

Fundamentals of Computers and Computing

CSE 1101

(Operating System, Computer Network)

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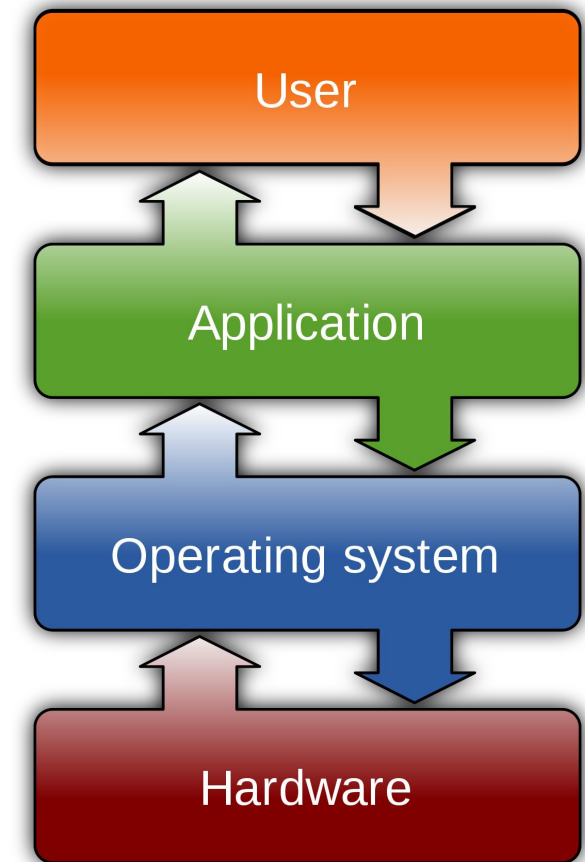
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What is an OS?

- An operating system is a system software that acts as an interface between the user and the computer hardware and controls the execution of all kinds of application software.
- In short, the operating system is the computer's master control program.
- When you issue a command, the OS translates it into code that the machine can use. The OS ensures that the results of your actions and displayed on screen, printed and so on.



OS examples



Functions of Operating System

- It boots the computer.
- It performs basic computer tasks e.g. managing the various peripheral devices e.g. mouse, keyboard.
- It provides a user interface, e.g. command line, graphical user interface (GUI).
- It handles system resources such as computer's memory and sharing of the central processing unit(CPU) time by various applications or peripheral devices.
- It provides file management which refers to the way that the operating system manipulates, stores, retrieves and saves data.
- Error Handling is done by the operating system. It takes preventive measures whenever required to avoid errors.

Types of OS

1. Batch Operating System
2. Multiprogramming Operating System
3. Multi-tasking/time sharing Operating System
4. Multiprocessor Operating System
5. Real time Operating System

What is Network?

A **network** is **a set of technologies**-including **hardware**, **software**, and **media**-that can be **used to connect computers together**, enabling them to **communicate**, **exchange information**, and **share resources in real time**

Network Topologies

- **Topology** the logical layout of the cables and devices that connect the nodes of the network.
- Network designers consider several factors when deciding which topology or combination of topologies to use:
 - the type of computers and cabling in place,
 - the distance between computers,
 - the speed at which data must travel around the network, and
 - the cost of setting up the network.

Network Topology

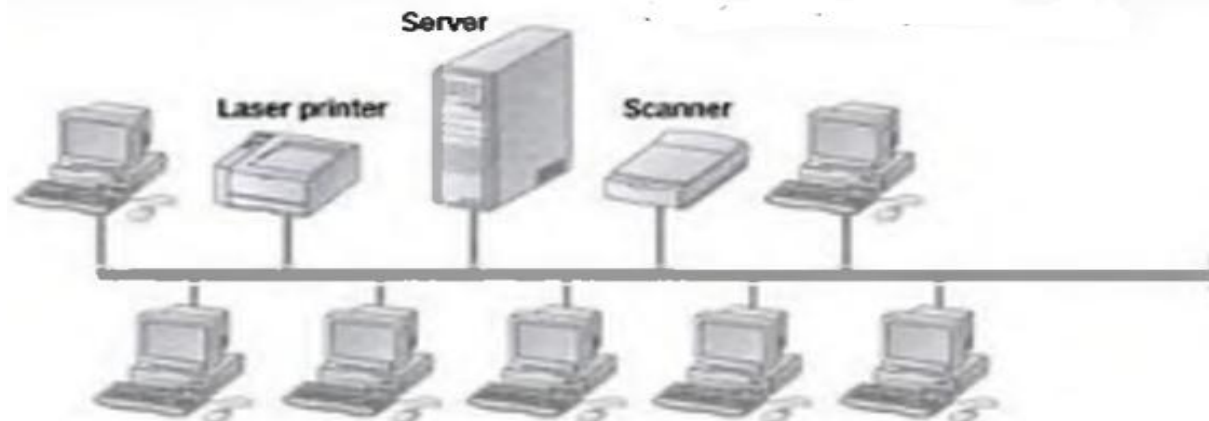
Topology of a network describes the way the computers and the nodes of the network are interconnected. There are a number of possible topologies

- Bus Topology
- Star Topology
- Tree Topology
- Ring Topology
- Mesh Topology

The physical connections that connects the nodes are known as links. A link may be through a pair of wires, a coaxial cable, an optical fiber or through a satellite.

Network Topology: Bus

- A bus topology network uses one cable . All the nodes and peripheral devices are connected in a series to that cable.
- A special device, called a terminator, is attached at the cable's start and end points, to stop network signals so they do not bounce back down the cable.



Network Topology: Bus

- This topology's main **advantage** is that it uses the least amount of cabling of any topology.
- In a bus topology network, however, extra circuitry and software are used to keep data packets from colliding with one another.
- A broken connection can bring down all or part of the network.

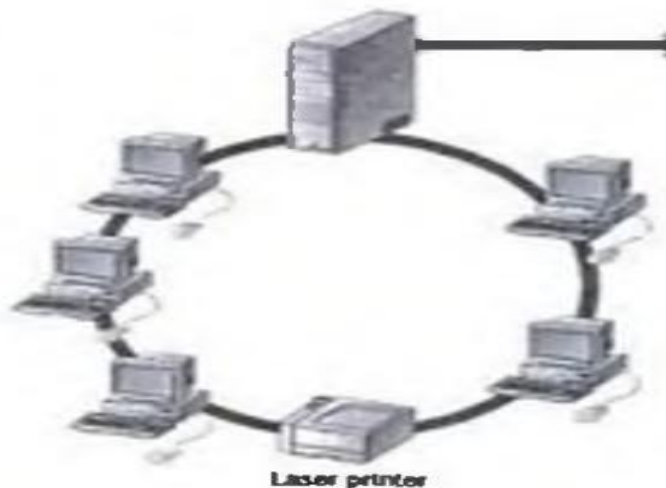
Network Topology: Star

- In a star network, all nodes are connected to a device called a hub and communicate through it.
- In a star topology, a broken communication between a node and the hub does not affect the rest of the network.
- If the hub is lost, however, all nodes connected to that hub are unable to communicate.



Network Topology: Ring

- The ring topology connects the network's nodes in a circular chain, with each node connected to the next.
- The last node connects to the first, completing the ring.
- Each node examines data as it travels through the ring.
- If the ring is broken, however, the entire network is unable to communicate.



Network Topology: Mesh

- The mesh topology is the least-used network topology and the most expensive to implement .
- In a mesh environment, a cable runs from every computer to every other computer.
- If you have four computers, you must have six cables—three coming from each computer to the other computers.
- The big advantage to this arrangement is that data can never fail to be delivered; if one connection goes down, there are other ways to route the data to its destination.



Network Address

- A network address is logical or physical address that uniquely distinguishes a device over a computer or telecommunications network. It is a numeric/symbolic number or address that is assigned to any device for communicate with other devices in a network.
- Network address contain information about the devices location in the network such as **MAC** address and **IP** address.

What is a MAC Address?

- The term MAC address is an acronym for Media Access Control Address. The MAC Address refers to a unique identifier that gets assigned to a Network Interface Card/ Controller (NIC). It has a 64-bit or 48-bit address linked and connected to the concerned network adapter. The MAC Address can exist in a hexadecimal format. This type of address exists in six separate sets of two characters/ digits – separated from each other using colons.
- Ex: 00:FF:FF:AB:BB:AA

What is an IP Address?

- The term IP Address is an acronym for Internet Protocol Address. An IP Address refers to the address that assists a user in identifying a network connection. It also goes by the *Logical Address* name provided to individual connections in the present network. An IP address lets us understand and control the way in which various devices communicate on the Internet. It also defines the specific behavior of various Internet routers.
- Ex: 192.168.1.1