Practical Malicious codes

Computer Science CY

Third Class part 1

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NETWORKS

A network is a set of devices (often referred to as *nodes)* connected by communication links.

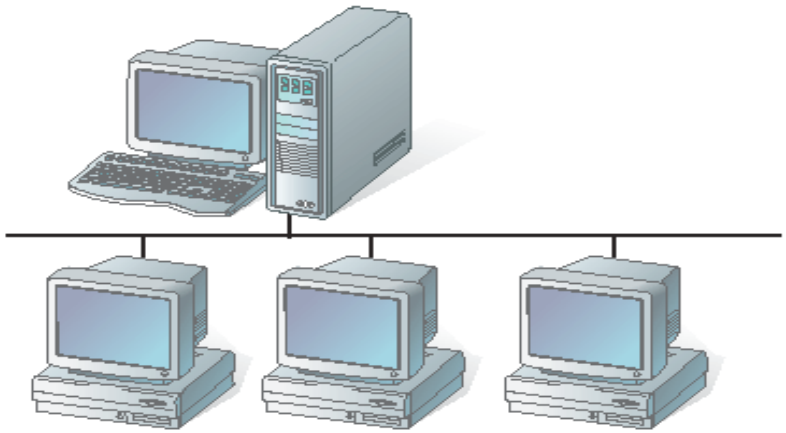
A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.

Network's Components

Cables
Client
Servers
Workstations
Routers
Hubs, Switches

Hub

Connections



Client-Servers Network Model

Network Client

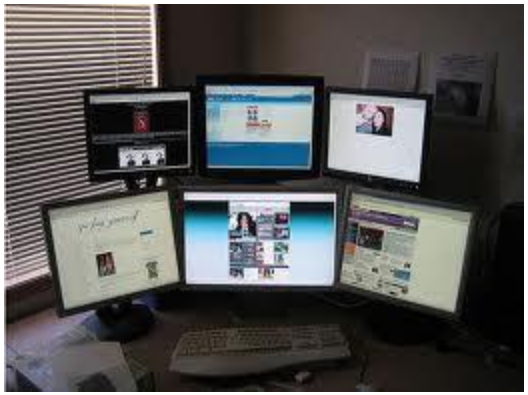
A network Client

- A client/server network is a collection of devices or user (clients), all connected to one or more server devices, in a single network. Files and information are shared in the network through the server, where the server is the main center of network resources
- Clients can be printers, workstations, servers, or any other device connected to the computers on a network.
- The most common network clients are workstations.

Workstation

- A workstation is a computer that operates independently of the network.
- It manages its own files and processing.
- Workstations connect to the network for the purpose of security and centralized management of networked resources.

Interface of Work Stations



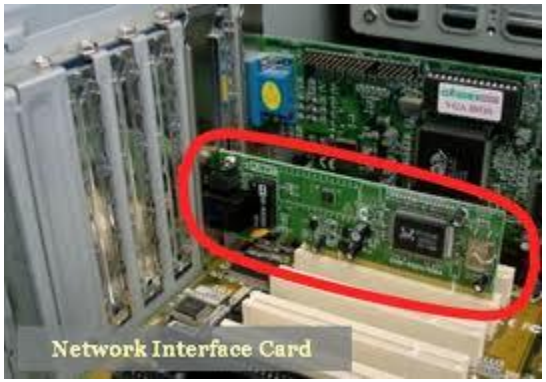
Communication Medium

- A communication medium is the physical path between the networked resources.
- The medium used is either a coaxial cable or a twisted-pair wire.
- Fiber-optic cabling and wireless medium have gained widespread acceptance as a network communication medium.

Network Interface Card (NIC)

- A NIC, also known as the network board, is used to connect the networked components to the physical cable.
- The NIC provides a physical connection to the device and also creates and sends signals from one networked device to another.

Network Interface Card



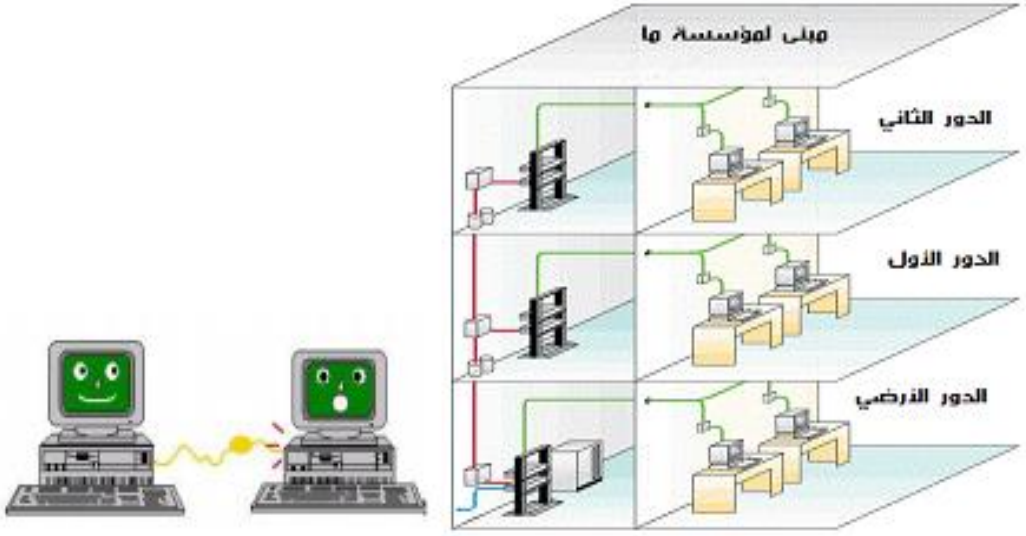
Network Classification

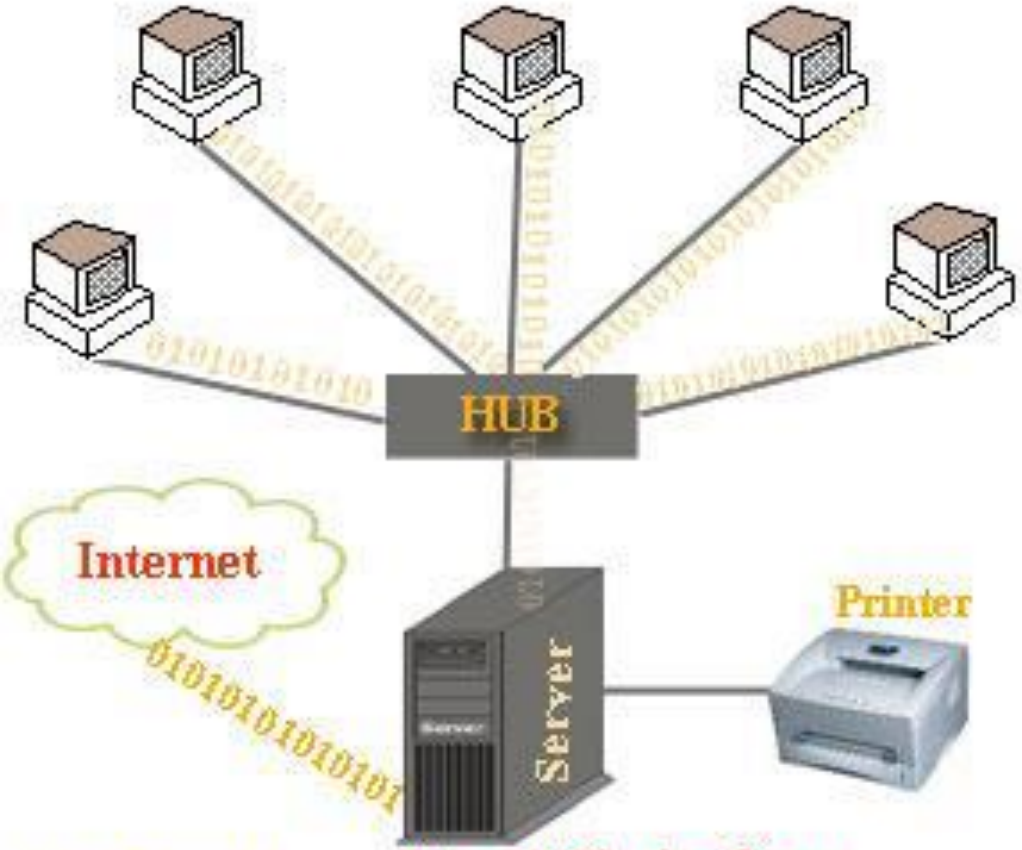
Network classification by size or scale:

- LAN
- WAN
- MAN

Local Area Network (LAN)

- Contains printers, servers and computers
- Systems are close to each other
- Contained in one office or building
- Organizations often have several LANS



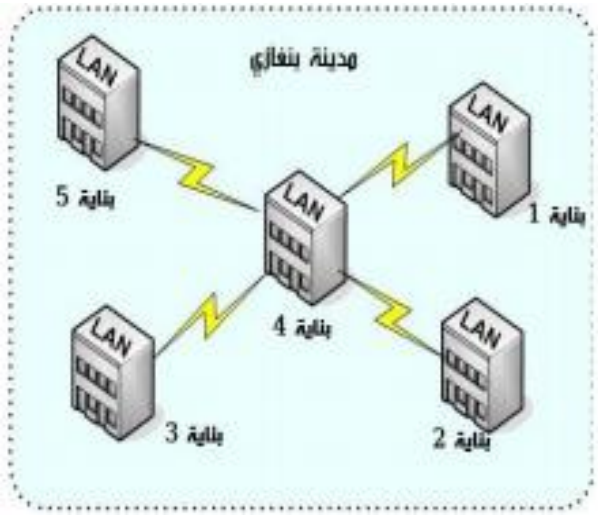

HUB
Internet
Server
Printer
Network
Structure
Internet Sharing Server
Mail Server
Sharing Resource
File Security server

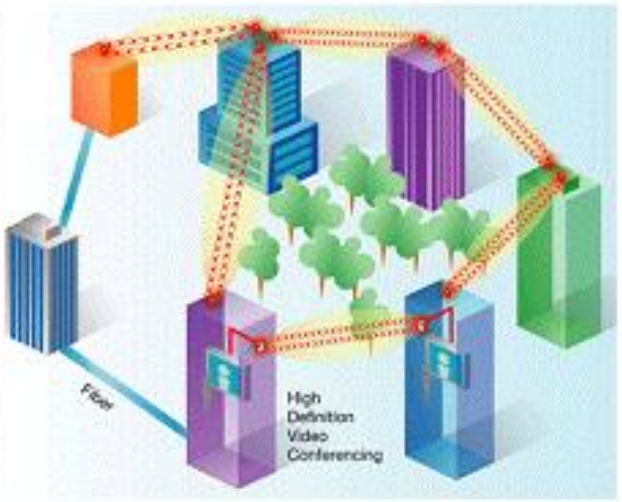
Metropolitan Area Network (MAN)

- Is collection of LANs with the same geographical area, for instance a city.
- Is a network of computers located at different sites within a large physical area, such as a city.
- MAN often acts as a high speed network(although not as fast as LAN) to allow sharing of regional resources.
- MAN can defined as a group of computers and network devices connected together within a large physical area.
- Companies that have several branches within the kuala lumpur city such as banks, might find a MAN useful to them.

Wide Area Networks (WAN)

- Two or more LANs connected
- Over a large geographic area
- Typically use public or leased lines
- Phone lines
- Satellite
- The Internet is a WAN its about 10-100 km





Topology of Network

- The network topology defines the layout of the network.
- It shows how devices on the network are interconnected.
- Devices on the network are termed nodes.
- A network has both a physical and a logical topology.

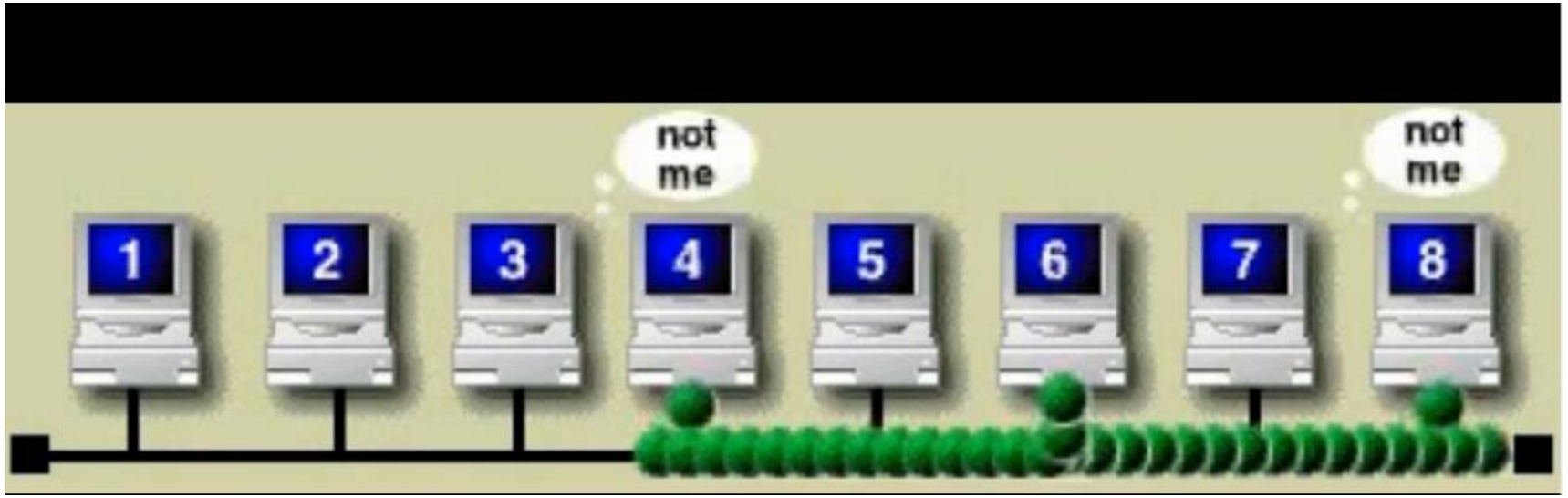
Bus Topology

Commonly referred to as a linear bus, all the devices on a bus topology are connected by one single cable, which proceeds from one computer to the next (The bus is the data link in a bus network. The bus can only transmit data in one direction, and if any network segment is severed, all network transmission ceases)

This topology is rarely used and would only be suitable for a home office or small business with only a few hosts.

Collisions and Terminator

Bus topology avoiding data collisions using terminator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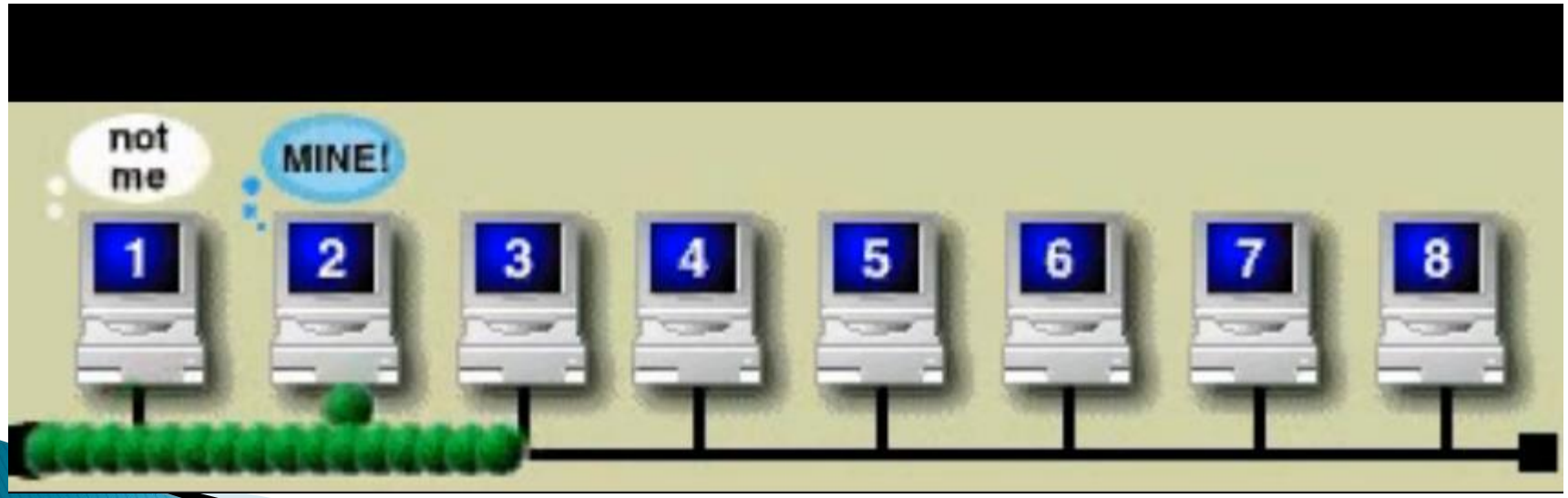
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Identifying Network Topologies

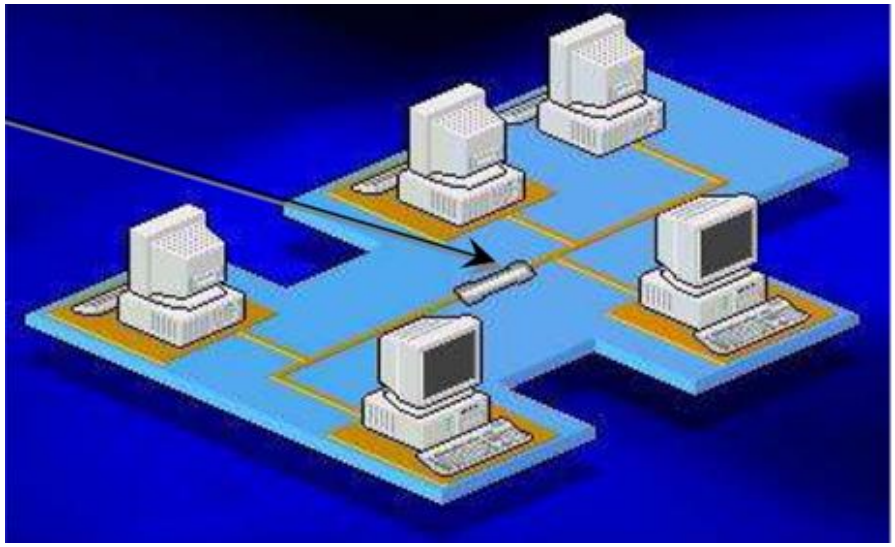
Advantages of a bus topology

- The thinnet cabling it uses is quite inexpensive.
- It uses less cable compared to other physical topologies like star or extended star
- It works well for small networks
- It does not need a central device, such as a hub, switch, or router

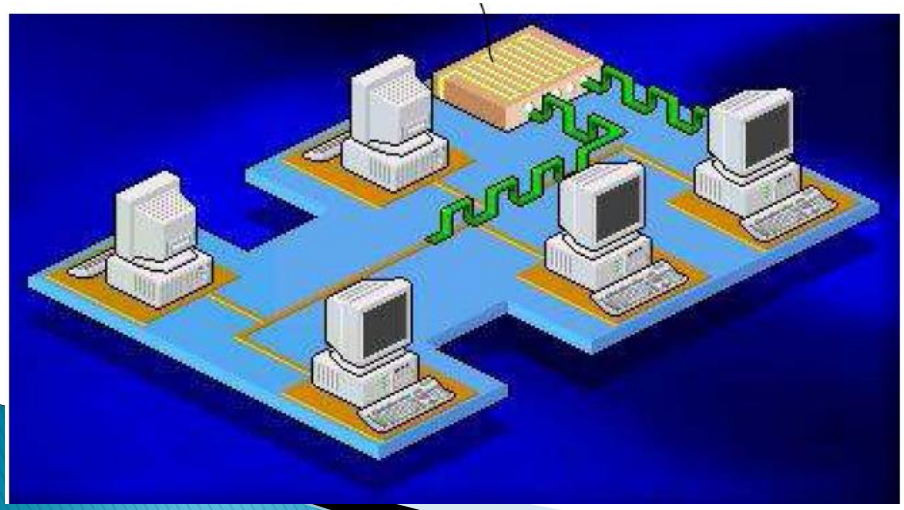
Disadvantages of a bus topology:

- It results in slower access to the network and less bandwidth due to the sharing of the same cable by all devices
- It is challenging to identify and isolate problems
- A break at any point in the bus cable can disable the entire bus network
- It needs terminators

How to Extend The Network Bus



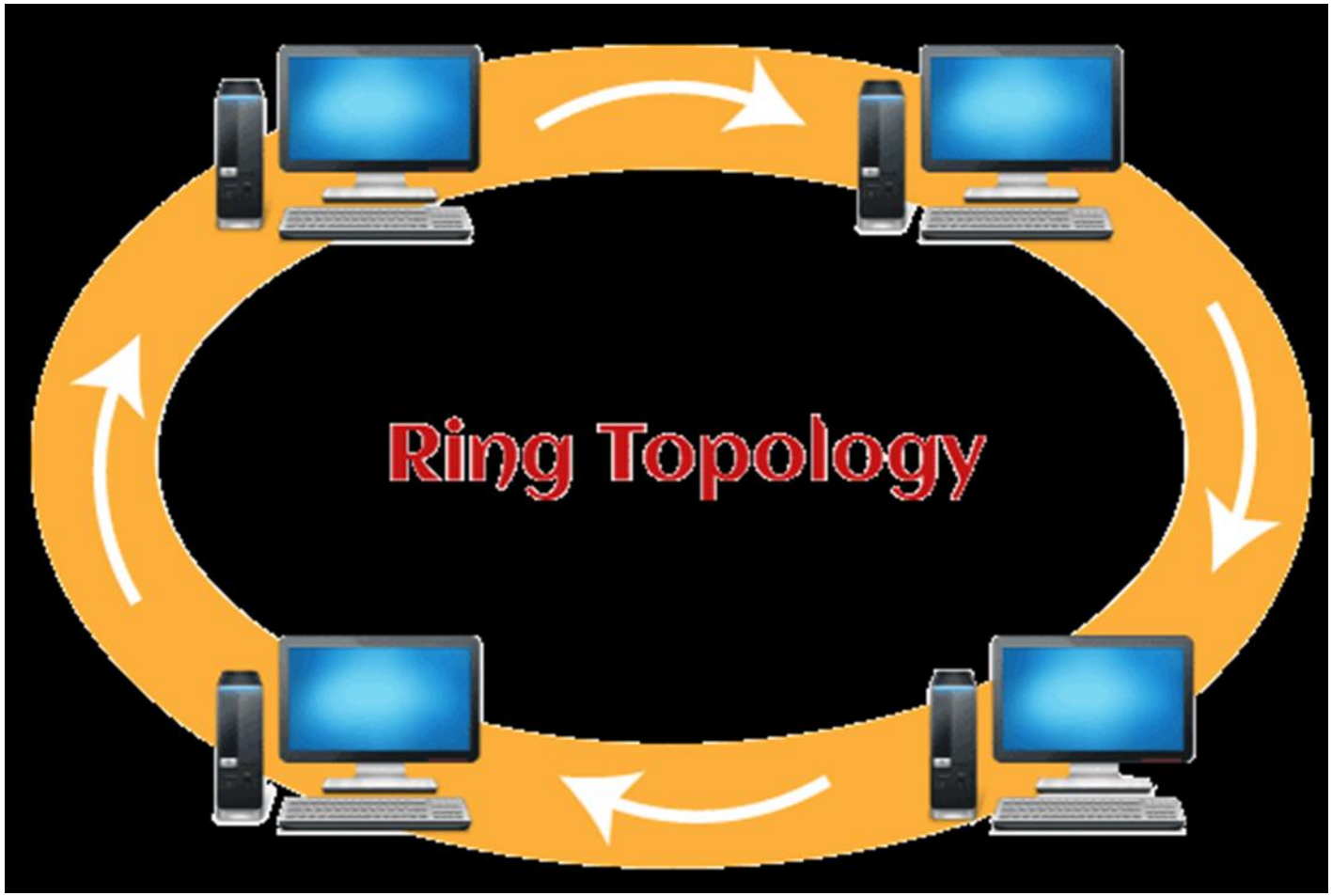
Barrel Connector



Repeater

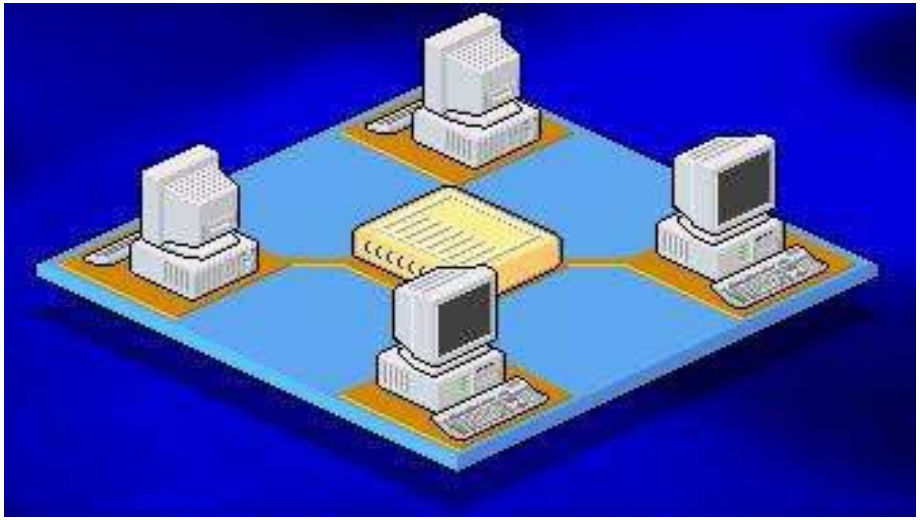
Ring Topology

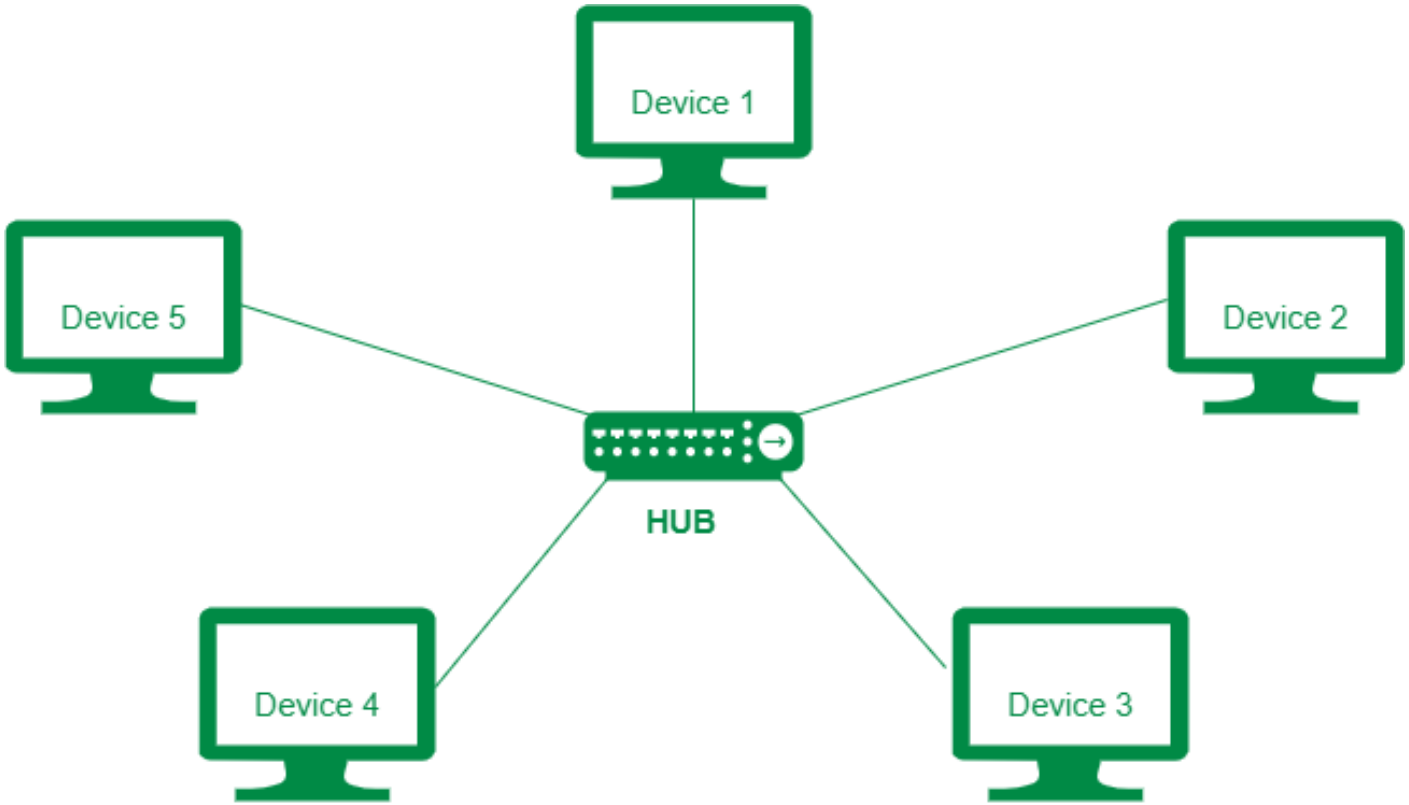
A ring network is a network topology in which each node connects to exactly two other nodes, forming a single continuous pathway for signals through each node – a ring. Data travels from node to node, with each node along the way handling every packet.


Ring Topology

Network star

- The most commonly used architecture in Ethernet LANs and resembles spokes in a bicycle wheel.
- A star topology generally costs more to implement than the bus topology because more cable is used and a central device is needed, such as a hub, switch, or router.



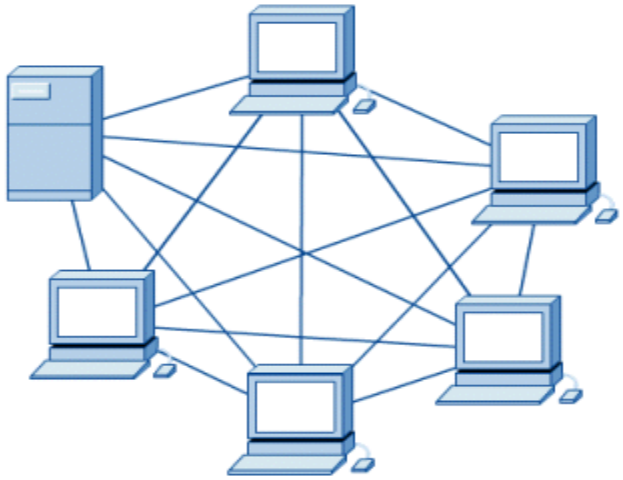


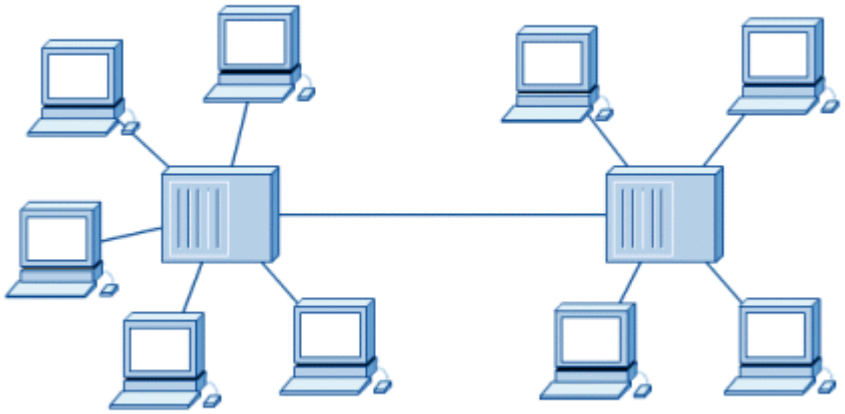
Star Topology

Identifying Network Topologies

Mesh Topology

- Mesh topology connects all devices (nodes) to each other for redundancy and fault tolerance.
- It is used in wide-area networks (WANs) to interconnect LANs and for critical networks.
- The mesh topology is expensive and difficult to implement.



HYBRID TOPOLOGY

- The hybrid topology combines more than one type of topology.
- When a bus line joins two hubs of different topologies, the configuration is called a star bus.
- The bus line is used to transfer the data between the star topologies.