed) at a later time. Macros are great for reducing the amount of work you have to do on a series of steps that you perform frequently. Here's how to create and test a macro in Microsoft Word. Why Use a Macro

With a macro, you can get the same results by clicking a command instead of going through all the steps. Some ways to use macros to increase your productivity include:

- Insert your company logo and name in a particular typeface.
- Insert a table that you need to create regularly.
- Format a document with certain characteristics, such as page numbering and double-spaced paragraphs.

Creating and using macros is a learned skill but the resulting efficiency is well worth the effort.

4.9. 1Macro

Table. To do this, we click on “View,” then “Macros,” then “Record Macro.” When using Microsoft Word, you may feel the need to repeat a specific action multiple times. This may involve reusing preset text or inserting specific text with intricate formatting. It can be a chore, and you may be wishing for an easier way to do it.

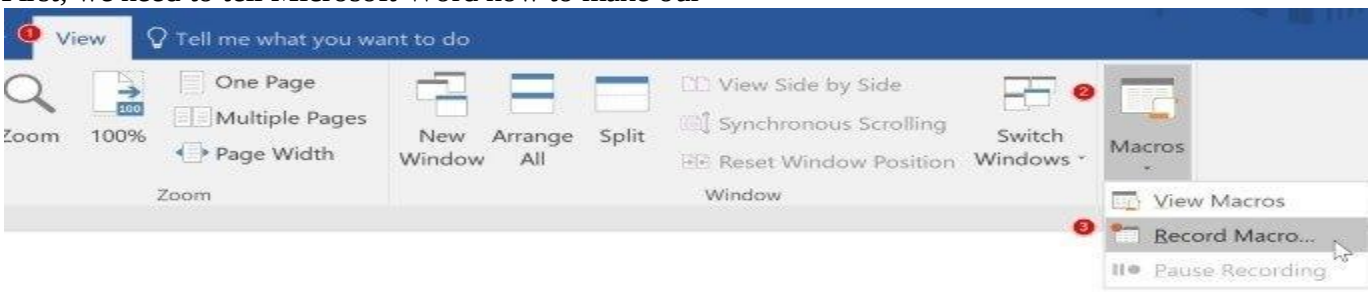
Thankfully, there is one! By making use of Word's macros, you can automate repetitive actions and make your life simpler.

What Are Macros?
So, what are macros? The best way to think of macros is as a series of instructions. You set out a series of steps that you want Word to automate, then tell Word to perform those steps whenever you like. This makes automation very easy, and can save a lot of time and effort. The easiest way to create a macro is to allow Word to record your actions, then physically perform your desired actions within the document. Once recorded, you can tell Word to repeat what you did at any time.

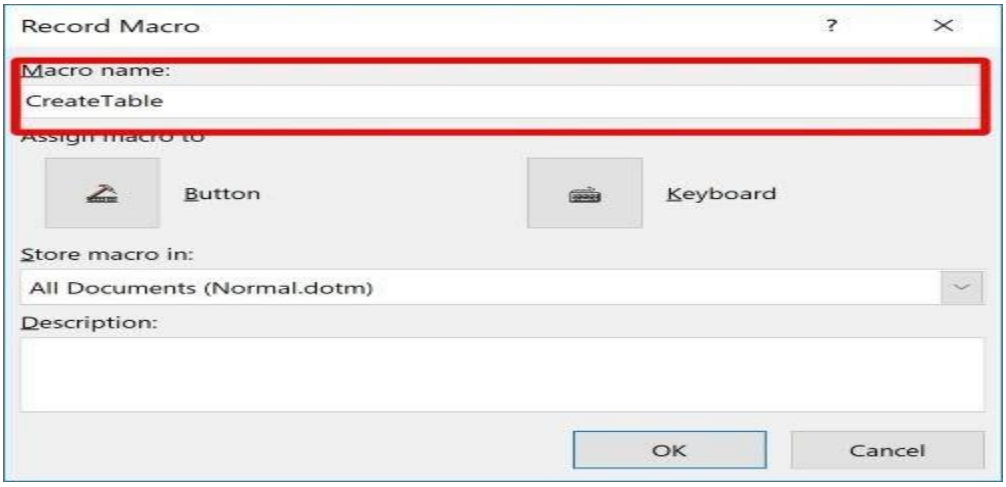
4.9.1 Making a Macro

So now that we know what they do, let's learn to make a macro in Microsoft Word! In this example we'll be creating a macro that automatically creates a table. This might be a useful feature if you occasionally see yourself needing to create a new table without manually making a new one or copy-pasting an existing table.

First, we need to tell Microsoft Word how to make our



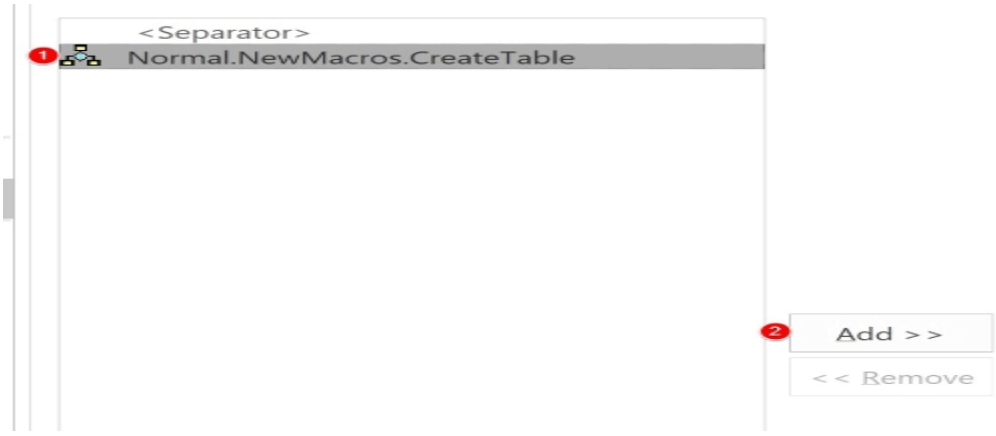
We name our macro here. For this example we'll call it "Create Table."



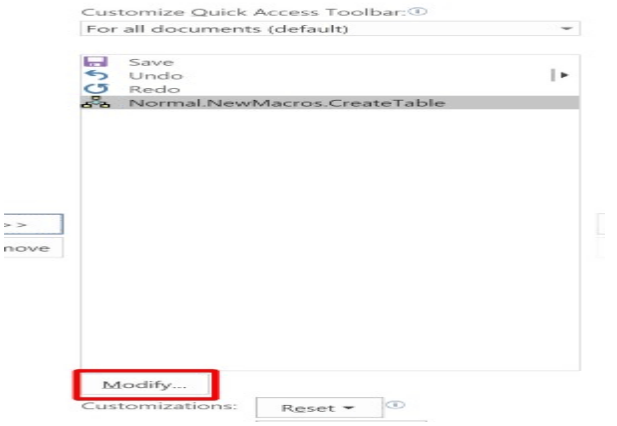
Underneath the naming box are two buttons, “Button” and “Keyboard.” This is where you pick if you want to activate your macro via a button within Word or by pressing a hotkey on your keyboard.

Selecting the Button Option

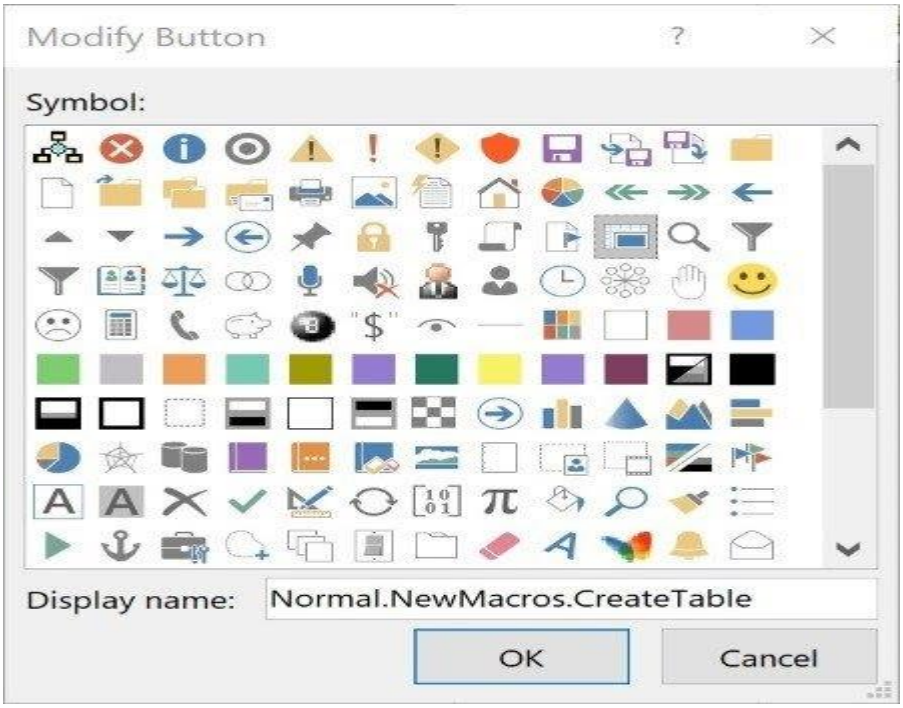
If you select “Button,” you’ll be taken to a new popup window. It may look confusing at first, but it’s just Word allowing you to add the button to the Quick Access bar. This is where we want our button, so we’ll select the macro and click “Add >>” to add it to the list on the right.



With the macro still selected, click “Modify…” at the bottom of the list.



Here you can choose what icon your button uses. Pick something that suits your macro, then OK out of all windows.



Selecting the Keyboard Option

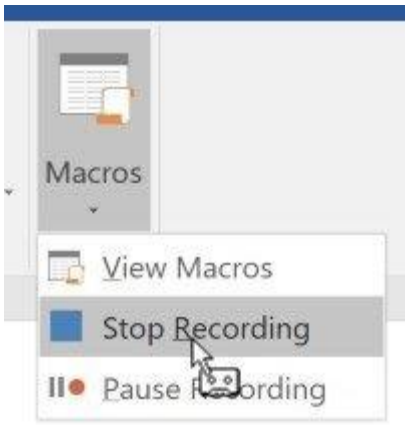
If you select the keyboard option, you can define which hotkey to assign the macro to. It's compatible with quite a few combinations, such as Ctrl + [Key] and Ctrl + Shift + [Key], so pick out a hotkey that suits you. Word will let you know if anything is currently assigned to that hotkey so you don't interfere with existing shortcuts. Once you've found the perfect key combination, click "Assign."

4.10 RECORDING THE MACRO

Now that you have set up the method of activation, Microsoft Word will begin recording your actions. While it's recording, any actions you now perform in the document will be remembered in the macro. In this example, we create our table and fill it out with the essential fields. Because our actions are being recorded, we should be careful and not make any mistakes!

First Name	Second Name	Role

Once the table is done, we click "View," then "Macro" again, and then click "Stop recording."



Now that our macro is recorded, we can make this table at any time we like. If we assigned it to a hotkey on the keyboard, we can press those keys to insert a table. Likewise, if we made a button for it, we can find that button in the Quick Access bar.

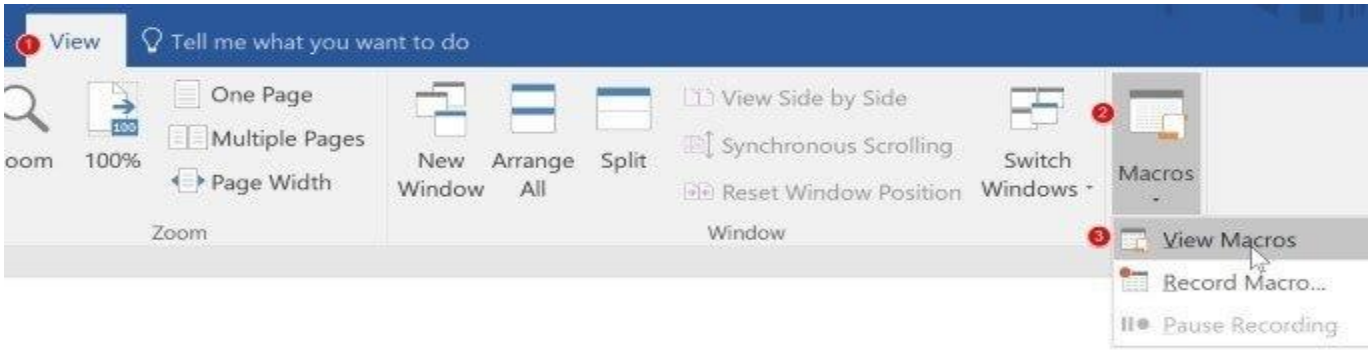
Regardless of which method we selected for the macro, our table is replicated when we activate it. Now we can recreate our base table with little hassle!

First Name	Second Name	Role

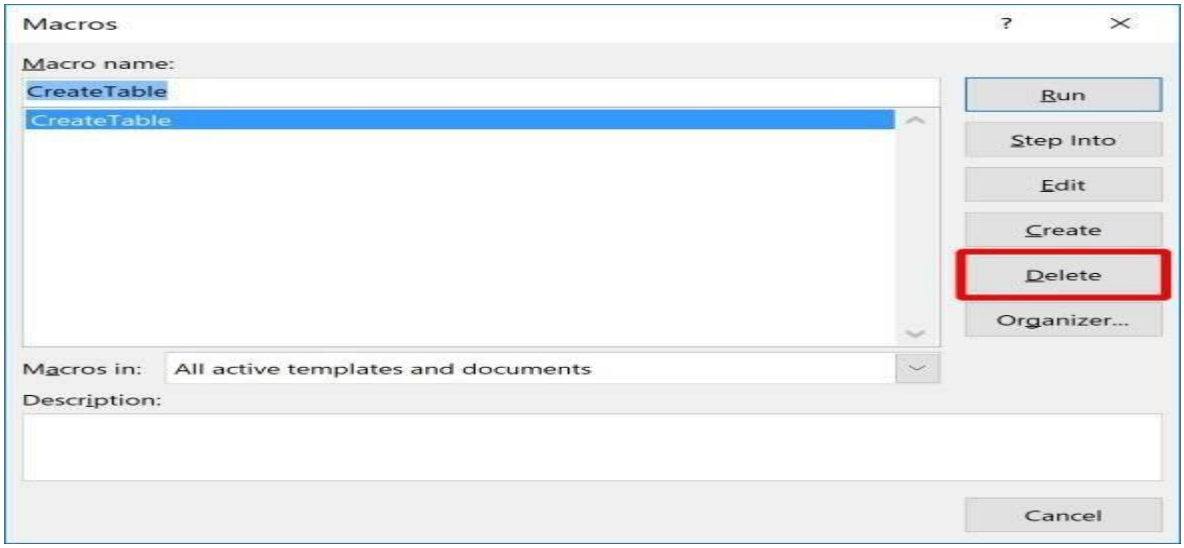
First Name	Second Name	Role

Deleting a Macro

When your macro has outlived its use, you can get rid of them by simply clicking "View," then "Macros," then "View Macros."



Select the macro you don't want anymore, then click "Delete."


Macros
Macro name:
CreateTable
CreateTable
Run
Step Into
Edit
Create
Delete
Organizer...
Macros in:
All active templates and documents
Description:
Cancel

UNIT-V

MS-POWER POINT

- CREATING A PRESENTATION
- CREATING AND PUBLISHING A WEB PRESENTATION
- MODIFYING A PRESENTATION
- WORKING WITH VISUAL ELEMENTS
- PRESENTATION AND DESIGNING A TEMPLATE

5.1 MORE CREATIVE SLIDESHOWS

- I like to think of Microsoft PowerPoint as a test of basic marketing skills. To create a passing presentation, I need to demonstrate design skills, technical literacy, and a sense of personal style.

- If the presentation has a problem (like an unintended font, a broken link, or unreadable text), then I've probably failed the test.

- Even if my spoken presentation is well rehearsed, a bad visual experience **can ruin it for the audience.**

- Expertise means nothing without a good presentation to back it up. For starters, grab your collection of **free PowerPoint templates** below, and use the tips that follow to perfect your next presentation.
- No matter your topic, **successful PowerPoints** depend on three main factors: your command of PowerPoint's design tools, your attention to presentation processes, and your devotion to consistent style. Here are some simple tips to help you start mastering each of those factors, and don't forget to check out the additional resources at the bottom of this post.

Make a Power Point Slide

- Open Microsoft PowerPoint.
- If a page with templates doesn't automatically open, go to "File" at the top left of your screen and click "New Presentation".
- To use a template, either click the "Design" tab or go to "File" again and click "New from Template".
- Insert a new slide by clicking on the "Home" tab and then the "New Slide" button.

- Consider what content you want to put on the slide, including heading, text, and imagery.
- Keep the amount of text under 6-8 lines (or 30 words) at a minimum of size 24 pt.
- Add images by clicking "Insert" and clicking the "Picture" icon.
- Add other elements by using features in the "Home" and "Insert" tabs on the top ribbon.
- Play around with the layout by dragging elements around with your mouse.

How to Make a PowerPoint Presentation

- A presentation is made up of multiple slides, and now that you know how to make one, you can delve deeper into PowerPoint's capabilities.

Open a blank presentation again or start from one you've already created.

- If you've already created a presentation, double click the icon to open the existing file. Otherwise, open Microsoft PowerPoint, click "File" in the top left corner, and click "New Presentation." From there, you can follow the prompts to set up a new presentation.

5.2. CHOOSE A "THEME" OR CREATE YOUR OWN.

Microsoft offers built-in themes and colour variations to help you design your slides with a cohesive look. To choose from these pre-built themes, choose the "File" tab again, select "New", choose one of the options, and click "Create."

Otherwise, you can use PowerPoint elements, your design sense, and your brand's colour palette to make your own "theme."

5.3. CREATE A VARIETY OF SLIDES FOR DIFFERENT PURPOSES.

You don't want to present the same exact slide, just with different content on it. This would bore your audience. Ensure that you create multiple variations, accommodating some of the common uses for slides. At minimum, you'll need:

- A title slide
- An agenda or table of contents slide
- A slide that introduces the speaker

- Various content slides (create different layouts considering what kind of multimedia you'll use)

5.4. USE THE DUPLICATE SLIDES FEATURE TO SAVE YOU TIME.

There's no reason to create these designs over and over again. Now that you have a few to draw from, you can simply duplicate them before inputting your content. Here's how to do that:

1. On the left pane, right click the thumbnail of the slide you want to duplicate.
2. Choose "Duplicate Slide" from the pop-up menu.

This will automatically add a copy of this slide to the presentation. From there, you can customize it for your needs.

5.5. ADD TRANSITIONS TO YOUR SLIDES (OPTIONAL).

Done well, transitions can add a little bit of movement and showmanship to your presentation. PowerPoint has several transitions built in for you to choose from.

To access them, select the "Transitions" tab from the top ribbon. From there, you can select a transition for it to preview on your screen. To customize it further, click "Effect Options" and play with the features to find something that suits your liking. To remove a transition, select "Transitions" and click "None."

5.6. ADD ANIMATIONS TO YOUR SLIDES (OPTIONAL).

Like transitions, animations can add movement, reveal information, and help you underscore the points you want to hit during your speech. To animate an element, follow these steps:

1. Select the element you want animated by clicking on it.
2. Choose "Animations" from the top ribbon.
3. You'll have the option to choose from several effects displayed in the ribbon.
4. Clicking on one will give you a preview.
5. To customize the animation, select "Effect Options."

6. To remove an animation, click "None" in the ribbon.

Some of the ways to customize animations include:

- On Click
- With Previous
- After Previous
- Duration
- Delay

These describe how you want the effect to behave, so play around with them until you find an effect that suits your liking.You'll also have the option to move animations around as you edit your slides with the "Reorder Animation" function in the top ribbon.

5.7. SAVE YOUR PRESENTATION.

Click "File" and "Save", making sure to specify which folder or destination you want your PowerPoint to be stored.

5.8. RUN YOUR PRESENTATION.

It's always good to do a trial run to ensure that your slides are set up properly and your animations fire they way you expect them to.

To present your PowerPoint, go to the "Slide Show" tab and click "Play from Start". The slide will cover your whole screen, blocking out your desktop and PowerPoint software. This is so your audience (in this case, you for the trial run) is solely focused on the visual elements of your presentation.

5.9. ADVANCE THE SLIDES.

When you're done with one slide and want to show the next in your sequence, click your mouse in presentation mode. This will advance the slide.

PowerPoint Presentation User Guide

1. Don't let PowerPoint decide how you use PowerPoint.

2. Create custom slide sizes.
3. Edit your slide template design.
4. Write text with your audience in mind.
5. Make sure all of your objects are properly aligned.
6. Use "Format Menus" to better control your objects' designs.
7. Take advantage of PowerPoint's shapes.
8. Create custom shapes.
9. Crop images into custom shapes.
10. Present websites within PowerPoint.
11. Try Using GIFs.
12. Keep it simple.
13. Embed your font files.
14. Save your slides as JPEGs.
15. Embed multimedia.
16. Bring your own hardware.
17. Use "Presenter View."

5.10 POWERPOINT STYLE

1.how to use PowerPoint.

Microsoft wanted to provide PowerPoint users with a lot of tools. But this does not mean you should use them all. Here are some key things to look out for:

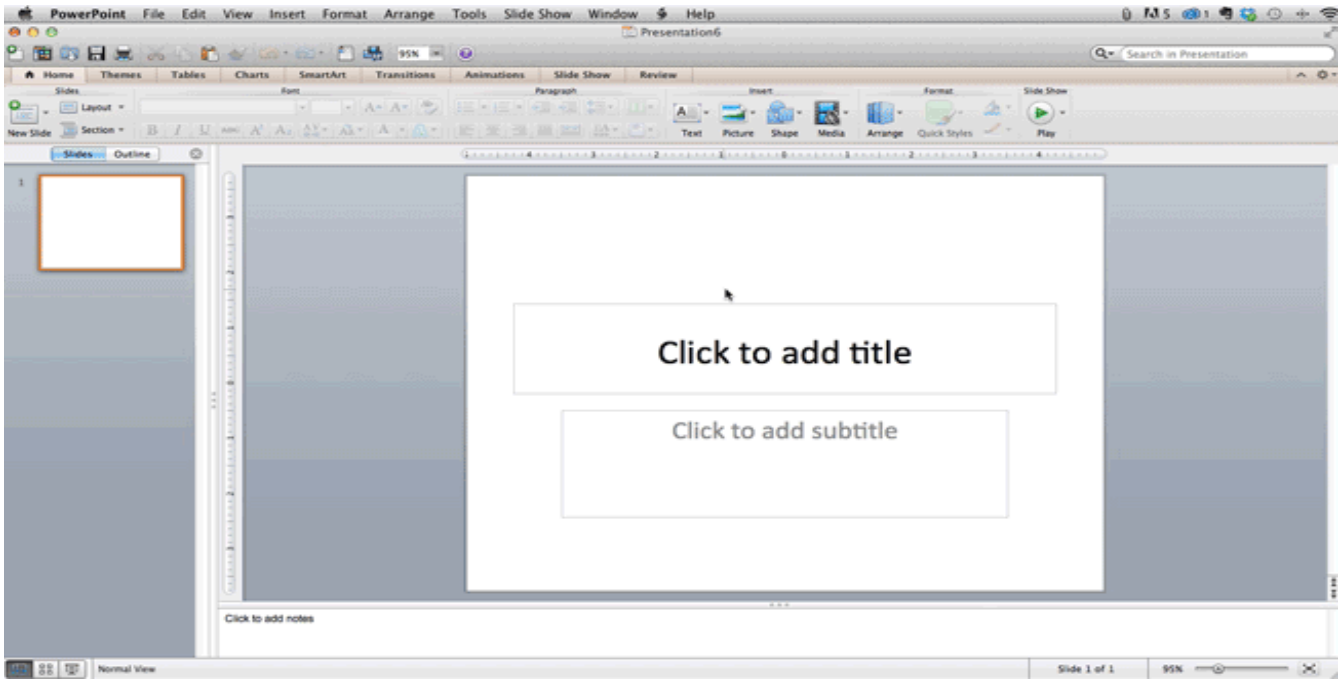
- Make sure that preset PPT themes complement your needs before you adopt them.

- Try to get away from using Microsoft Office’s default fonts, Calibri and Cambria. Using these two typefaces can make the presentation seem underwhelming.
- Professionals should never use PPT’s action sounds. (Please consider your audience above personal preference).
- PowerPoint makes bulleting automatic, but ask yourself: Are bullets actually appropriate for what you need to do? Sometimes they are, but not always.
- Recent PPT defaults include a small shadow on all shapes. Remove this shadow if it's not actually needed. Also, don’t leave shapes in their default blue.

2. Create custom slide sizes.

While you usually can get away with the default slide size for most presentations, you may need to adjust it for larger presentations on weirdly sized displays. If you need to do that, here's how.

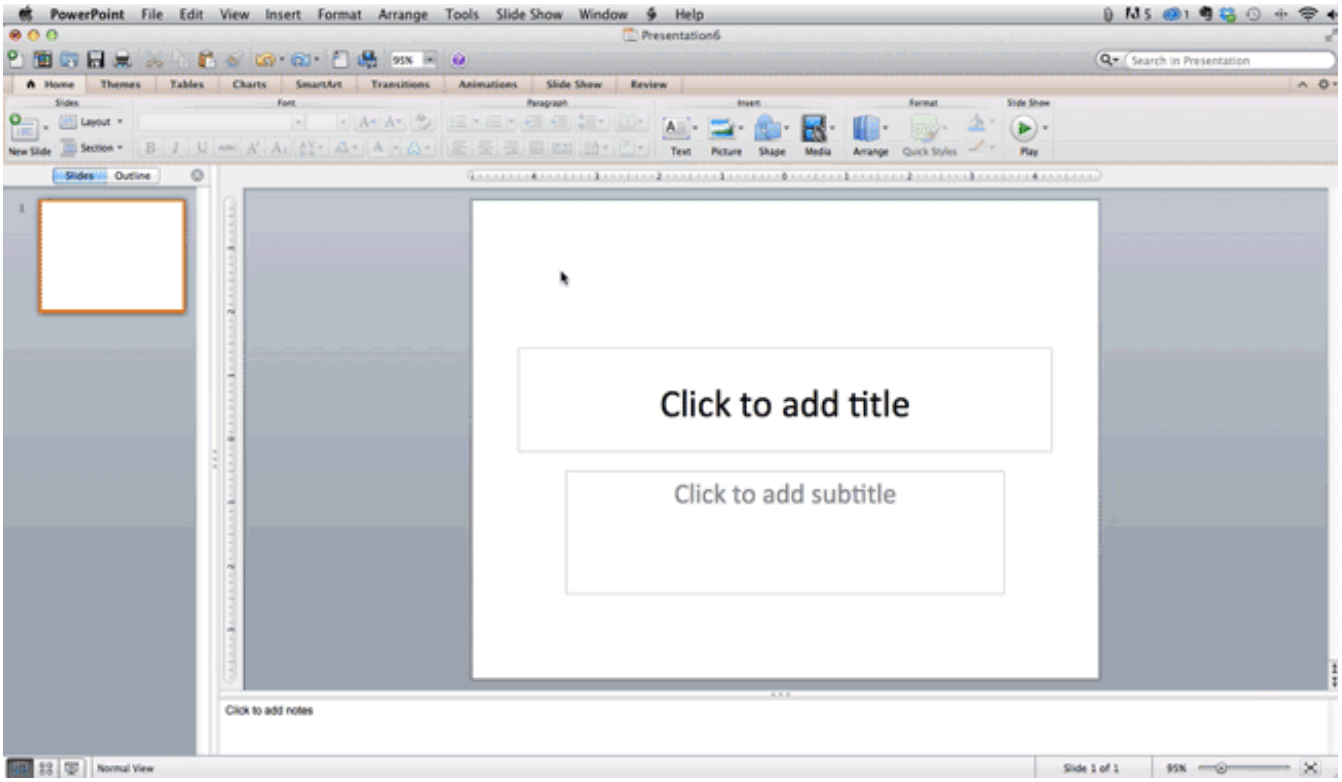
- In the top-left corner, choose "File."
- Select "Page Setup."
- Type the height and width of the background you'd like, and click "OK."
- A dialogue box will appear. Click "OK" again.
- Your background is resized!



3. ***Edit your slide template design.***

Often, it's much easier to edit your PowerPoint template before you start -- this way, you don't have design each slide by hand. Here's how you do that.

- Select "Themes" in the top navigation.
- In the far right, click "Edit Master," then "Slide Master."
- Make any changes you like, then click "Close Master." All current and future slides in that presentation will use that template.


PowerPoint File Edit View Insert Format Arrange Tools Slide Show Window Help
Presentation6
Search in Presentation
Home Themes Tables Charts SmartArt Transitions Animations Slide Show Review
New Slide Layout Section
Text Picture Shape Media Arrange Quick Styles Play
Slides Outline
Click to add title
Click to add subtitle
Click to add notes
Normal View
Slide 1 of 1
95%