
# Introduction to Computers

**Dr. Tejashree Moharekar**
**MCA, NET, PhD**

# Introduction to Computer

- Today, almost all of us in the world make use of computers in one way or the other.
- It finds applications in various fields of **engineering, medicine, commercial, research and others.**
- They are present everywhere, in all the dev ices that we use daily like **cars, games, washing machines, microwaves** etc. and in day to day computations like **banking, reservations, electronic mails, internet and many more.**

# Characteristics Of Computers

- **Speed**
- Computers work at an incredible speed. A powerful computer is capable of performing about 3-4 million simple instructions per second.
- **Accuracy**
- Computers not only provide incredible speed, instead, they are also capable of consistently working with accuracy. The degree of accuracy in computers is very high; computers can perform calculations at almost 100% accuracy. Errors may occur in a computer system, but only because of wrong human input or inaccurate data

# Characteristics Of Computers

- **Diligence**
- Unlike human beings, computers are highly consistent. They do not suffer from human traits of boredom and tiredness resulting in lack of concentration. Computers, therefore, are better than human beings in performing voluminous and repetitive jobs.

# Characteristics Of Computers

- **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.
- The presence of computers can be seen in almost every sphere – Railway/Air reservation, Banks, Hotels, Weather forecasting and many more.

# Characteristics Of Computers

- **Reliability of Computer**
- The results obtained by the computer are very reliable. But this is true only when the data given to the computer or program is correct and reliable.
- **Consistency of Computer**
- The computer is so consistent that it can perform trillions of processes without errors for several hours.
- This means that we can use a computer 24 hours a day or 365 days a year continuously. Furthermore, it provides consistent results for the same set of data, that is, if it is given the same set of data multiple times, it will give the same result each time.

# Characteristics Of Computers

- **Memory of Computer**
- A computer has a built-in memory, where it can store instant data immediately.
- **Storage Capacity of Computer**
- Computers can store vast amounts of data. Today's computers have increased storage capacity compared to earlier days. Besides, we also have the option to store data in secondary devices such as external drives, or floppies, etc.

# Characteristics Of Computers

- **Remembrance Power of Computer**
- The computer has the power to store any data or information for as long as we like.
- Data can also be recalled easily if needed.
- It is our choice to decide how much data we want to store on the computer and when to recall or erase these data.

# Characteristics Of Computers

- **Automation in Computer**
- Computers can also be used to automate routine tasks with the help of a task scheduler such as launching a specific application or software, sending an email, scanning for viruses, and many other maintenance tasks.
- Besides, computers can also be programmed to perform many complex tasks.

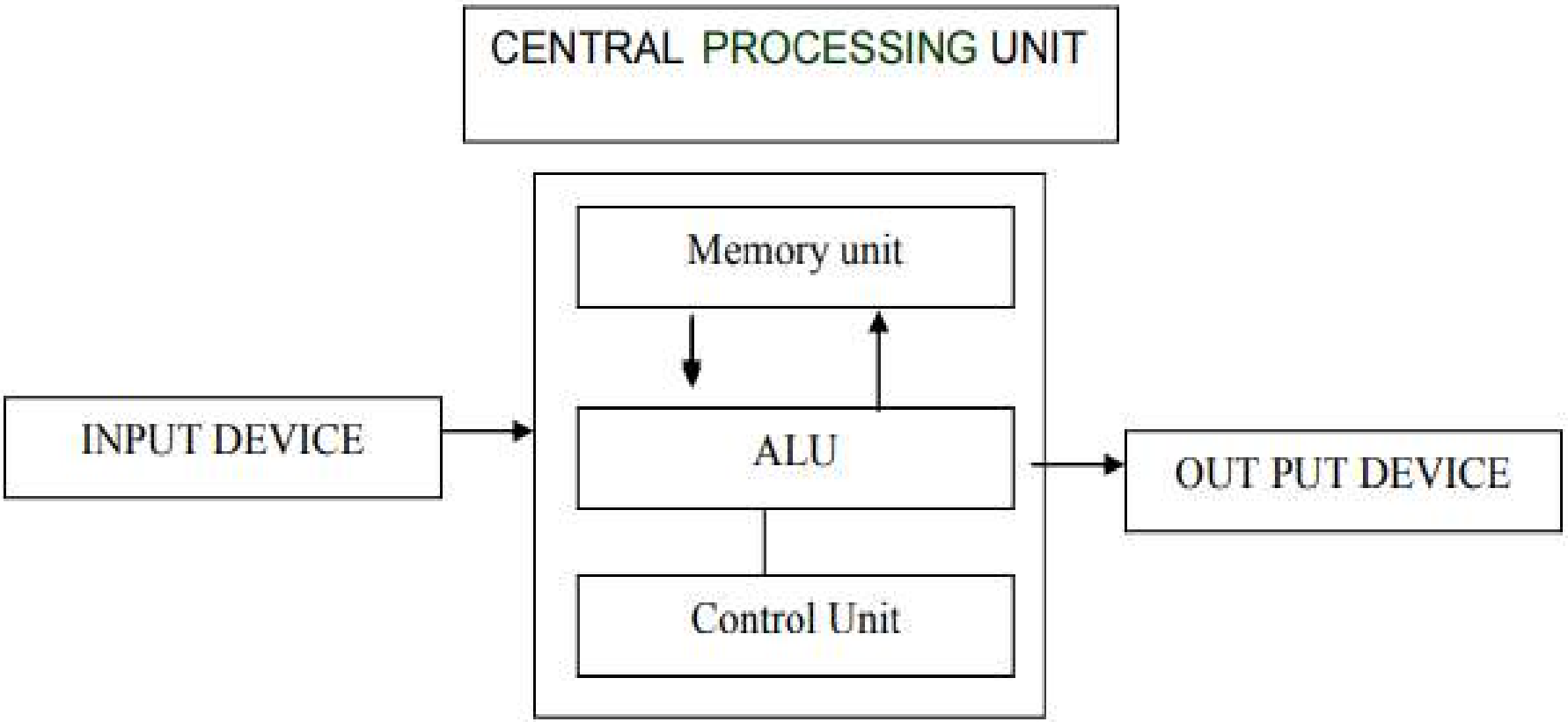
# Characteristics Of Computers

- **Automation in Computer**
- Computers can also be used to automate routine tasks with the help of a task scheduler such as launching a specific application or software, sending an email, scanning for viruses, and many other maintenance tasks.
- Besides, computers can also be programmed to perform many complex tasks.

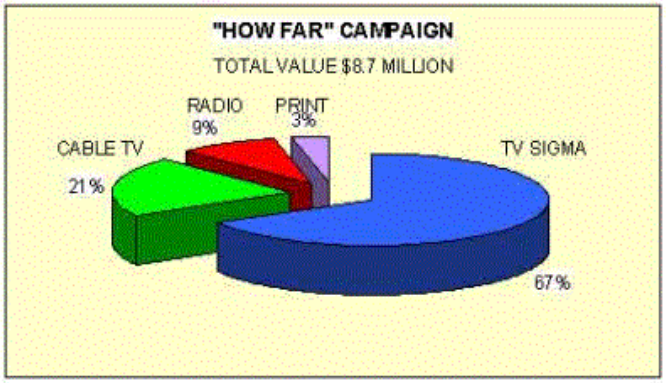
# Computer: Information Processing System

- **DATA** is a collection of independent and unorganized facts.
- **INFORMATION** is the processed and organized data presented in a meaningful form.
- **DATA PROCESSING** is the course of doing things in a sequence of steps.

# Block Diagram of Computer



PROCESSING SYSTEM




DATA

INFORMATION

# Functionalities of a Computer

1. It accepts and gather data. (INPUT)
2. It processes data to become information. (PROCESSING)
3. It stores data and information. (STORE)
4. It presents information. (OUTPUT)

# Three Major Components

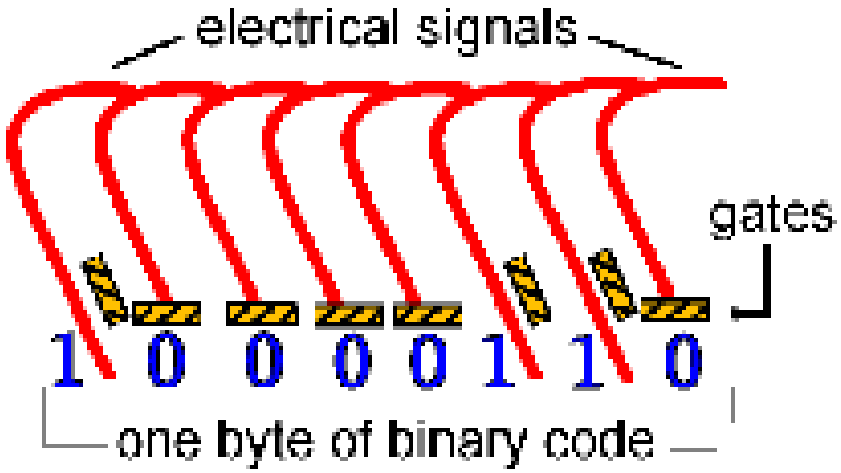
- **HARDWARE** is the tangible part of a computer system.
- **SOFTWARE** is the non-tangible part that tells the computer how to do its job.
- **PEOPLEWARE** refer to people who use and operate the computer system, write computer programs, and analyze and design the information system.

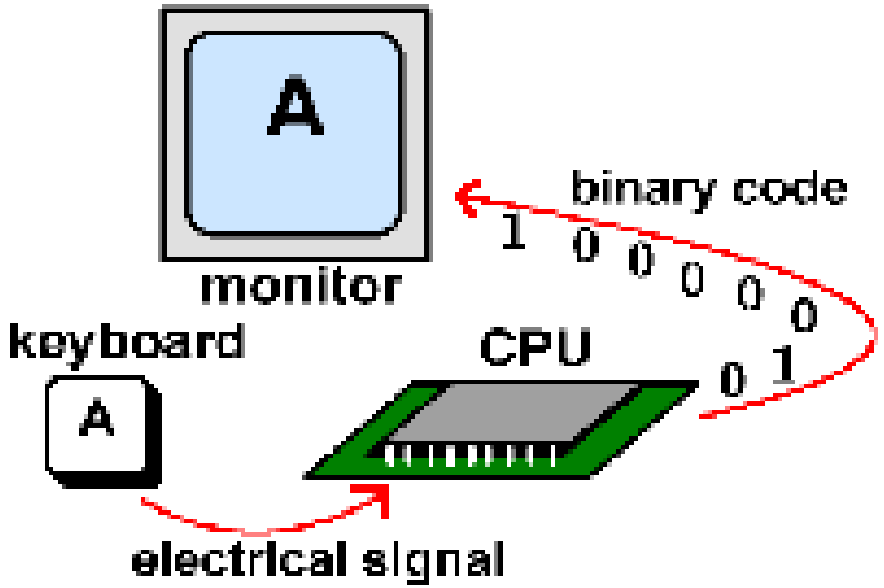
# Basic Units of Measurement

- **BIT** is a unit of information equivalent to the result of a choice between only 2 possible alternatives in the binary number system.
- **BYTE** is a sequence of 8 bits (enough to represent one character of alphanumeric data) processed as a single unit for information.

# Basic Units of Measurement

- A byte can be used to represent a single character, which can be:
  - **A letter**
  - **A number**
  - **A special character or symbol, or**
  - **A space**


electrical signals
gates
1 0 0 0 0 1 1 0
one byte of binary code


A
monitor
binary code
1 0 0 0 0 0 1
keyboard
A
CPU
electrical signal

# Basic Units of Measurement

- 1,000 bytes =1 kilobyte (K or KB)

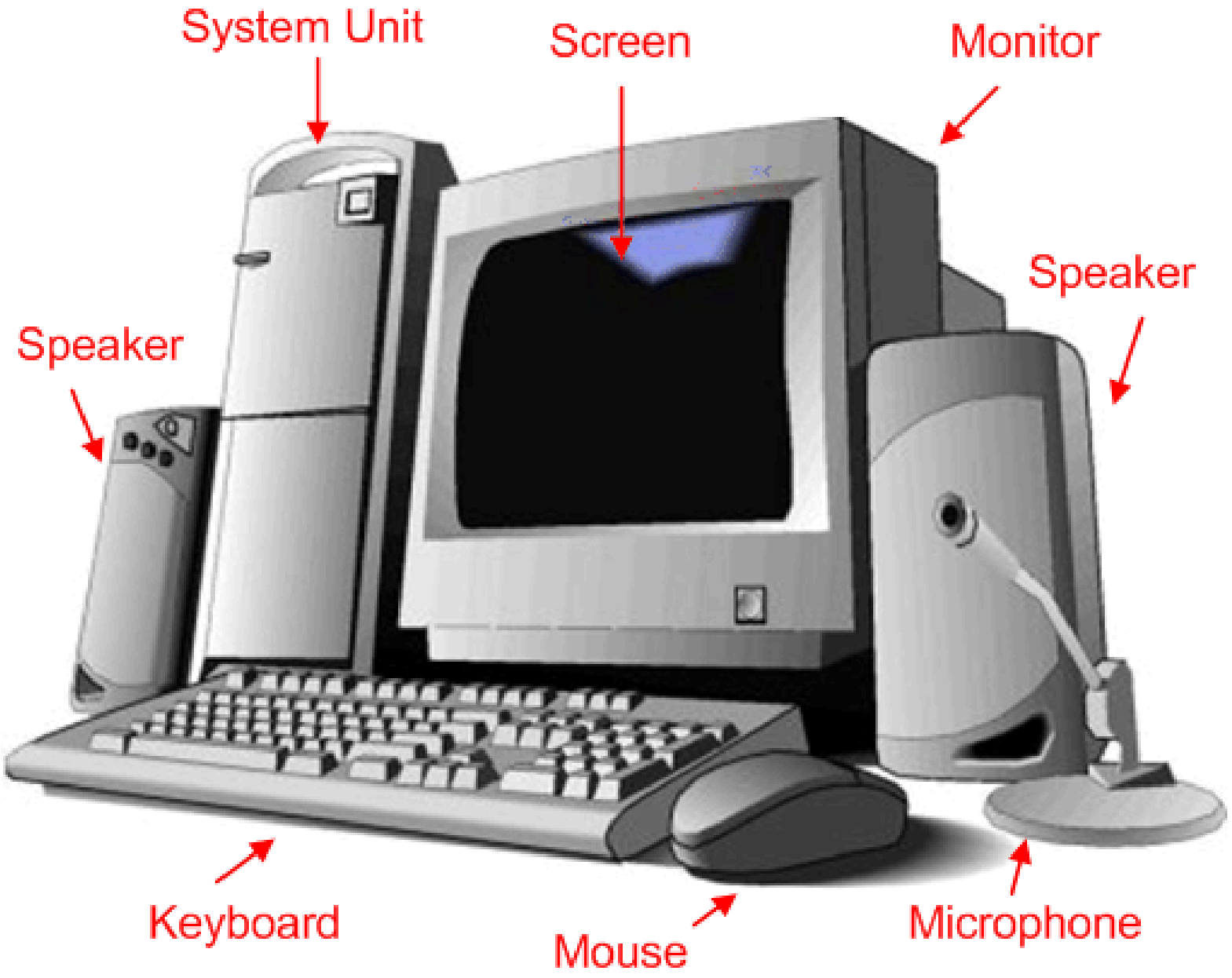
  1,000 KB =1 megabyte (MB)

  1,000 MB =1 gigabyte (GB)

  1,000 GB =1 Terabyte (TB)

# BASIC PC HARDWARE

- **HARDWARE is the tangible part of a computer system.**

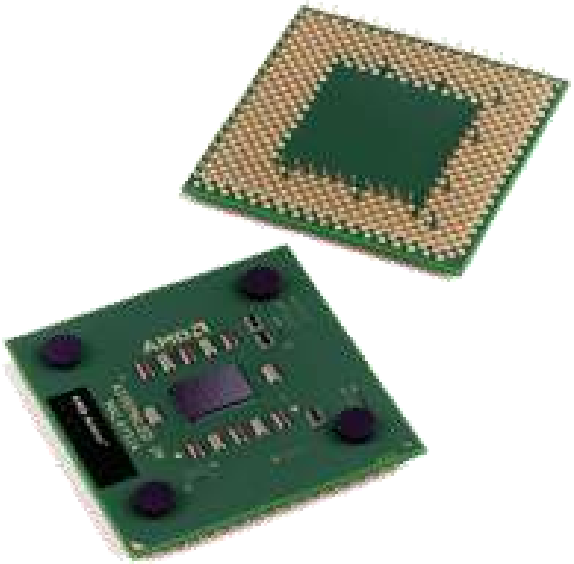

System Unit
Screen
Monitor
Speaker
Speaker
Keyboard
Mouse
Microphone

# Basic hardware of a PC system

- Central Processing Unit (CPU)
- Memory Unit
- Input Devices
- Output Devices
- Secondary Storage Devices

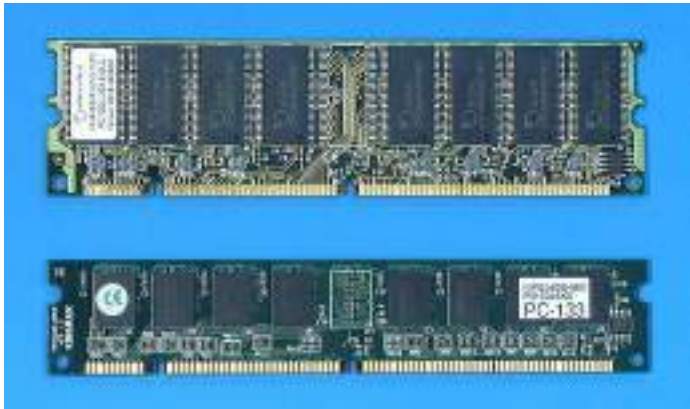
# 1. Central Processing Unit

- Brain of the computer.
- It directs and controls the entire computer system and performs all arithmetic and logical operations.

# 2. Memory Unit

- Where the programs and data are stored .
  - **READ ONLY MEMORY (ROM)** contains the pre-programmed computer instructions such as the Basic Input Output System (BIOS).
  - **RANDOM ACCESS MEMORY (RAM)** is used to store the programs and data that you will run.
  - Exists only when there is power.

# 3. Input Devices

- Allows data and programs to be sent to the CPU.
  - Keyboard
  - Mouse
  - Joystick
  - Microphone
  - Webcam
  - Scanner
  - Monitor

# Keyboard

- Traditional keyboards
- Flexible keyboards
- Ergonomic keyboards
- Wireless keyboards
- PDA keyboards


# Two Types of Mouse

- **Mechanical -** a type of computer mouse that has a rubber or metal ball on its underside and it can roll in every direction.

- **Optical:** This type uses a laser for detecting the mouse's movement.

# Other Pointing Devices

- Trackball
- Track point
- Touch pad
- Touch Screen


- **Joystick** – input device for computer games

- **Light Pens** – light-sensitive penlike device

- **Stylus** – penlike device commonly with tablet PCs and PDAs.

# Scanning Devices

- Optical scanners
- Card readers
- Bar code readers
- Character and mark recognition devices


# Image Capturing Devices

- **Digital Cameras**


- **Digital Video Cameras**

# 4. Output Devices

- Media used by the computer in displaying its responses to our requests and instructions.
- Monitor
- Audio Speakers
- Printer

# Types of Monitor

- Cathode Ray Tube (CRT)

- Liquid Crystal Display (LCD)

# Printers

- **IMPACT PRINTERS** uses pressure by physically striking the paper. Ex. Daisy wheel printers, line printers, dot matrix printers & band printers.
- **NON-IMPACT PRINTER** does not apply pressure on the paper but instead produces character by using lasers, ink spray, photography or heat.

## Dot matrix printer

## Laser printer

## Inkjet printer

# 5. Secondary Storage Devices

- Attached to the computer system to allow you to store programs and data permanently for the purpose of retrieving them for future use.
- Floppy disk, Hard disk, CD Rom

# Floppy Disk

- The most common secondary storage device
- 3.5” disk – 1.44MB

# High-Capacity Floppy Disks

- Floppy disk cartridges
- 3 ½ inches in diameter
- Stores more information
- Zip disks

# Hard Disk Drive or Hard Disk

- Made of rigid materials unlike floppy disks
- Holds a greater amount of data

# Optical Discs

- A standard part of modern desktop machines, especially used for multimedia purposes and preferred in loading applications.

# Kinds


- Blue Ray Disk – 40G
- Digital Versatile Disk
  - DVD-R – write once, 3.95G
  - DVD RW – rewritable, 3G
  - Single Layer and Double Layer
- Compact Disk
  - CD-R – write once, 650MB
  - CD-RW – rewritable, 700MB

# Optical Drives

| | |
|---|---|
| CD-ROM | read CDs |
| CD-Writer | read/write CDs |
| DVD-Combo | read/write CDs, read DVD |
| DVD Writer | read/write CDs<br>read/write DVDs |

# Other Secondary Storage

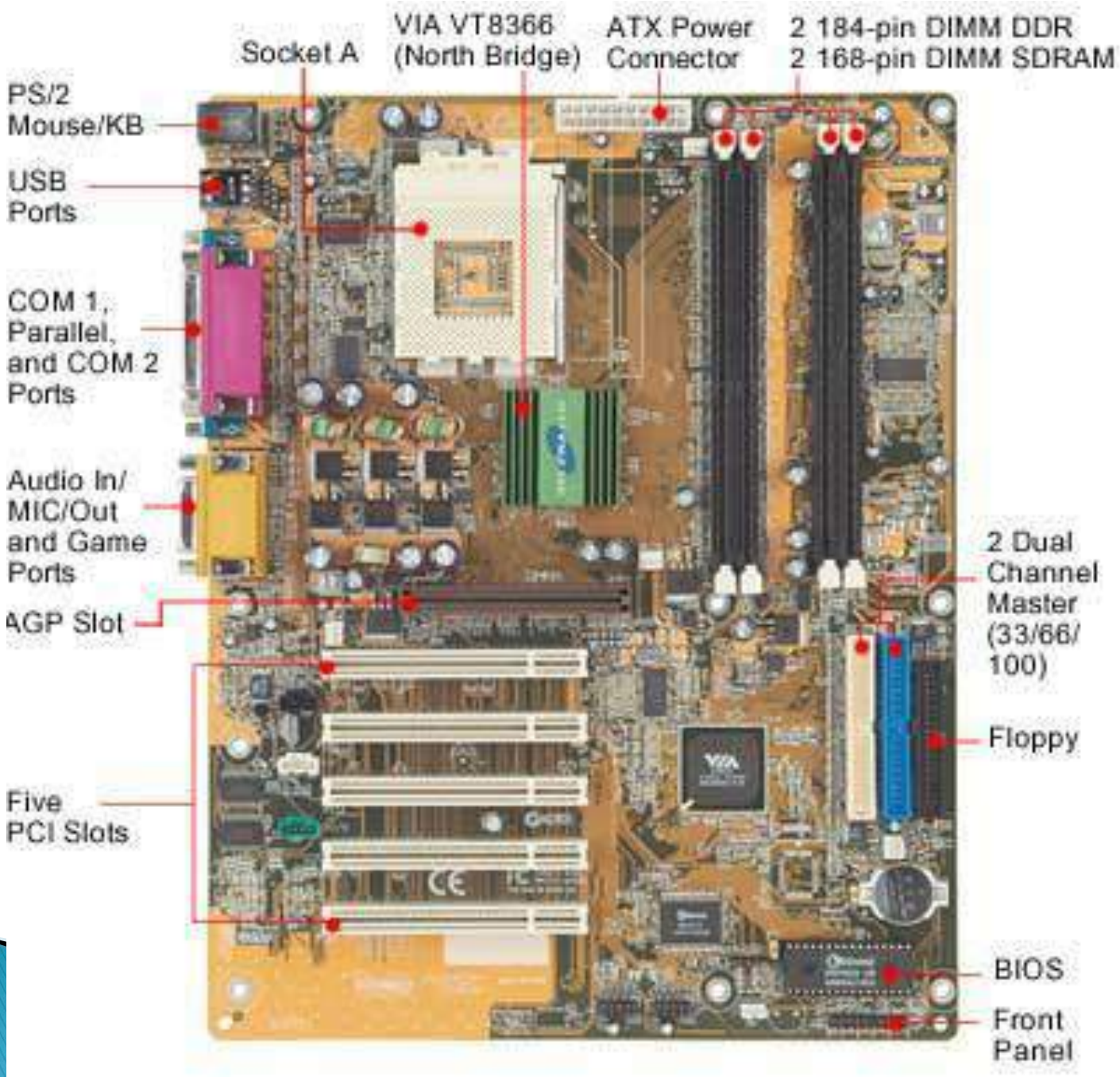
- Solid-State Storage
  - No moving parts
  - Flash memory cards
  - USB flash drives


# Power Supply

- Responsible for powering every device in your computer.
- Parts of a Power supply:
  - Disk drive connectors
  - Motherboard connector
  - Power supply fan
  - Power switch
  - Input voltage selector
  - Cover
  - Power plugs receptacle

# Motherboard

- The physical arrangement in a computer that contains the computer's basic circuitry and components.
- Components are:
  - Microprocessor
  - (Optional) Coprocessors
  - Memory
  - Basic Input/Output System (BIOS)
  - Expansion Slot
  - Interconnecting circuitry


Socket A
VIA VT8366
(North Bridge)
ATX Power
Connector
2 184-pin DIMM DDR
2 168-pin DIMM SDRAM
PS/2
Mouse/KB
USB
Ports
COM 1,
Parallel,
and COM 2
Ports
Audio In/
MIC/Out
and Game
Ports
AGP Slot
Five
PCI Slots
2 Dual
Channel
Master
(33/66/
100)
Floppy
BIOS
Front
Panel

# Expansion Slots

- Graphic cards
- Sound cards
- Modem cards
- Network interface cards/network adapter

# Software

- Instructions that tell the computer how to process data into the form you want.
- Software and programs are interchangeable.
- Two major types:
  - System and Applications

# 2 Kinds of Software

1. System Software enables the application software to interact with the computer hardware.
   - **Operating Systems** are programs that coordinate computer resources, provide an interface between users and the computer; and run applications.
   - **Utilities** perform specific tasks related to managing computer resources.
   - **Device drivers** are specialized programs designed to allow particular input or output devices to communicate with the rest of the computer system.

# unctions of a System Software

- Managing resources (memory, processing, storage, and devices like printer).
- Providing user interface
- Running applications


# 2 Kinds of Software


2. Applications Software – provides the real functionality of a computer. It help you use your computer to do specific types of work.
   - Basic Applications, widely used in all career areas.
   - Specialized Applications, more narrowly focused on specific disciplines and occupations.

# Booting Process

- Booting is the process of switching on a computer.
- Booting is basically the process of starting the computer.
- When the CPU is first switched on it has nothing inside the Memory.
- In order to start the Computer, **load the Operating System** into the Main Memory and then Computer is ready to take commands from the User.

# Booting Process

- Booting is the process of switching on a computer.
- In computing, booting (or booting up) is the **initialization** of a computerized system.
- The system can be a computer or a **computer appliance**.
- Booting is complete when the normal, operative, runtime environment is attained.

# Booting Process

- On modern general purpose computers, the boot up process can take tens of seconds,
- It involves performing a **power-on self-test**, **locating and initializing peripheral devices**, and then **finding, loading and starting an operating system.**

# Booting Process

- The system **BIOS (Basic Input/Output System)** makes the peripheral devices active.
- Further, it requires that the boot device loads the operating system into the main memory.

# Types of Booting

**Cold Booting**

**Warm Booting**

# What is a programming language

- **Low-level language**
- This language is the most understandable language used by computer to perform its operations.
- It can be further categorized into **: Machine level language and Assembly language.**

# Machine Language (1GL)

- **Machine Language (1GL)**
- Machine language consists of strings of binary numbers (i.e. 0s and 1s) and it is the only one language, the processor directly understands.
- Machine language has an Merits of very fast execution speed and efficient use of primary memory.

# Machine Language (1GL)

- **Merits:**
- It is directly understood by the processor so has faster execution time since the programs written in this language need not to be translated.
- It doesn’t need larger memory.

# Machine Language (1GL)

- **Demerits:**
- It is very difficult to program using 1GL since all the instructions are to be represented by 0s and 1s.
- Use of this language makes programming time consuming.
- It is difficult to find error and to debug.
- It can be used by experts only.

# Assembly Language

- Assembly language is also known as low-level language because to design a program programmer requires detailed knowledge of hardware specification.
- This language uses mnemonics code (symbolic operation code like ‘ADD’ for addition) in place of 0s and 1s.
- The program is converted into machine code by assembler.
- The resulting program is referred to as an object code.

# Assembly Language

- **Merits:**
- It is makes programming easier than 1GL since it uses mnemonics code for programming.
- Eg: ADD for addition, SUB for subtraction, DIV for division, etc.
- It makes programming process faster.
- Error can be identified much easily compared to 1GL.
- It is easier to debug than machine language.

# Assembly Language

- **Demerits:**
- Programs written in this language is not directly understandable by computer so translators should be used.
- Being machine dependent language, programs written in this language are very less or not portable.
- Programmers must know its mnemonics codes to perform any task.

# High level language

- Instructions of this language closely resembles to human language or English like words.
- It uses mathematical notations to perform the task.
- The high level language is easier to learn.
- It requires less time to write and is easier to maintain the errors.
- The high level language is converted into machine language by one of the two different languages translator programs; interpreter or compiler.

# Device Drivers

- The OS depends on individual pieces of software to control each individual piece of hardware, called device drivers.
- Device drivers contain instructions, like a manual for the kernel, on how to make the hardware perform a requested function.
- The OS calls the driver, and the driver “drives” the device.
- These software pieces exist for all hardware, and are often specialized for things like **video cards, network adapters, input devices and sound cards**.

# Introduction to Computers

## Session-II

**Dr. Tejashree Moharekar**
**MCA, NET, PhD**

# Number System

- The technique to represent and work with numbers is called number system.
- **Decimal number system** is the most common number system.
- Other popular number systems include **binary number system, octal number system, hexadecimal number system, etc**.

# Decimal Number System

- Decimal number system is a base 10 number system having 10 digits from 0 to 9.
- This means that any numerical quantity can be represented using these 10 digits.
- Decimal number system is also a positional value system.
- This means that the value of digits will depend on its position.
- Say we have three numbers – 734, 971 and 207. The value of 7 in all three numbers is different–

# Decimal Number System

| | | | | | |
|---|---|---|---|---|---|
| $10^5$ | $10^4$ | $10^3$ | $10^2$ | $10^1$ | $10^0$ |

# Binary Number System

- The easiest way to vary instructions through electric signals is two-state system – on and off.
- On is represented as 1 and off as 0, though 0 is not actually no signal but signal at a lower voltage.
- The number system having just these two digits – **0 and 1** – is called binary number system.
- Each binary digit is also called a bit.

# Binary Number System

| $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ |
|---|---|---|---|---|---|

- Computer memory is measured in terms of how many bits it can store.
- 1 byte (B) = 8 bits
- 1 Kilobytes (KB) = 1024 bytes
- 1 Megabyte (MB) = 1024 KB
- 1 Gigabyte (GB) = 1024 MB
- 1 Terabyte (TB) = 1024 GB
- 1 Exabyte (EB) = 1024 PB
- 1 Zettabyte = 1024 EB
- 1 Yottabyte (YB) = 1024 ZB

# Octal Number System

- Octal number system has eight digits – 0, 1, 2, 3, 4, 5, 6 and 7.
- Octal number system is also a positional value system with where each digit has its value expressed in powers of 8, as shown here .

# Octal Number System

- Decimal equivalent of any octal number is sum of product of each digit with its positional value.
- $726_8 = 7\times8^2 + 2\times8^1 + 6\times8^0$
- $= 448 + 16 + 6$
- $= 470_{10}$

| $8^5$ | $8^4$ | $8^3$ | $8^2$ | $8^1$ | $8^0$ |
|---|---|---|---|---|---|

# Hexadecimal Number System

- This number system has 16 symbols **– 0 to 9 and A to F** where A is equal to 10, B is equal to 11 and so on till F.
- Hexadecimal number system is also a positional value system with where each digit has its value expressed in powers of 16, as shown here −

| | | | | | |
|---|---|---|---|---|---|
| $16^5$ | $16^4$ | $16^3$ | $16^2$ | $16^1$ | $16^0$ |

# Hexadecimal Number System

- Decimal equivalent of any hexadecimal number is sum of product of each digit with its positional value.
- $27FB_{16} = 2\times16^3 + 7\times16^2 + 15\times16^1 + 10\times16^0$
- $= 8192 + 1792 + 240 + 10$
- $= 10234_{10}$

| | | | | | |
|---|---|---|---|---|---|
| $16^5$ | $16^4$ | $16^3$ | $16^2$ | $16^1$ | $16^0$ |

# Types of Computer

- PC
- Desktop
- Laptop
- Tablet Computers
- Smartphones
- Workstations
- Server
- Mainframe
- Supercomputers
- Wearable Computers

# PC

- A single person defines the personal computer, or PC, as any computer designed for general use by one person.
- PCs were first known as microcomputers because they were a complete computer but built on a smaller scale than the huge systems in use by most businesses.
- Personal computers come in many forms, including the new Apple iPad.

# Desktop

- A PC that is not designed for portability is a desktop computer.
- The expectation with desktop systems is that you will set the computer up in a permanent location, like a desk or table.
- Most desktops offer more power, storage and versatility for less cost than their portable brethren.

# TABLET COMPUTERS

- Tablet Computers are ultra-portable computers that are even smaller than traditional laptops.
- Their low cost means they're cheaper than almost any brand-new laptop you'll find at retail outlets.
- However, the internal components are less powerful than those in regular laptops.
- Recent improvements to tablet computers have allowed users to view HD video, get high quality sound, great photo capabilities, and the ability to share information, photos, and videos with anyone.

# Handheld Computers

- Smartphones are handheld-sized computers that often use flash memory instead of a hard drive for storage.
- These devices usually do not have keyboards but rely on touchscreen technology for user input.
- Smartphones are typically smaller than a paperback novel, very lightweight with a reasonable battery life.
- Smartphones have the same capabilities as tablet computers, but also allow users to text or make phone calls.

# WORKSTATION

- Another type of computer is a workstation.
- A workstation is simply a desktop computer that has a more powerful processor, additional memory and enhanced capabilities for performing a special group of task, such as 3D Graphics or game development.
- They may even use multiple screens to enhance their viewing.

# SERVER

- A computer that has been optimized to provide services to other computers over a network.
- Servers usually have powerful processors, lots of memory and large hard drives.
- Servers allow many computers to share a printer or other devices without the cost of having to buy one for every computer.
- Servers also allow users to share information and files with each other.
- The computers in this lab are part of a network.

# MAINFRAME

- In the early days of computing, mainframes were huge computers that could fill an entire room or even a whole floor!
- As the size of computers has diminished while the power has increased, the term mainframe has fallen out of use in favor of enterprise server.
- You'll still hear the term used, particularly in large companies to describe the huge machines processing millions of transactions every day.
- Mainframes store vast amounts of information.

# SUPERCOMPUTER

- This type of computer usually costs hundreds of thousands or even millions of dollars.
- Although some supercomputers are single computer systems, most are composed of multiple high performance computers working in parallel as a single system.
- Supercomputers are the fastest, most powerful, most expensive computers made today

# WEARABLE COMPUTERS

- The latest trend in computing is wearable computers. Essentially, common computer applications (e-mail, database, multimedia, calendar/scheduler) are integrated into watches, cell phones, visors and even clothing.
- Users can use these devices for health and fitness, navigation, social networking, and gaming.

# Basics of Computer Networks And Internet

## Session-I

**Dr. Tejashree Moharekar**
**MCA, NET, PhD**

# Definition of Operating System

- OS is a program that acts as an intermediary between **Operating System** and user of a computer and the computer hardware.
- The purpose of an Operating System is to ***provide an environment in which a user can execute program.***
- **An Operating System** is an important part of almost every Computer System.
- It is basically a ***control program that controls the execution of user programs to prevent errors and improper use of the computer***.

# What is an Operating System?

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

# Definition of Operating System

- OS is a program that acts as an intermediary between **Operating System** and user of a computer and the computer hardware.
- The purpose of an Operating System is to ***provide an environment in which a user can execute program.***
- **An Operating System** is an important part of almost every Computer System.
- It is basically a ***control program that controls the execution of user programs to prevent errors and improper use of the computer***.

# Functions Provided by OS

- An operating system provides an environment for the execution of the program. It provides some functions to the programs.

| | | | |
|---|---|---|---|
| **Program Execution** | **I/O Operation** | **File System Manipulation** | **Communication** |
| **Error detection** | **Resource Allocation** | **Accounting** | **Protection** |

# Functions Provided by OS

- **Program execution**
- Operating systems handle many kinds of activities from user programs to system programs like printer spooler, name servers, file server, etc.
- Each of these activities is encapsulated as a process.

# Functions Provided by OS

- ***Following are the major activities of an operating system with respect to program management –***
- Loads a program into memory.
- Executes the program.
- Handles program's execution.
- Provides a mechanism for process synchronization.
- Provides a mechanism for process communication.
- Provides a mechanism for deadlock handling.

# Functions Provided by OS

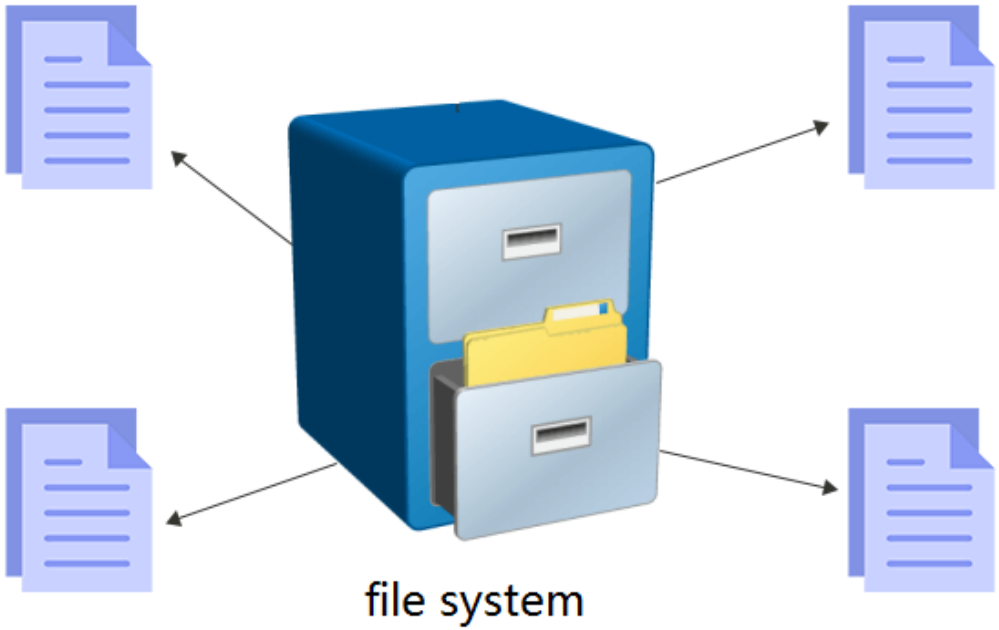
- **I/O Operation**
- An I/O subsystem comprises of I/O devices and their corresponding driver software.
- ***An Operating System manages the communication between user and device drivers.***
- I/O operation means read or write operation with any file or any specific I/O device.
  - Operating system provides the access to the required I/O device when required.

# Functions Provided by OS

- **File system manipulation**
- A file represents a collection of related information.
- Computers can store files on the disk (secondary storage), for long-term storage purpose.
- Examples of storage media include magnetic tape, magnetic disk and optical disk drives like CD, DVD.
- Each of these media has its own properties like speed, capacity, data transfer rate and data access methods.

# Functions Provided by OS

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



# Functions Provided by OS

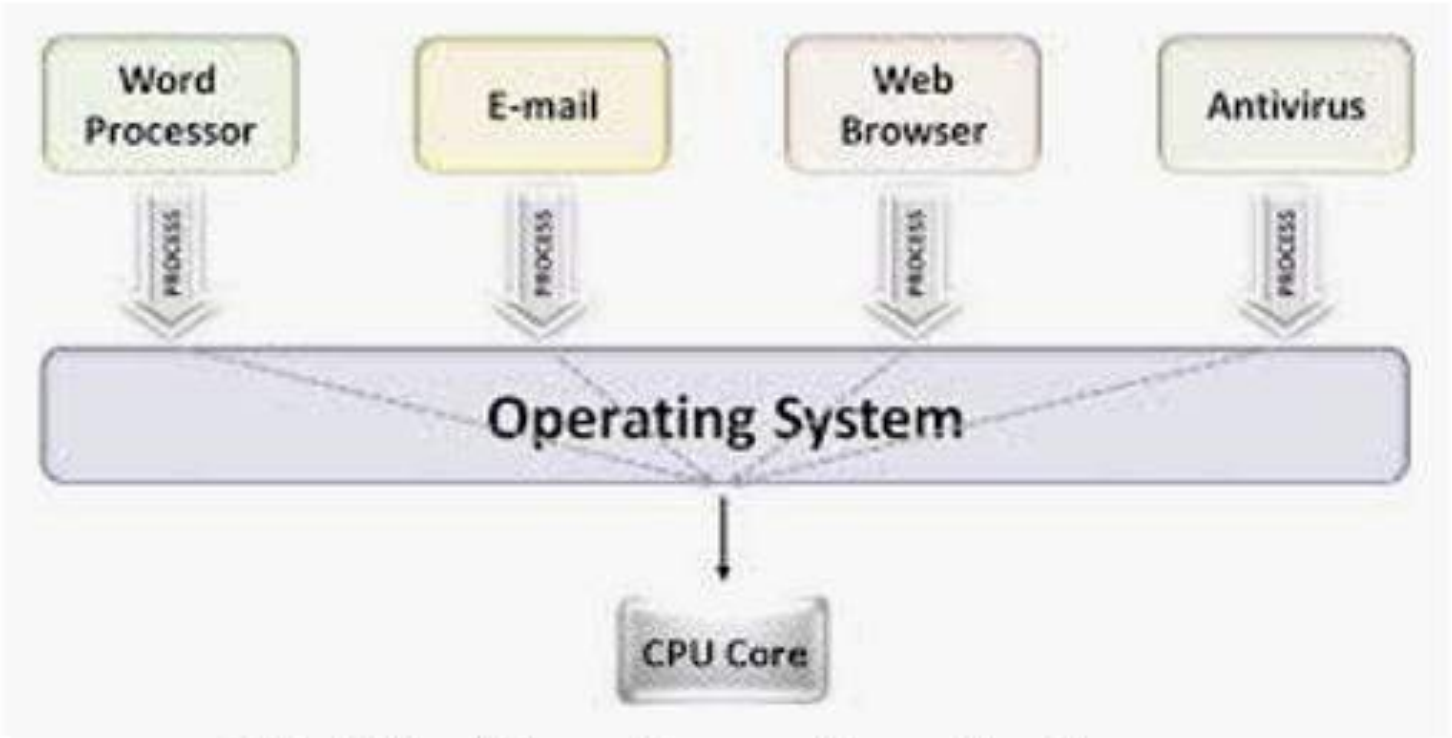
- **File system manipulation**
- Program needs to read a file or write a file.
- The operating system gives the permission to the program for operation on file.
- Permission varies from read-only, read-write, denied and so on. Operating System provides an interface to the user to create/delete files.

# Functions Provided by OS

- **Communication**
- In case of distributed systems which are a collection of processors that do not share memory, peripheral devices, or a clock, the operating system manages communications between all the processes.
- Multiple processes communicate with one another through communication lines in the network.

# Functions Provided by OS

- **Resource Management**




Multitasking Operating System

# Functions Provided by OS

- **Protection**
- Considering a computer system having multiple users and concurrent execution of multiple processes, the various processes must be protected from each other's activities.
- Protection refers to a mechanism or a way to control the access of programs, processes, or users to the resources defined by a computer system.

# Single-User/Single-Tasking OS

- **Advantages**
- This operating system occupies less space in memory.
- **Disadvantages**
- It can perform only a single task at a time.

# Single-User/Multitasking OS

- An operating system that allows a single user to perform more than one task at a time is called Single-User Multitasking Operating System.
- Examples include Microsoft Windows

# Multiuser/Multitasking OS

- It is an operating system that permits several users to utilize the programs that are concurrently running on a single network server.
- The single network server is termed as "Terminal server".
- "Terminal client" is a software that supports user sessions.
- Examples include UNIX

# Multiuser/Multitasking OS

- **Advantages**
- It is highly productive as it performs multiple tasks at a time.
- It is time saving as we don’t have to make changes in many desktops, instead can make changes only to the server.
- **Disadvantages**
- If the connection to the server is broken, user cannot perform any task on the client as it is connected to that server.

# Real-time operating system

- Real-time operating system is designed to run real-time applications.
- It can be both single- and multi-tasking.
- **Advantages**
- It works very fast.
- It is time saving, as it need not be loaded from memory.
- Since it is very small, it occupies less space in memory.

# WINDOWS OPERATING SYSTEM

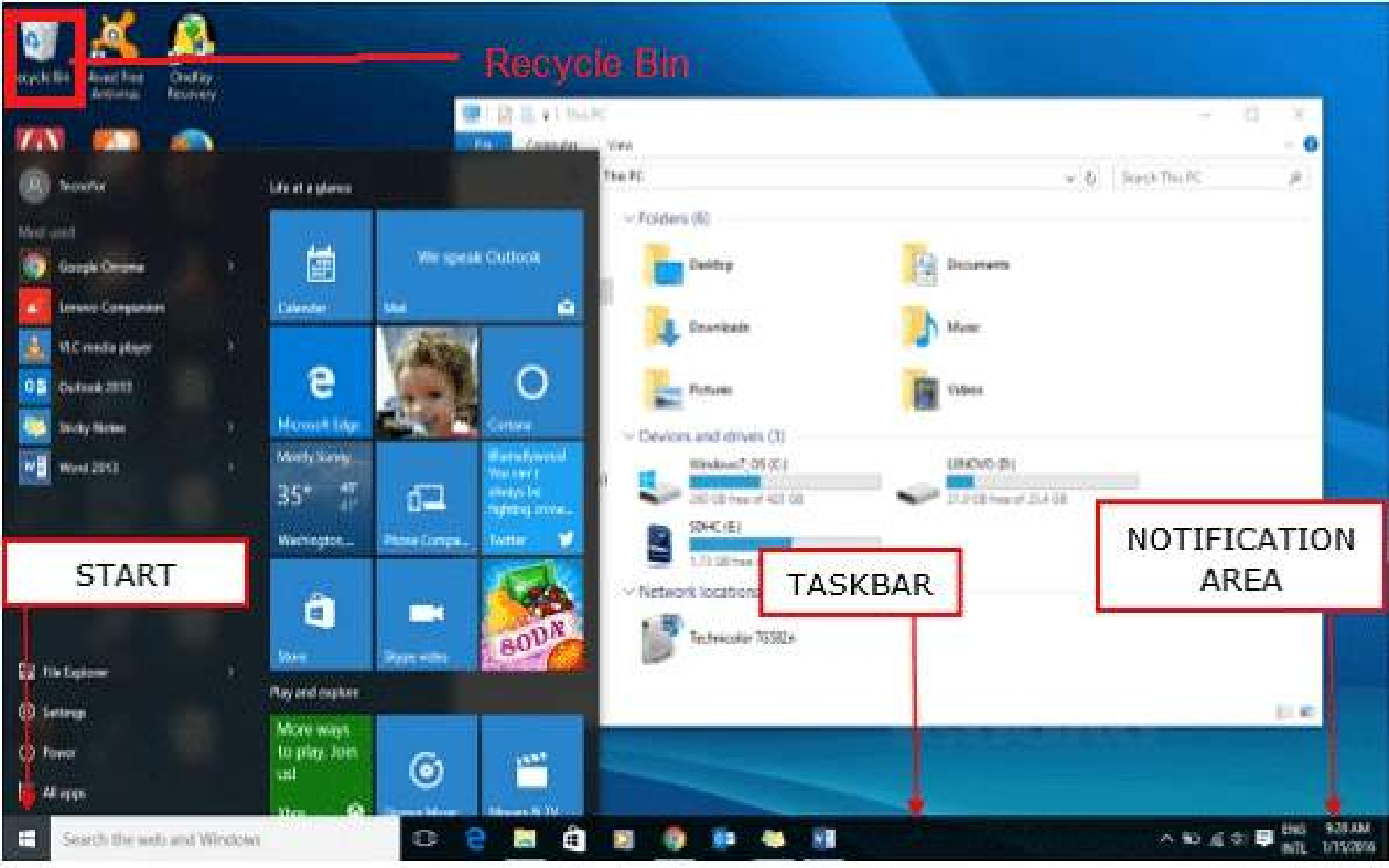
- Microsoft Windows is a multitasking operating system developed by Microsoft Corporation which uses Graphical User Interface to interact with the users.
- Bill Gates and Paul Allen founded Microsoft and windows operating system has been its primary product.

# WINDOWS OPERATING SYSTEM

- Main Components of Windows

| | | | |
|---|---|---|---|
| Configuration and maintenance | User interface | Applications and utilities | Windows Server components |
| File systems | Core components | Services | DirectX |
| Networking | Scripting and command-line | Kernel | NET Framework |
| Security | Deprecated components and apps | APIs | |

# WINDOWS OPERATING SYSTEM



# Features of Windows

- **Windows Search:**
- We can have numerous files and contents located on our system and sometimes we may run out of memory about the exact location of our file.
- Windows Search is a search function included with Windows that allows the user to search their entire computer

# Features of Windows

- **Windows File Transfer:**
- We may have the need to transfer in or transfer out the files and contents from our machine to other devices such as other computers or mobiles and tablets.
- We can do this by using an Easy Transfer Cable, CDs or DVDs, a USB flash drive, wireless Bluetooth, a network folder, or an external hard disk.

# Features of Windows

- **Windows Updates:**
- Windows includes an automatic update feature with the intended purpose of keeping its operating system safe and up-to-date.
- **Windows taskbar:**
- At the bottom most part of your windows, you will see a row which is known as the taskbar. It has the currently running applications.The taskbar is the main navigation tool for Windows

# Features of Windows

- **Remote Desktop Connection:**
- This feature of windows allows you to connect to another system and work remotely on another system.

# Advantages of Windows

- Desktop as well as tablet-friendly OS
- Switch between applications is very easy
- Not much technical knowledge is required to operate windows
- Windows OS is the dominant OS and enjoys more than 90% of Market share
- MS OS have a great support community
- Microsoft provides a powerful set of Enterprise focused Operating System,
- More gaming

# Disadvantages of Windows

Cost for upgrade

Windows OS attracts a large number of virus programs due to its largest market share and easy to breach paradigm

Windows OS is not that much of touch-friendly

# Advantages and Disadvantages of Windows

- **Remote Desktop Connection:**
- This feature of windows allows you to connect to another system and work remotely on another system.

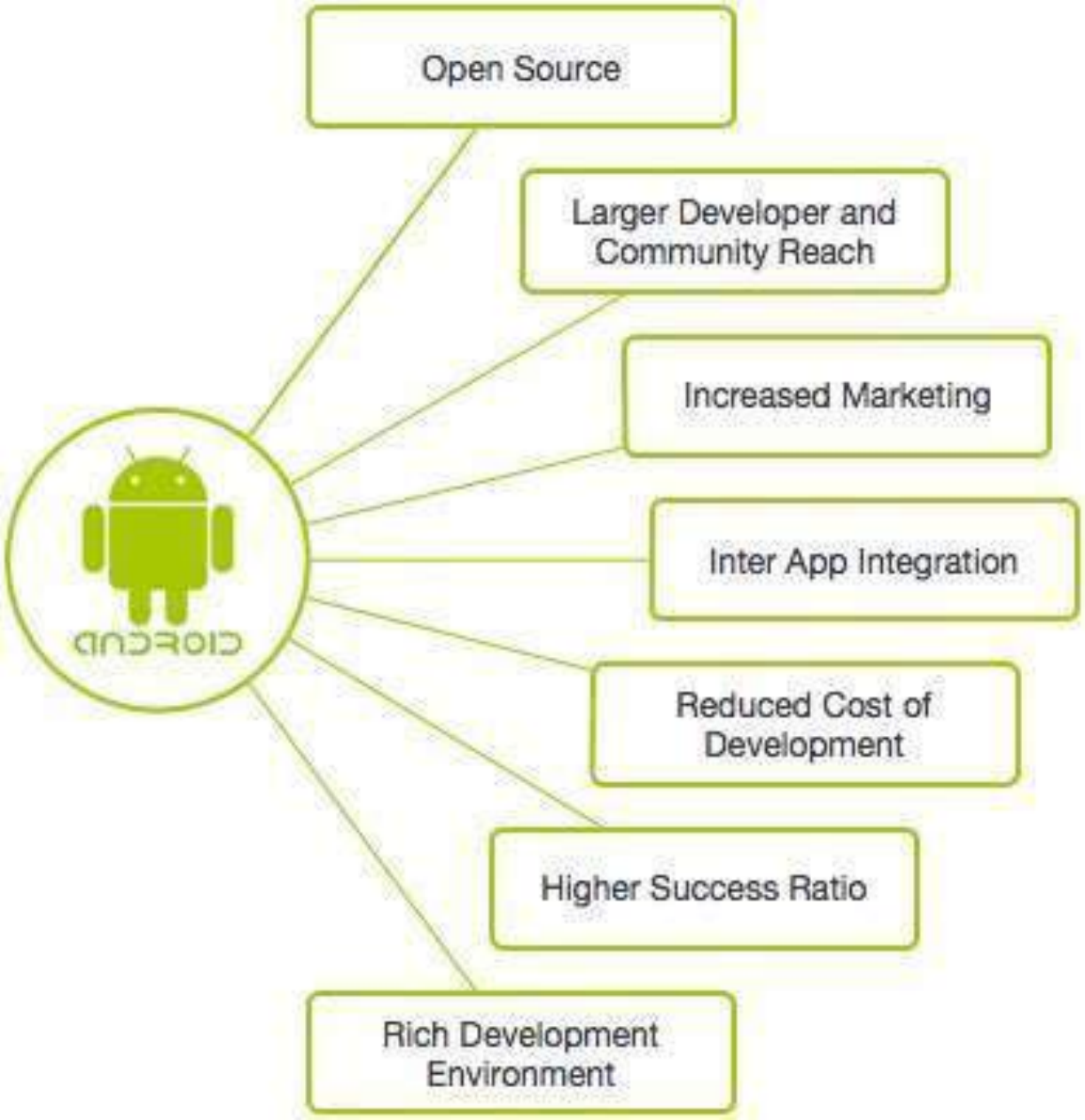

# Android OS

ANDROID

# Android OS

- Android is an open source and Linux-based Operating System for mobile devices such as smartphones and tablet computers.
- Android was developed by the **Open Handset Alliance**, led by Google, and other companies.

# Android OS


Open Source
Larger Developer and Community Reach
Increased Marketing
Inter App Integration
Reduced Cost of Development
Higher Success Ratio
Rich Development Environment
android

# Features of Android OS

| | |
|---|---|
| **Beautiful UI** | • Android OS basic screen provides a beautiful and intuitive user interface |
| **Connectivity** | • GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, LTE, NFC and WiMAX. |
| **Storage** | • SQLite, a lightweight relational database, is used for data storage purposes. |
| **Media support** | • H.263, H.264, MPEG-4 SP, AMR, AMR-WB, AAC, HE-AAC, AAC 5.1, MP3, MIDI, Ogg Vorbis, WAV, JPEG, PNG, GIF, and BMP. |

# Features of Android OS

| | |
|---|---|
| **Messaging** | • SMS and MMS |
| **Web browser** | • Based on the open-source WebKit layout engine, coupled with Chrome's V8 JavaScript engine supporting HTML5 and CSS3. |
| **Multi-touch** | • Android has native support for multi-touch which was initially made available in handsets such as the HTC Hero. |
| **Multi-tasking** | • User can jump from one task to another and same time various application can run simultaneously. |
| **Resizable widgets** | • Widgets are resizable, so users can expand them to show more content or shrink them to save space. |

# iOS OS

iPhone Operating System

(iOS)

# iOS OS

- IOS stands for iphone operating system. It is a proprietary mobile operating system of apple for its handheld.
- It supports Objective-C, C, C++, Swift programming language.
- It is based on the Macintosh OS X. iPhone, ipod and iPad all comes with IOS.

# Features of iOS OS

Multitasking
Social Media
iCloud
In-App purchase
Game Center
Notification Center
Accelerometer
Gyroscope
Powerful APIs
GPS
High end processor
Accessibility
Bluetooth

Orientations
Camera integration
Location services
Maps
Email, contacts, web pages and messages etc.

# Chapter 2
# Basics of Computer Networks And Internet
## Session-2

**Dr. Tejashree Moharekar**
**MCA, NET, PhD**

# Introduction : Computer Network

- Computer network is an interconnection between two or more hosts/computers.
- A computer network is a group of two or more computers that are linked together.
- Networks are usually used to share resources, exchange files or communicate with other users.

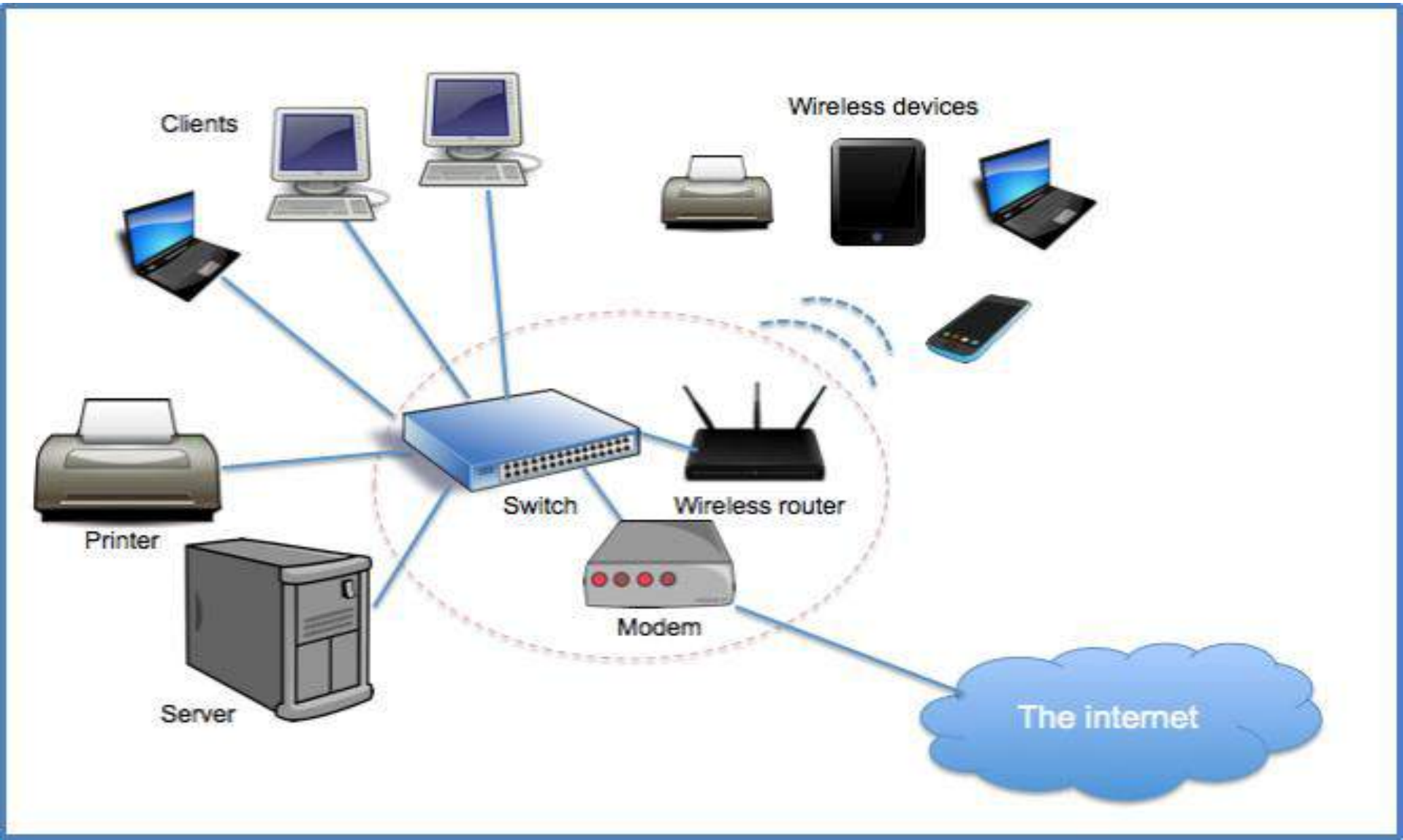
# Definition of Computer Network

- **Definition –**
  - ***A group of computers which are connected to each other and follow similar usage protocols for the purpose of sharing information and having communications provided by the networking nodes is called a Computer Network.***

# Introduction : Computer Network

- A network is a set of nodes connected by communication links.
- A node can be a computer, printer, or any other device capable of sending or receiving data from the other node through the network.
- Computers are linked in networks to allow them to exchange information electronically.

# Computer Network



# Goals of Computer Network

- **Resource Sharing –**
- Many organization has a substantial number of computers in operations, which are located apart.
- Ex. A group of office workers can share a common printer, fax, modem, scanner, etc.

# Goals of Computer Network

- **High Reliability –**
- If there are alternate sources of supply, all files could be replicated on two or more machines.
- If one of them is not available, due to hardware failure, the other copies could be used.

# Goals of Computer Network

- **Inter-process Communication–**
- Network users, located geographically apart, may converse in an interactive session through the network.
- In order to permit this, the network must provide almost error-free communications.

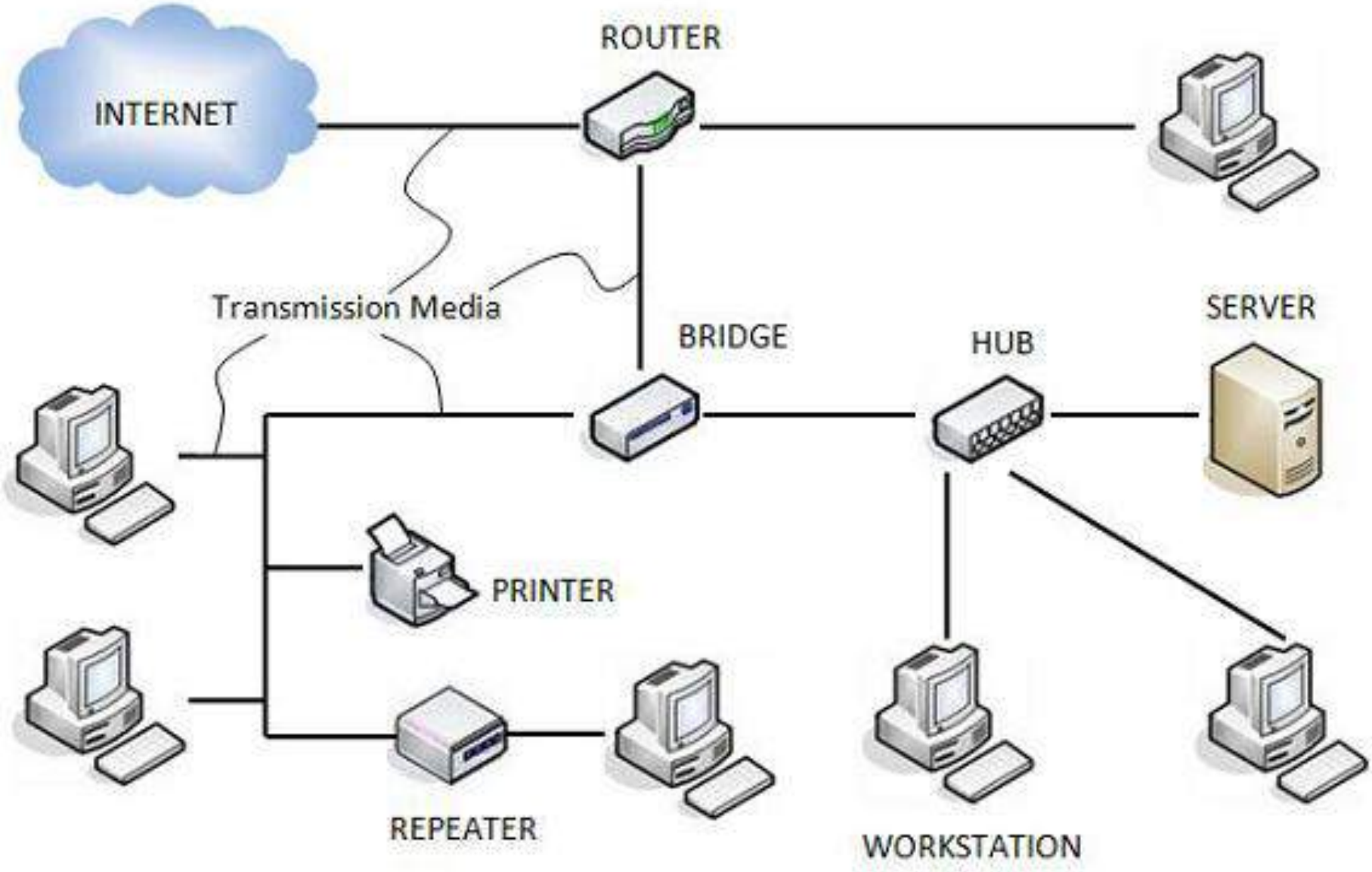
# Goals of Computer Network

- **Flexible access –**
- Files can be accessed from any computer in the network.
- The project can be begun on one computer and finished on another.
- Another closely related goal is to increase the **systems performance** as the work load increases by just adding more processors. With central mainframes, when the system is full, it must be replaced by a larger one, usually at great expense and with even greater disruption to the users.

# Goals of Computer Network

- Computer networks provide a **powerful communication** medium. A file that was updated or modified on a network can be seen by the other users on the network immediately.
- Another closely related goal is to increase the **systems performance** as the work load increases by just adding more processors. With central mainframes, when the system is full, it must be replaced by a larger one, usually at great expense and with even greater disruption to the users.

# Components of Computer Network



# Components of Computer Network

- Computer networks components comprise both physical parts as well as the software required for installing computer networks, both at organizations and at home.
- The **hardware components** are the server, client, peer, transmission medium, and connecting devices.
- The **software components** are operating system and protocols.

# Components of Computer Network: Hardware Components

- **Servers**– Servers are high-configuration computers that manage the resources of the network. The network operating system is typically installed in the server and so they give user accesses to the network resources. Servers can be of various kinds: file servers, database servers, print servers etc.
- **Clients** – Clients are computers that request and receive service from the servers to access and use the network resources.

# Components of Computer Network: Hardware Components

- **Peers** – Peers are computers that provide as well as receive services from other peers in a workgroup network.
- **Transmission Media** – Transmission media are the channels through which data is transferred from one device to another in a network.
- Transmission media may be guided media like **coaxial cable, fibre optic cables etc; or maybe unguided media like microwaves, infra-red waves etc.**

# Components of Computer Network: Hardware Components

- **Connecting Devices** − Connecting devices act as middleware between networks or computers, by binding the network media together. Some of the common connecting devices are:

  **a. Routers**

  **b. Bridges**

  **c. Hubs**

  **d. Repeaters**

  **e. Gateways**

  **f. Switches**

# Components of Computer Network: Software Components

- **Networking Operating System −**
- Network Operating Systems is typically installed in the server and facilitate workstations in a network to share files, database, applications, printers etc.

# Components of Computer Network: Software Components

- **Protocol Suite –**
- A protocol is a rule or guideline followed by each computer for data communication.
- Protocol suite is a set of related protocols that are laid down for computer networks.
- The two popular protocol suites are –

**a. OSI Model ( Open System Interconnections)**

**b. TCP / IP Model**

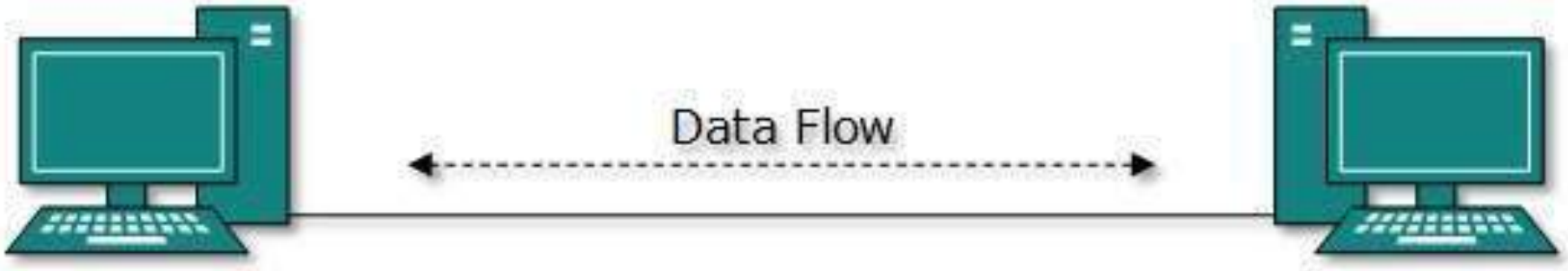
# Network Topology

- A Network Topology is the arrangement with which computer systems or network devices are connected to each other.
- Network Topology represents a network arrangement consisting of several nodes, i.e. sender and receiver nodes, and the lines connecting them.

# Point-to-Point Topology

- Point-to-point networks contains exactly two hosts such as computer, switches or routers, servers connected back to back using a single piece of cable.
- Often, the receiving end of one host is connected to sending end of the other and vice-versa.

# Point-to-Point Topology



# Bus Topology

- The bus topology is designed in such a way that all the stations are connected through a single cable known as a backbone cable.
- Each node is either connected to the backbone cable by drop cable or directly connected to the backbone cable.
- When a node wants to send a message over the network, it puts a message over the network.
- All the stations available in the network will receive the message whether it has been addressed or not.

# Bus Topology

- In case of Bus topology, all devices share single communication line or cable.
- Bus topology may have problem while multiple hosts sending data at the same time.
- It is one of the simple forms of networking where a failure of a device does not affect the other devices.
- But failure of the shared communication line can make all other devices stop functioning.

# Star Topology

- All hosts in Star topology are connected to a central device, known as hub device, using a point-to-point connection. When all communication must go through a central point, we called that topology a star topology.
- A star networks has a server at its center and all messages must go through the server.
- When we want to send message from one computer to another, It is first send to the server which then retract the massage to the distention computer.

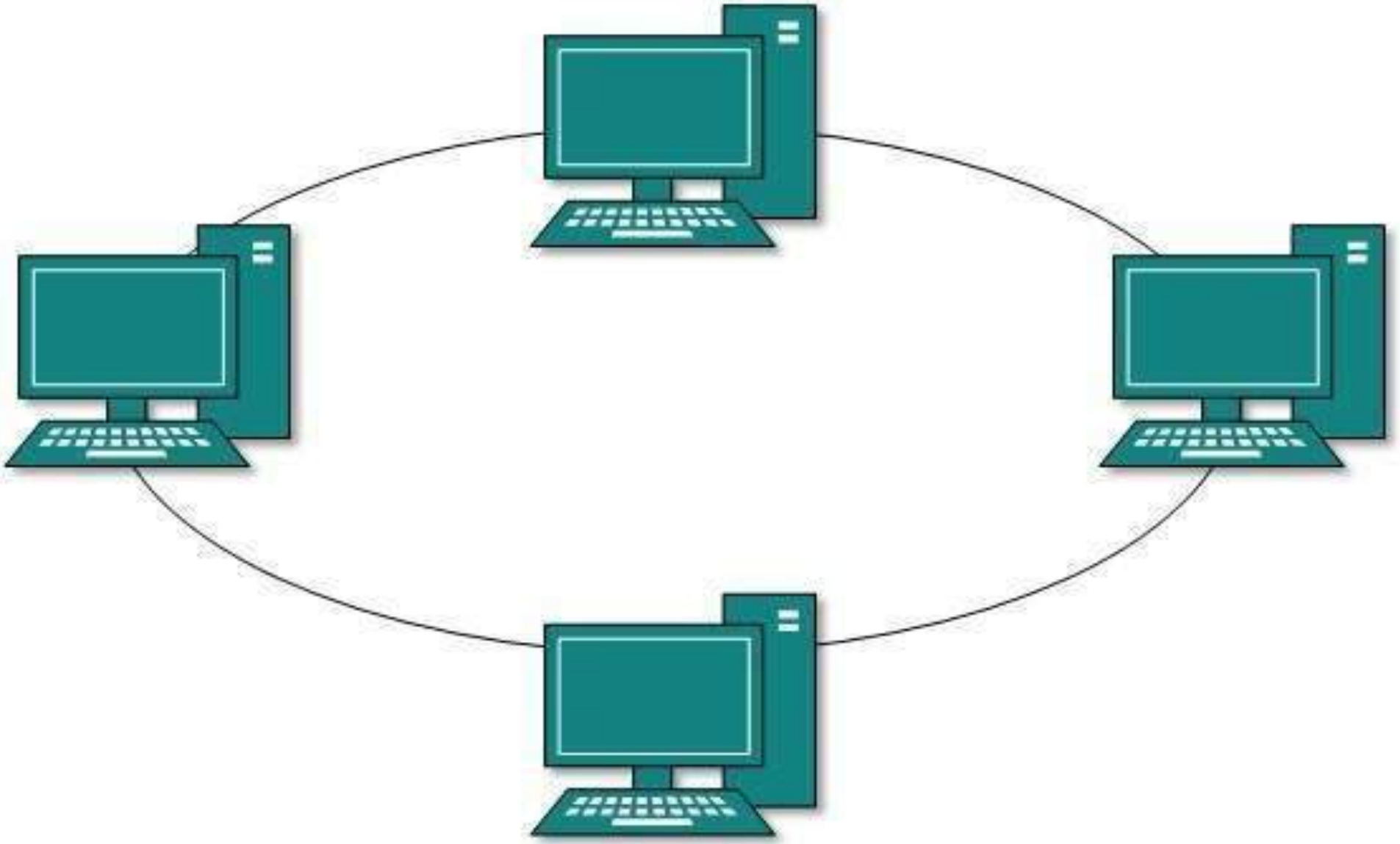
# Ring Topology

- In ring topology, each host machine connects to exactly two other machines, creating a circular network structure.
- When one host tries to communicate or send message to a host which is not adjacent to it, the data travels through all intermediate hosts.
- To connect one more host in the existing structure, the administrator may need only one more extra cable.

# Ring Topology

- Failure of any host results in failure of the whole ring.
- Thus, every connection in the ring is a point of failure. There are methods which employ one more backup ring.

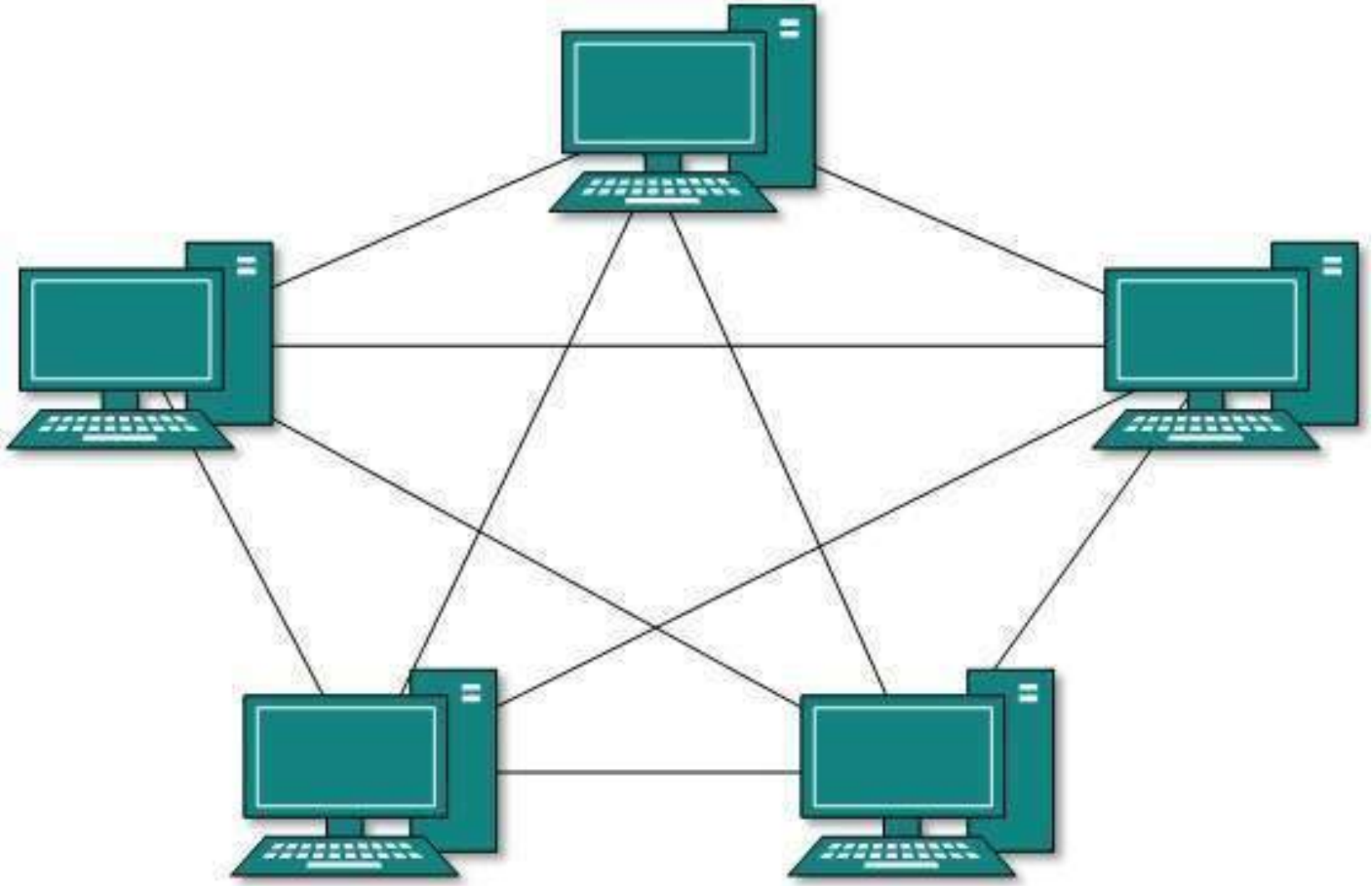
# Ring Topology



# Mesh Topology

- In this type of topology, a host is connected to one or multiple hosts.
- This topology has hosts in point-to-point connection with every other host or may also have hosts which are in point-to-point connection to few hosts only.

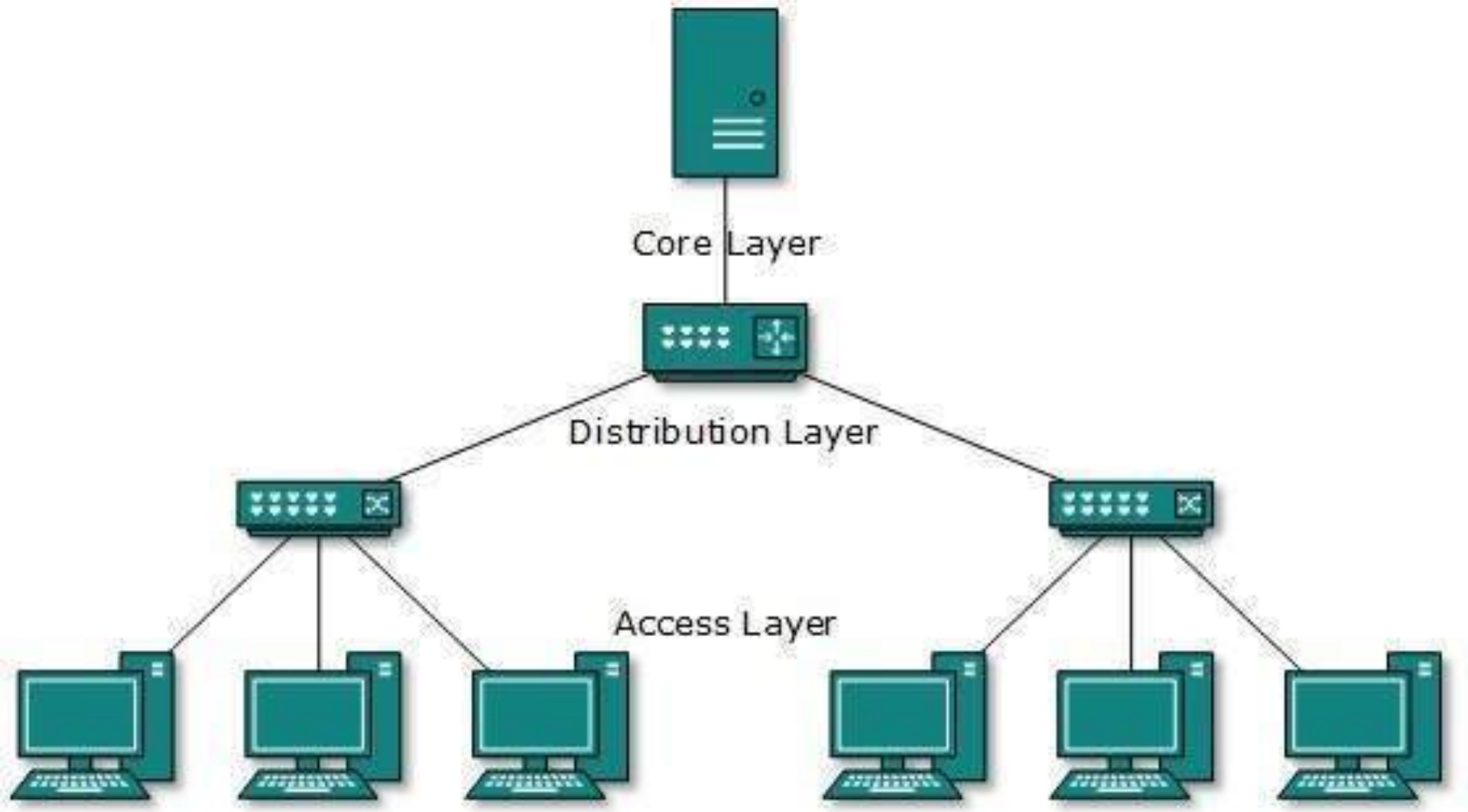
# Mesh Topology



# Tree Topology

- Also known as Hierarchical Topology, this is the most common form of network topology in use presently.
- This topology imitates as extended Star topology and inherits properties of bus topology.
- This topology divides the network in to multiple levels/layers of network.

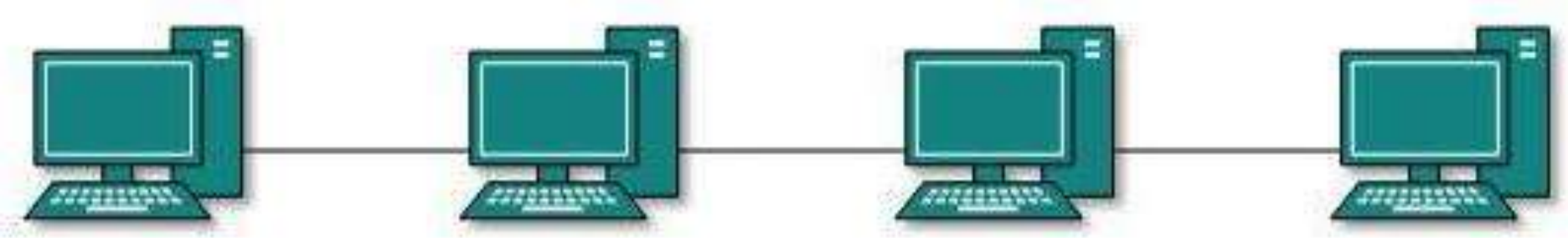
# Tree Topology



# Daisy Chain Topology

- This topology connects all the hosts in a linear fashion.
- Similar to Ring topology, all hosts are connected to two hosts only, except the end hosts.
- Means, if the end hosts in daisy chain are connected then it represents Ring topology.
- Each link in daisy chain topology represents single point of failure. Every link failure splits the network into two segments.

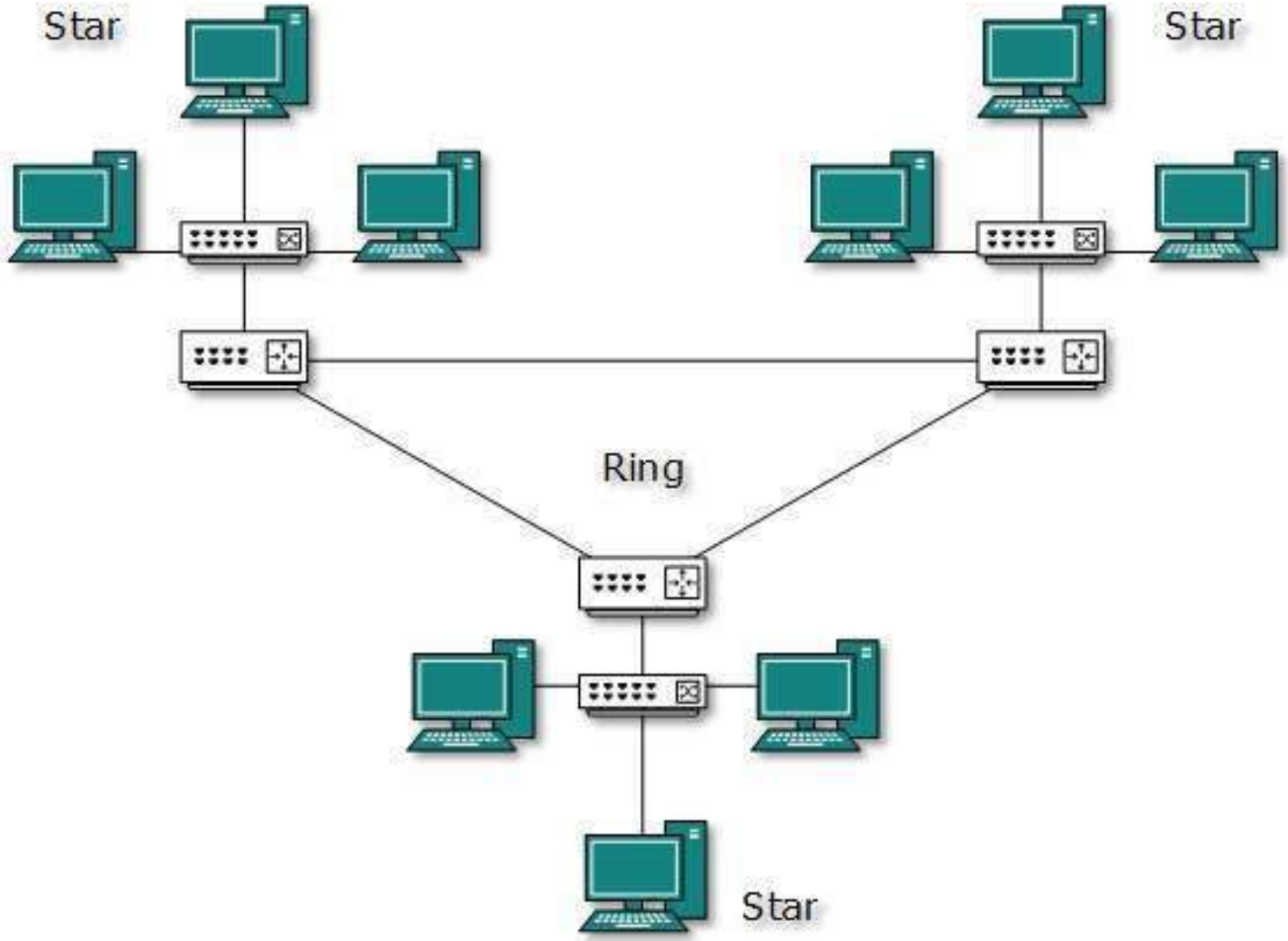
# Daisy Chain Topology



# Hybrid Topology

- A network structure whose design contains more than one topology is said to be hybrid topology.
- Hybrid topology inherits merits and demerits of all the incorporating topologies.

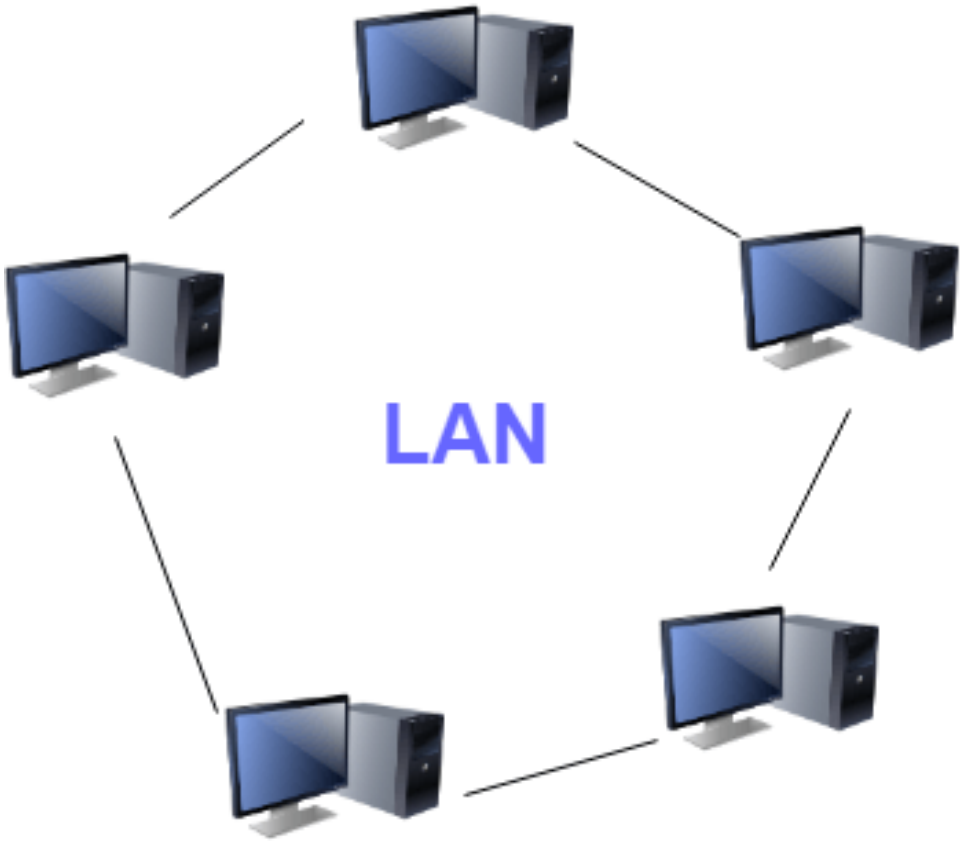
# Hybrid Topology



# Computer Network Types

- A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.

# What is LAN?



# What is LAN?

- A **Local Area Network (LAN)** is a group of computer and peripheral devices which are connected in a limited area such as school, laboratory, home, and office building.
- It is a widely useful network for sharing resources like files, printers, games, and other application.
- The simplest type of LAN network is to connect computers and a printer in someone's home or office.
- In general, LAN will be used as one type of transmission medium.

# What is LAN?

- **Characteristics of LAN**
- It is a private network, so an outside regulatory body never controls it.
- LAN operates at a relatively higher speed compared to other WAN systems.

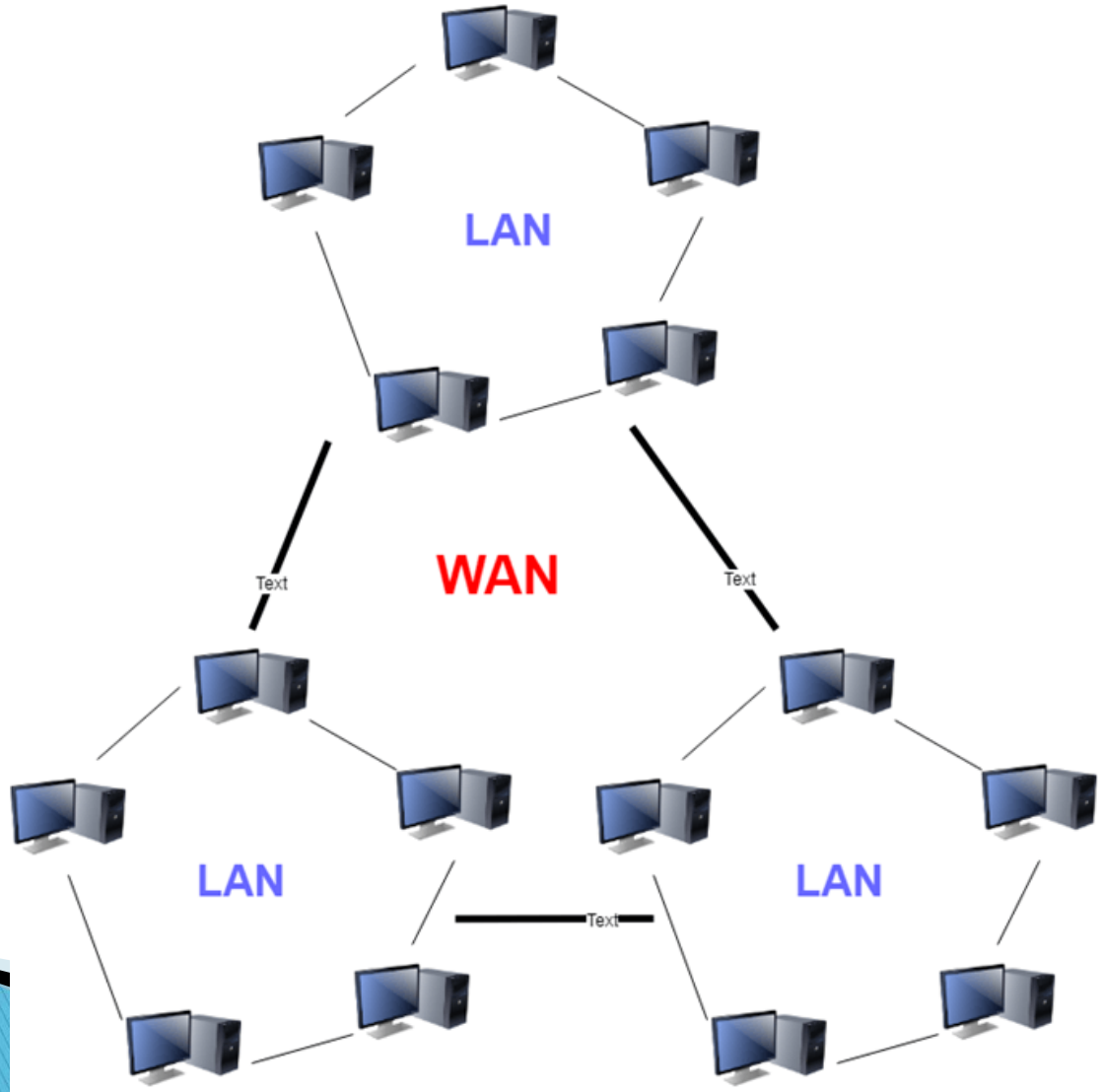
# Advantages of LAN

- Computer resources like hard-disks, DVD-ROM, and printers can share local area networks. This significantly reduces the cost of hardware purchases.
- You can use the same software over the network instead of purchasing the licensed software for each client in the network.
- Data of all network users can be stored on a single hard disk of the server computer.
- You can easily transfer data and messages over networked computers.
- It will be easy to manage data at only one place, which makes data more secure.
- Local Area Network offers the facility to share a single internet connection among all the LAN users.

# Disadvantages of LAN

- LAN will indeed save cost because of shared computer resources, but the initial cost of installing Local Area Networks is quite high.
- The LAN admin can check personal data files of every LAN user, so it does not offer good privacy.
- Unauthorized users can access critical data of an organization in case LAN admin is not able to secure centralized data repository.
- Local Area Network requires a constant LAN administration as there are issues related to software setup and hardware failures.

# What is WAN?



# WAN

- WAN (Wide Area Network) is another important computer network that which is spread across a large geographical area.
- WAN network system could be a connection of a LAN which connects with other LAN's using telephone lines and radio waves.
- It is mostly limited to an enterprise or an organization.

# WAN

- **Characteristics of WAN:**
- The software files will be shared among all the users; therefore, all can access to the latest files.
- Any organization can form its global integrated network using WAN.

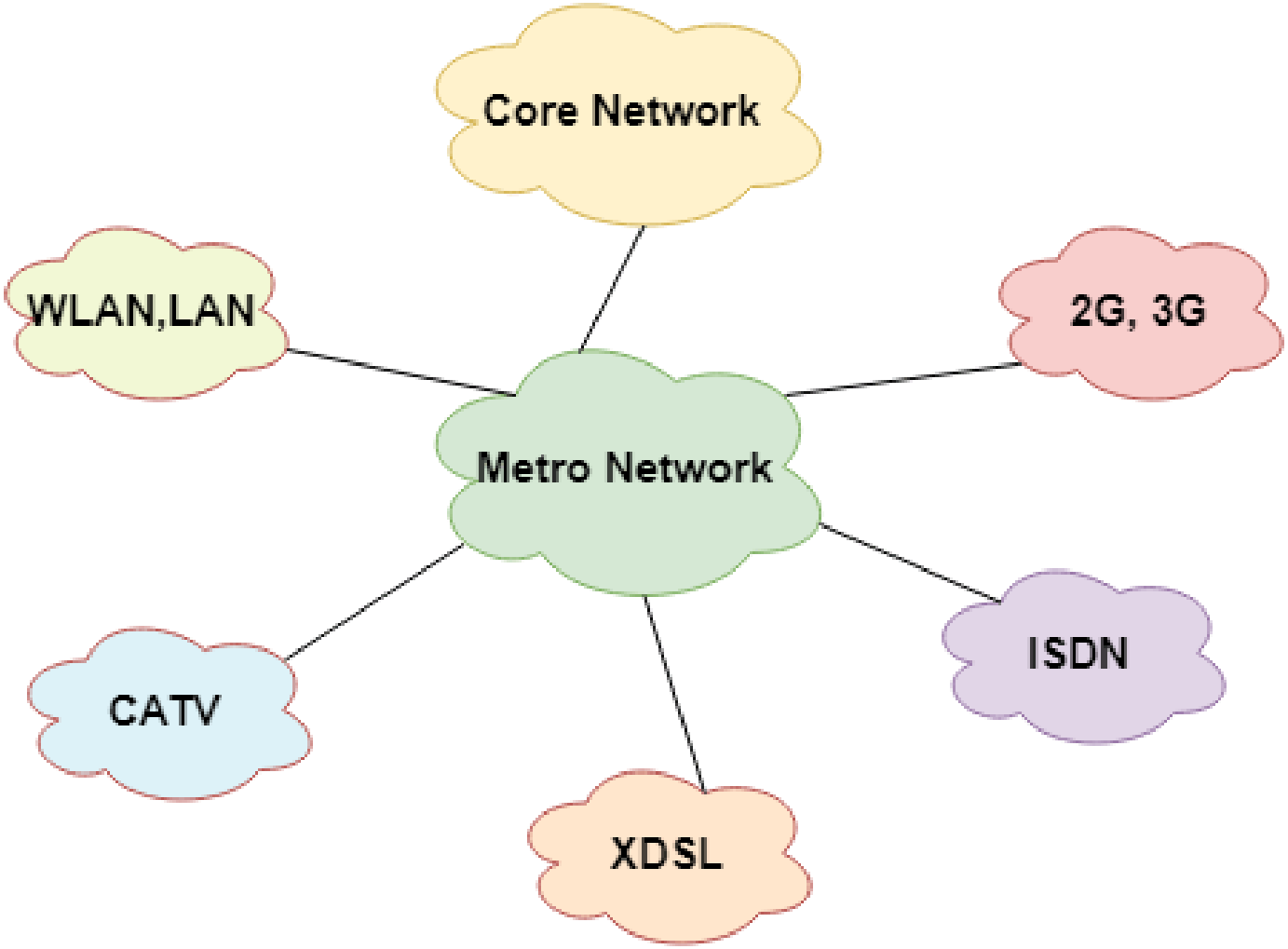
# Advantages of WAN

- WAN helps you to cover a larger geographical area. Therefore business offices situated at longer distances can easily communicate.
- Contains devices like mobile phones, laptop, tablet, computers, gaming consoles, etc.
- WLAN connections work using radio transmitters and receivers built into client devices.

# Disadvantage of WAN

- The initial setup cost of investment is very high.
- It is difficult to maintain the WAN network. You need skilled technicians and network administrators.
- There are more errors and issues because of the wide coverage and the use of different technologies.
- It requires more time to resolve issues because of the involvement of multiple wired and wireless technologies.
- Offers lower security compared to other types of networks.

# MAN



# MAN

- A Metropolitan Area Network or MAN is consisting of a computer network across an entire city, college campus, or a small region.
- This type of network is large than a LAN, which is mostly limited to a single building or site.
- Depending upon the type of configuration, this type of network allows you to cover an area from several miles to tens of miles.

# MAN

- **Characteristics of MAN**
- Here are important characteristics of the MAN network:
- It mostly covers towns and cities in a maximum 50 km range
- Mostly used medium is optical fibers, cables
- Data rates adequate for distributed computing applications.

# Advantages of MAN

- It offers fast communication using high-speed carriers, like fiber optic cables.
- It provides excellent support for an extensive size network and greater access to WANs.
- The dual bus in MAN network provides support to transmit data in both directions concurrently.
- A MAN network mostly includes some areas of a city or an entire city.

# Disadvantages of MAN

- You need more cable to establish MAN connection from one place to another.
- In MAN network it is tough to make the system secure from hackers

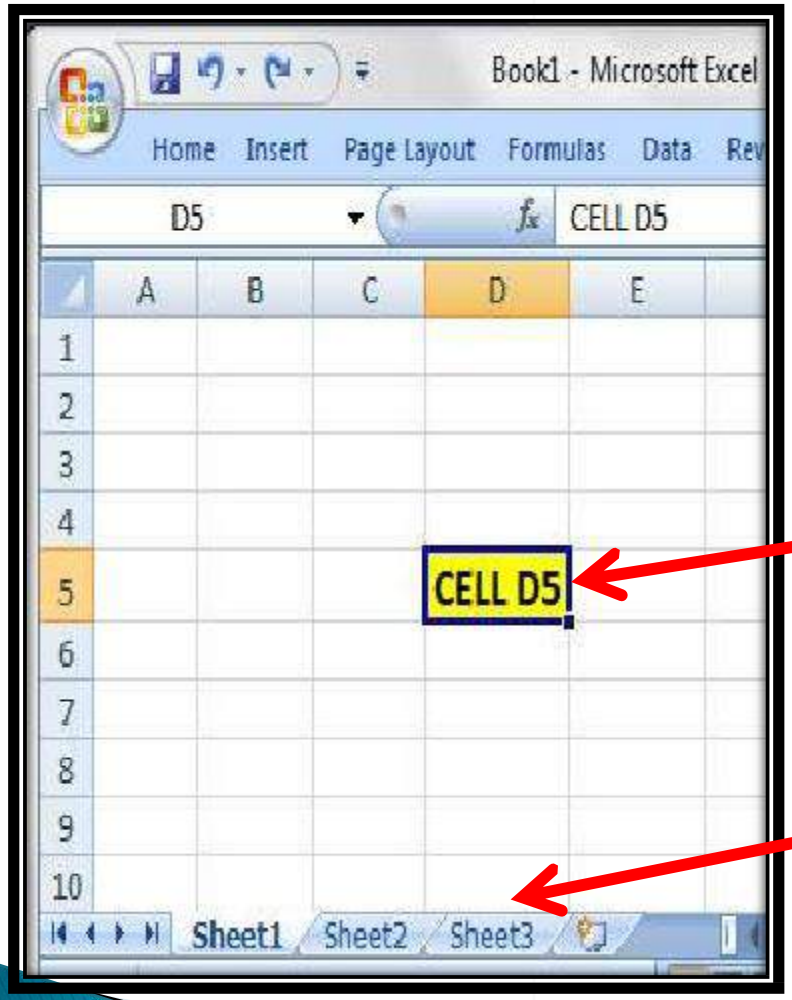
# CHAPTER 3 PART-2
# MICROSOFT Excel


- Dr. Tejashree T. Moharekar
- **MCA, NET, Ph. D**

# INTRODUCTION TO MS-EXCEL

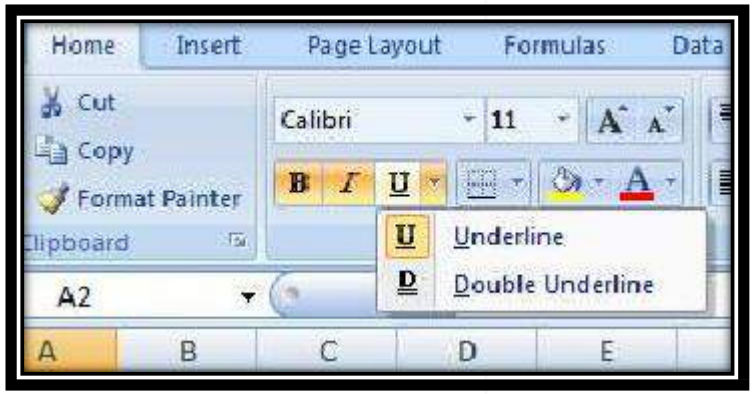
- Excel is a computer program used to create electronic spreadsheets.
- Within excel user can organize data ,create chart and perform calculations.
- Excel is a convenient program because it allow user to create large spreadsheets, reference information, and it allows for better storage of information.
- Excels operates like other Microsoft(MS) office programs and has many of the same functions and shortcuts of other MS programs.

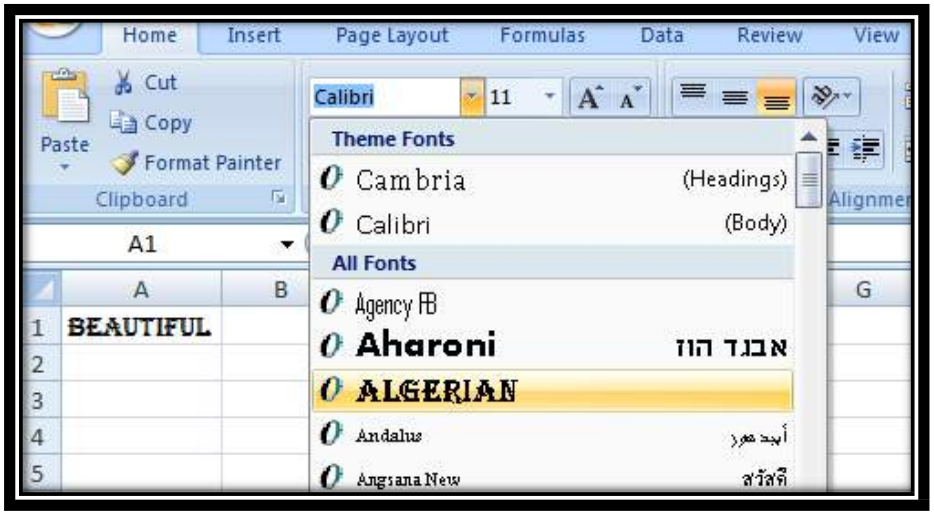
# OVERVIEW OF EXCEL




- Microsoft excel consists of workbooks. Within each workbook, there is an infinite number of worksheets.
- Each worksheet contains **Columns and Rows.**
- Where a column and a row intersect is called a **cell.** For e.g. cell **D5** is located where column **D** and row **5** meet.
- The tabs at the bottom of the screen represent different worksheets within a workbook. You can use the scrolling buttons on the left to bring other worksheets into view.

# FORMATTING TEXT




## TO FORMAT TEXT IN BOLD, ITALICS OR UNDERLINE:

Left-click a **cell** to select it or drag your cursor over the text in the formula bar to select it.
Click the **Bold**, **Italics or underline** command.

## TO CHANGE THE FONT STYLE:

Select the cell or cells you want to format.
Left-click the **drop-down arrow** next to the **Font Style** box on the Home tab.
Select a **font style** from the list.

# Chapter 3 part-2
# Microsoft PowerPoint

Dr. Tejashree Moharekar
MCA, NET, Ph. D

# What is PowerPoint?

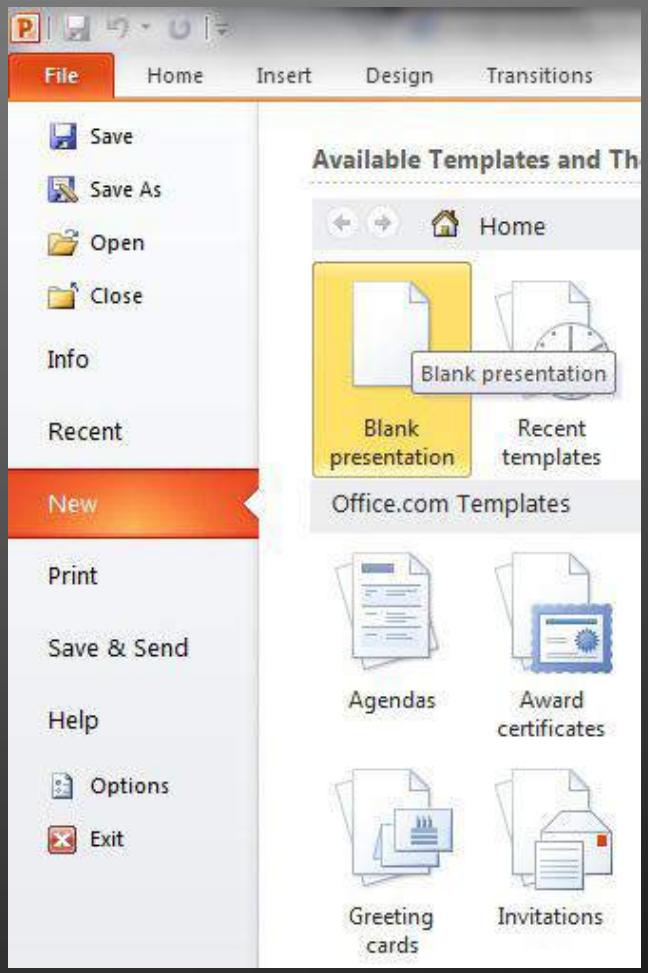
- PowerPoint is a closed source commercial presentation program developed by Microsoft.

# PowerPoint Ribbon


- During this presentation, we will refer to the PowerPoint “Ribbon” in terms of navigating the program.
- The Ribbon is the strip of buttons across the top of the main window.
- Users can access anything the program has to offer through the Ribbon.

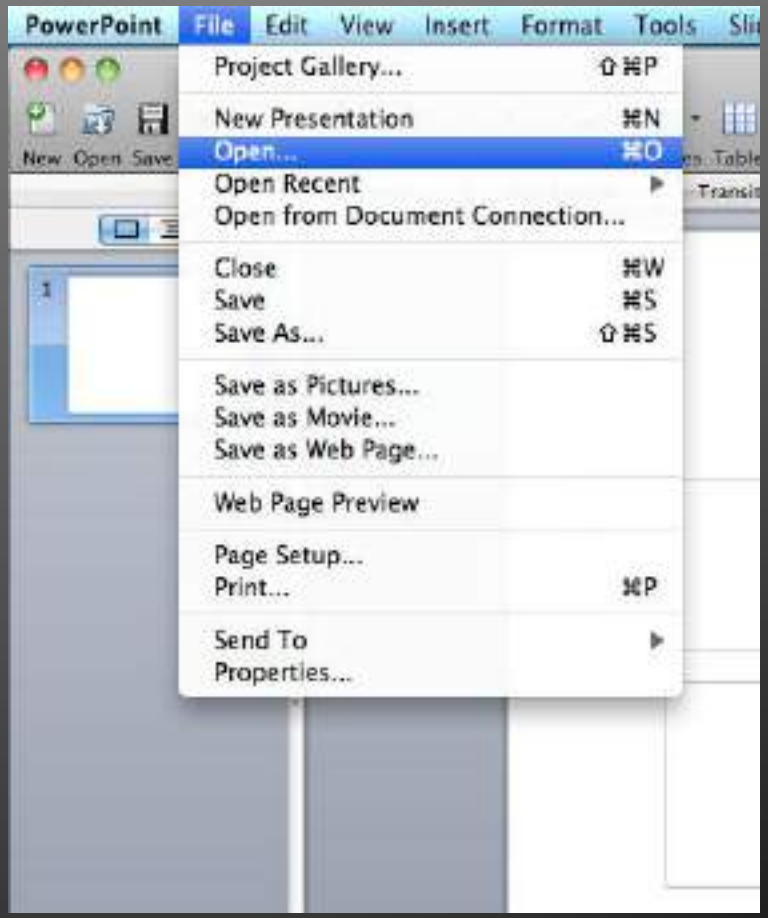
# Create a New Presentation

- Select “File” then “New”
- Shortcut: Hold the Control button, then press ‘N’ for “New”



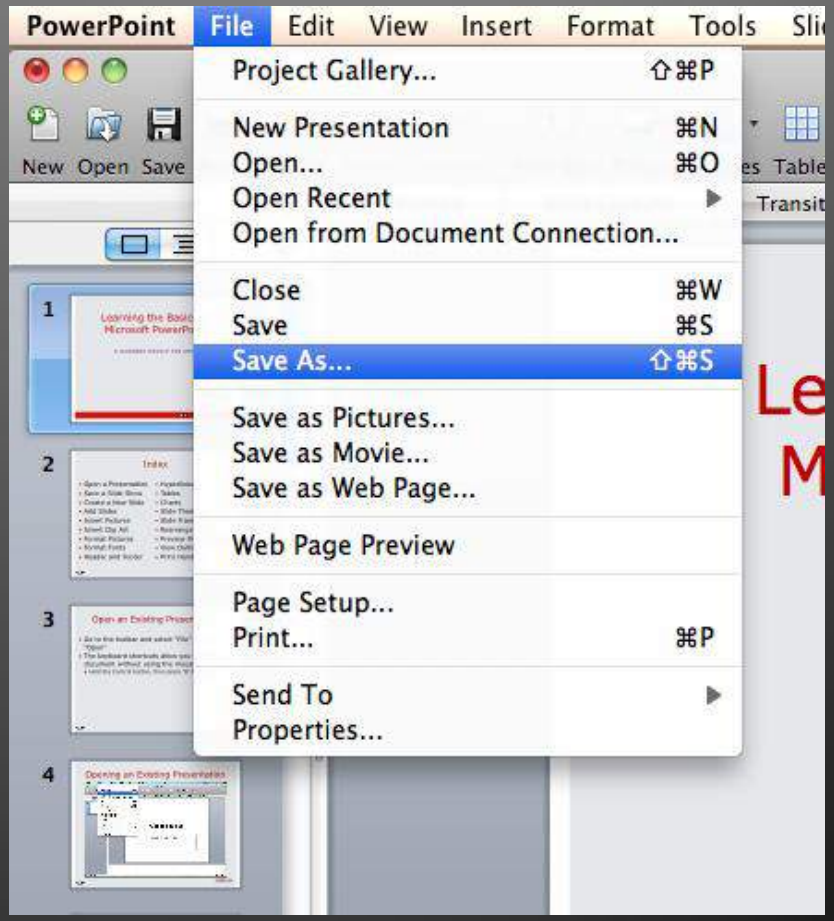
# Open an Existing Presentation

- Select “File” then “Open”
- Shortcut: Hold the Control button, then press ‘O’ for “Open”



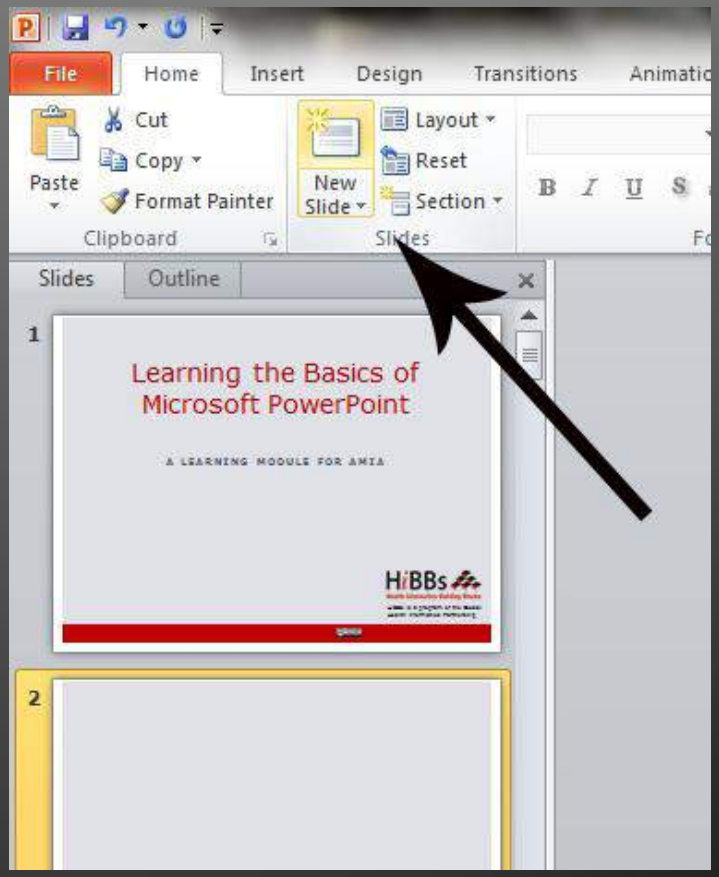
# Saving a Presentation

- Select “File” then “Save As”
- Shortcut: Press f12 to Save the file with a new name



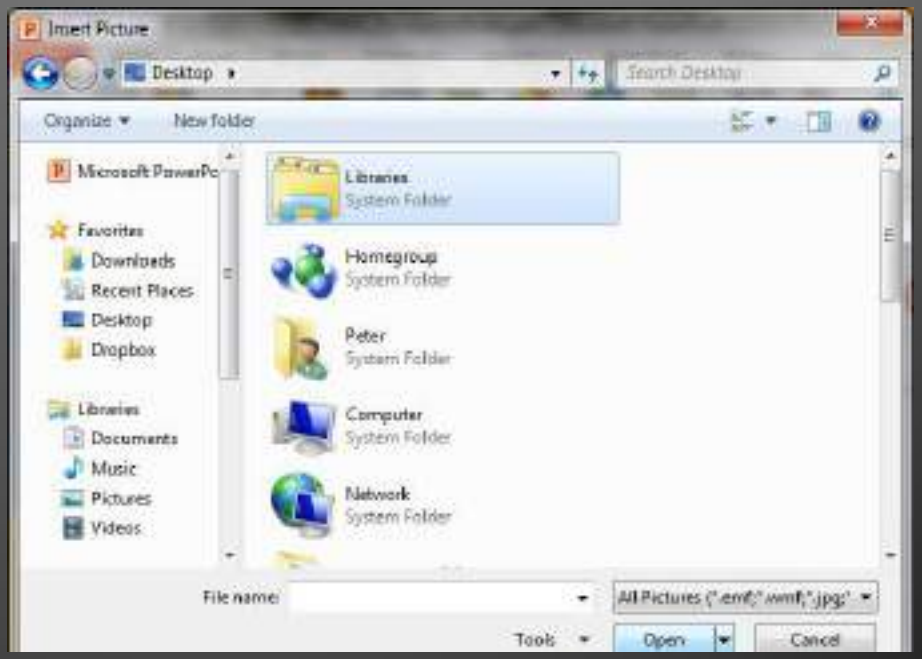
# Add a Slide

- Go to the “Home” ribbon and select the “New Slide” button
- Select the Slide Pane and press “Enter”



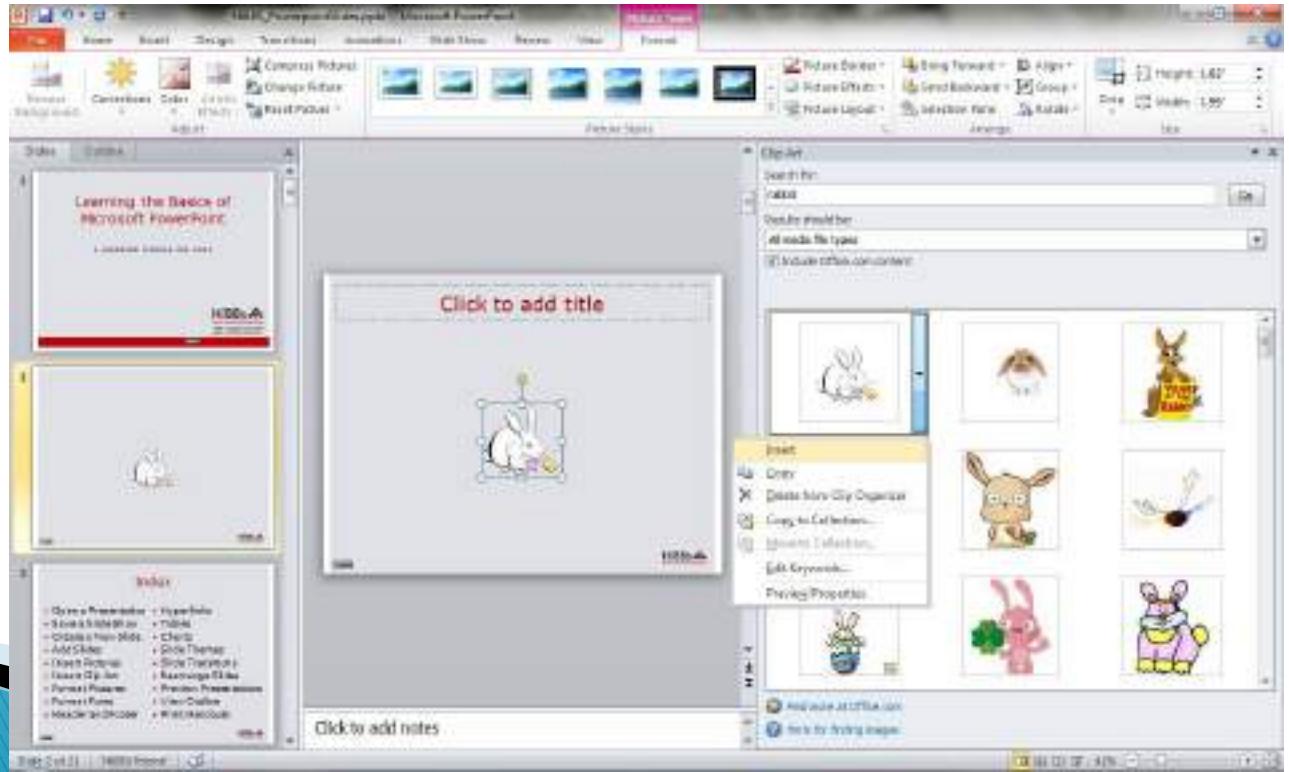
# Insert Pictures from Files

- Go to the “Insert” ribbon then select “Picture”
- Locate the image file from the folder to where it is saved.
- Select “Insert” from the dialog box.



# Insert Clip Art

- Go to the “Insert” ribbon then select “Clip Art”
- Enter search terms in Clip Art search pane on the right and select image.

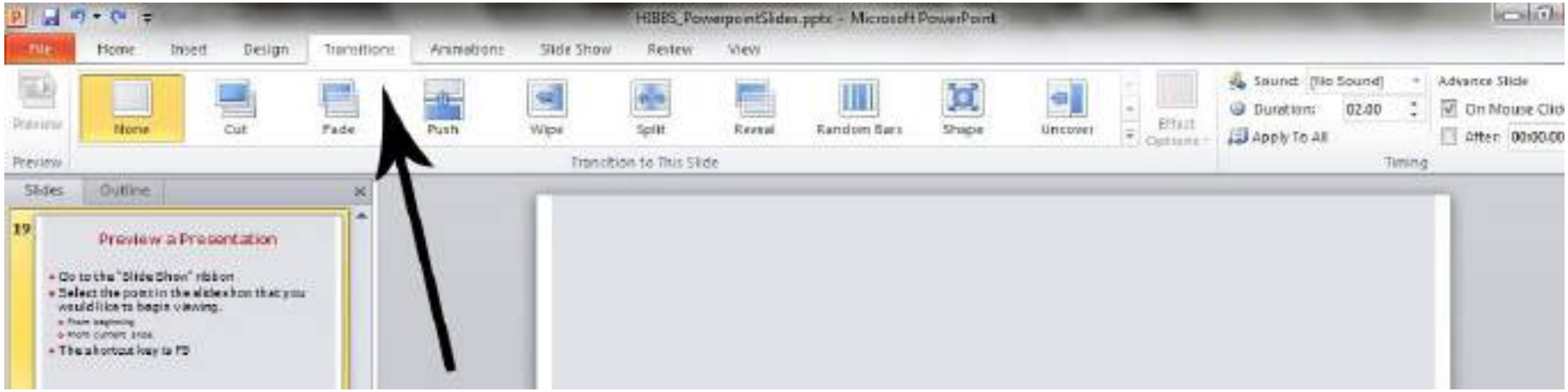


# Format Pictures

- To resize the image, click on the picture to surround the image with a blue box.
- Drag the corner dot away from the center to make it larger and toward the center to make it smaller.

# Slide Transitions

- Go to the “Transitions” ribbon
- Select desired Transition from toolbar




# Chapter 4
# Basics of Computer Networks And Internet
## Session-1

**Dr. Tejashree Moharekar**
**MCA, NET, PhD**

# Introduction : Internet

- Thus internet helps in transfer of messages through mail, chat, video & audio conference, etc.
- It has become mandatory for day-to-day activities: bills payment, online shopping and surfing, tutoring, working, communicating with peers, etc.

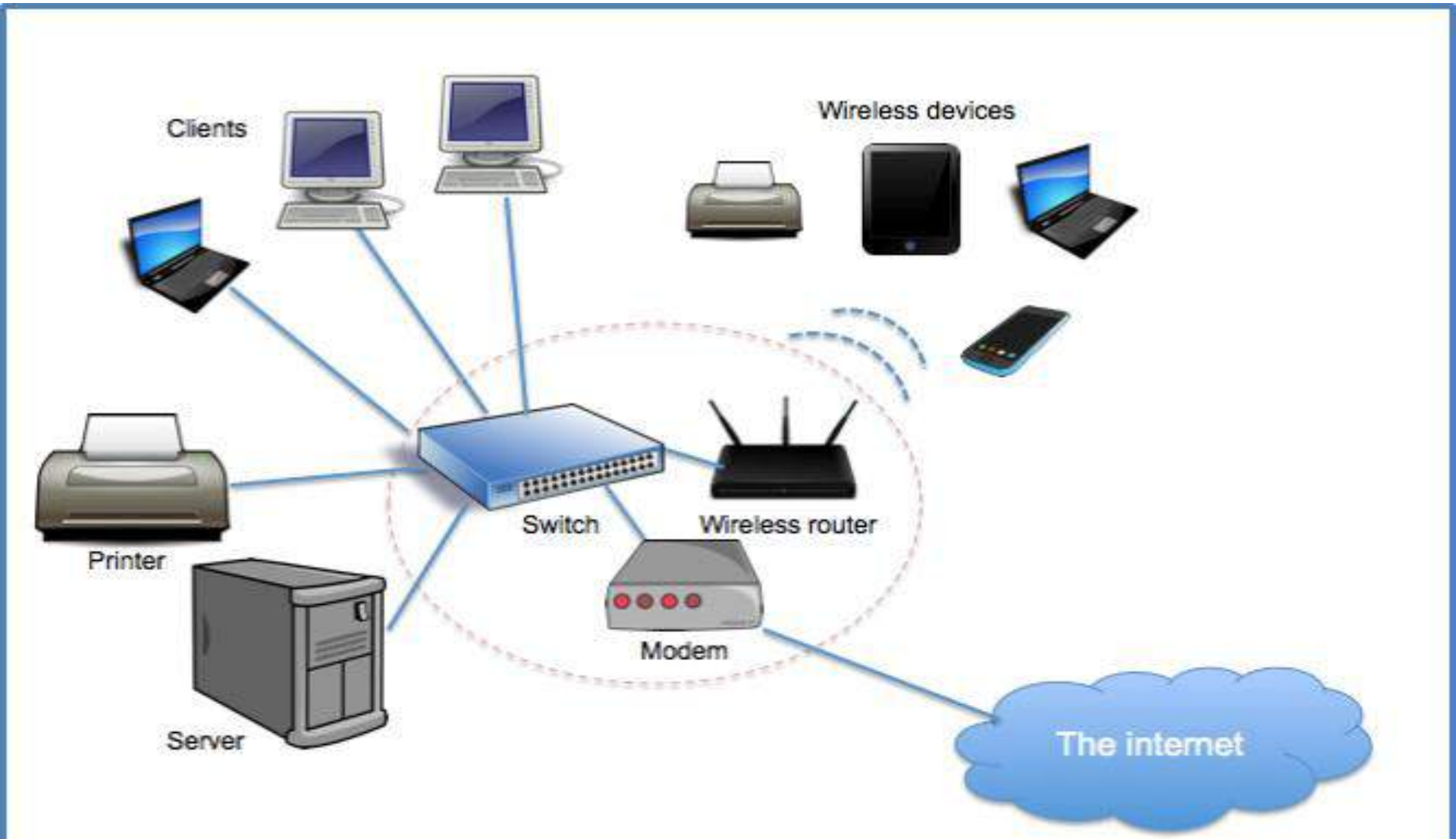
# Introduction : Internet

- Internet is called the network of networks.
- Internet is a global communication system that links together thousands of individual networks.
- It allows exchange of information between two or more computers on a network.

# Introduction : Internet

You can do all of this by connecting a computer to the Internet, which is also called **going online.** When someone says a computer is online, it's just another way of saying it's connected to the Internet.

# Internet


Clients
Wireless devices
Printer
Switch
Wireless router
Modem
Server
The internet

# What is the WWW?

- The World Wide Web (WWW) is an internet based service, which uses common set of rules known as protocols, to distribute documents across the Internet in a standard way.
- The World Wide Web. Or ‘Web’ is a part of the Internet.

# What is the WWW?

- The Web is viewed through web browser software's such as Google chrome, Internet Explorer, Mozilla Firefox etc.
- Using browsers one can access the digital libraries containing innumerable articles, journals, e-books, news, tutorials stored in the form of web pages on computers around the world called web servers
- Today thousands of web pages/websites are added to the WWW every hour.

# What is the Website?

- A website is made up of related text, images, and other resources. Websites can resemble other forms of media—like newspaper articles or television programs—or they can be interactive in a way that's unique to computers.
- The purpose of a website can be almost anything: a news platform, an advertisement, an online library, a forum for sharing images, or an educational

# What is the Web Browser

- Once you are connected to the Internet, you can access and view websites using a type of **application called a web browser.**

# Need for Awareness:

- Cyber crime is a growing trend
- Raise awareness of threats
- As with most crimes the police can’t tackle this problem alone
- To encourage reporting
- Cyber crime is massively under reported.

# Basic Security Concepts

- Threats
  - Anything that can harm a computer
  - Vulnerabilities are weaknesses in security
  - Security attempts to neutralize threats

# Basic Security Concepts

- Countermeasures
  - Steps taken to block a threat
  - Protect the data from theft
  - Protect the system from theft

# Threats To Users

- Identity Theft
  - Impersonation by private information
    - Thief can ‘become’ the victim
  - Reported incidents rising

# Threats To Users

- Loss of privacy
  - Personal information is stored electronically
  - Purchases are stored in a database
    - Data is sold to other companies
  - Public records on the Internet
  - Internet use is monitored and logged
  - None of these techniques are illegal

# Threats to Users

- Cookies
  - Files delivered from a web site
  - Originally improved a site's function
  - Cookies now track history and passwords
  - Browsers include cookie blocking tools

# Threats to Users

- Spyware
  - Software downloaded to a computer
  - Designed to record personal information
  - Typically undesired software
  - Hides from users
  - Several programs exist to eliminate

# Threats to Users

- Web bugs
  - Small programs embedded in gif images
  - Gets around cookie blocking tools
  - Companies use to track usage
  - Blocked with spyware killers

# Threats to Users

- Spam
  - Unsolicited commercial email
  - Networks and PCs need a spam blocker
    - Stop spam before reaching the inbox
  - Spammers acquire addresses using many methods
  - CAN-SPAM Act passed in 2003

# Threats to Hardware

- Affect the operation or reliability
- Power-related threats
  - Power fluctuations
    - Power spikes or browns out
  - Power loss
  - Countermeasures
    - Surge suppressors
    - Line conditioners
    - Uninterruptible power supplies
    - Generators

# Threats to Hardware

- Theft and vandalism
  - Thieves steal the entire computer
  - Accidental or intentional damage
  - Countermeasures
    - Keep the PC in a secure area
    - Lock the computer to a desk
    - Do not eat near the computer
    - Watch equipment
    - Chase away loiterers
    - Handle equipment with care

# Threats to Data

- The most serious threat
  - Data is the reason for computers
  - Data is very difficult to replace
  - Protection is difficult
    - Data is intangible

# Threats to Data

- Trojan horses
  - Program that poses as beneficial software
  - User willingly installs the software
  - Countermeasures
    - Anti-virus software
    - Spyware blocker

# Threats to Data

- Cybercrime
  - Using a computer in an illegal act
  - Fraud and theft are common acts

# Threats to Data

- Internet fraud
  - Most common cybercrime
  - Fraudulent website
  - Have names similar to legitimate sites

# Threats to Data

- Hacking
  - Using a computer to enter another network
  - Cost users $1.3 trillion in 2003
  - Hackers motivation
    - Recreational hacking
    - Financial hackers
    - Grudge hacking
  - Hacking methods
    - Sniffing
    - Social engineering
    - Spoofing

# Threats to Data

- Cyber terrorism
  - Attacks made at a nations information
  - Targets include power plants
  - Threat first realized in 1996
  - Organizations combat cyber terrorism
    - Computer Emergency Response Team (CERT)
    - Department of Homeland Security

# Malware

- A malware attack is a common cyberattack where malware (normally malicious software) executes unauthorized actions on the victim's system.

# Malware

- Malware breaches a network through a vulnerability, typically when a user clicks a dangerous link or email attachment that then installs risky software.
- **Once inside the system, malware can do the following:**
- Blocks access to key components of the network (ransomware)
- Installs malware or additional harmful software
- Covertly obtains information by transmitting data from the hard drive (spyware)
- Disrupts certain components and renders the system inoperable

# Phishing

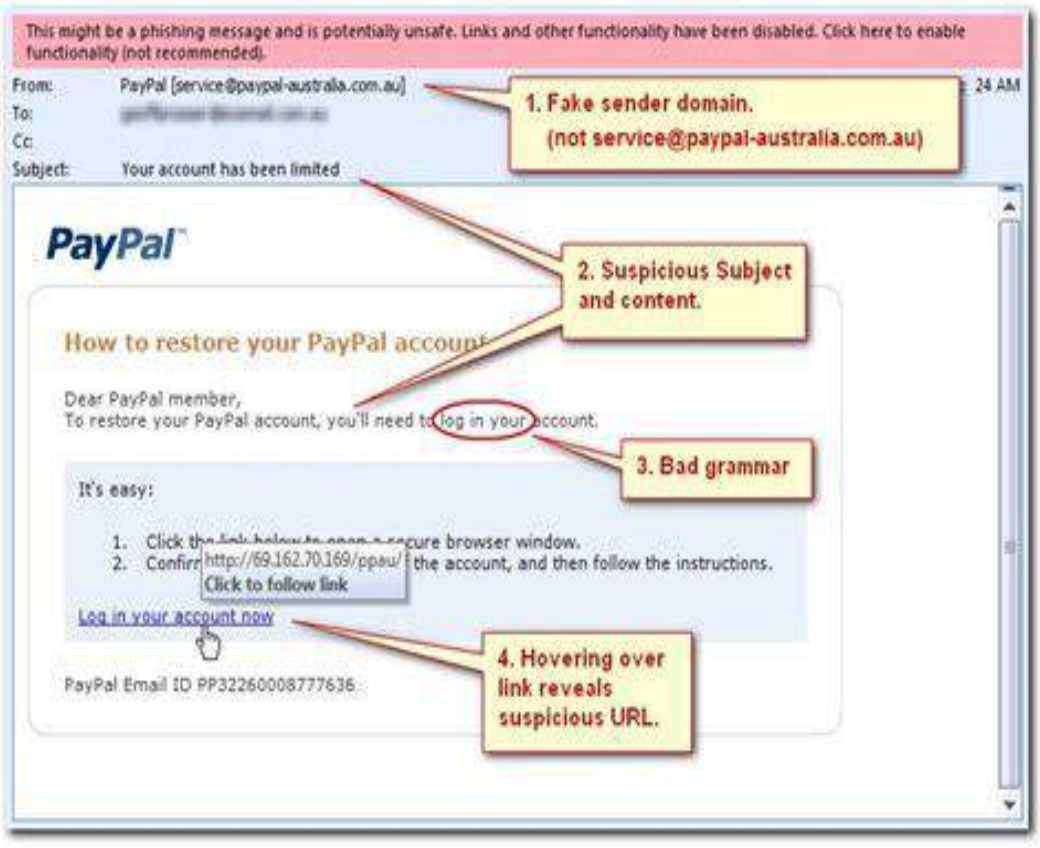
- Phishing is the practice of sending fraudulent communications that appear to come from a reputable source, usually through email.
- The goal is to steal sensitive data like credit card and login information or to install malware on the victim's machine. Phishing is an increasingly common cyberthreat.

# Phishing

- Is the attempt to obtain sensitive information by deception.
- They will be after your login credentials, payment card details or to upload malware to your computer
- The email will normally impersonate a genuine company or person.

## How to tackle the problem

- Don't click any links on an email unless you can guarantee who its from.
- Use a trusted method of contacting the company via a phone number, app or website.
- Mark the email as spam and contact the organisation.



# Man-in-the-middle attack

- Man-in-the-middle (MitM) attacks, also known as eavesdropping attacks, occur when attackers insert themselves into a two-party transaction. Once the attackers interrupt the traffic, they can filter and steal data.
- **Two common points of entry for MitM attacks:**
- 1. On unsecure public Wi-Fi, attackers can insert themselves between a visitor's device and the network. Without knowing, the visitor passes all information through the attacker.
- 2. Once malware has breached a device, an attacker can install software to process all of the victim's information.

# Denial-of-service attack

- A denial-of-service attack floods systems, servers, or networks with traffic to exhaust resources and bandwidth.
- As a result, the system is unable to fulfill legitimate requests.
- Attackers can also use multiple compromised devices to launch this attack.
- This is known as a distributed-denial-of-service (DDoS) attack.