Computer Networks

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CCICOMP

Outline

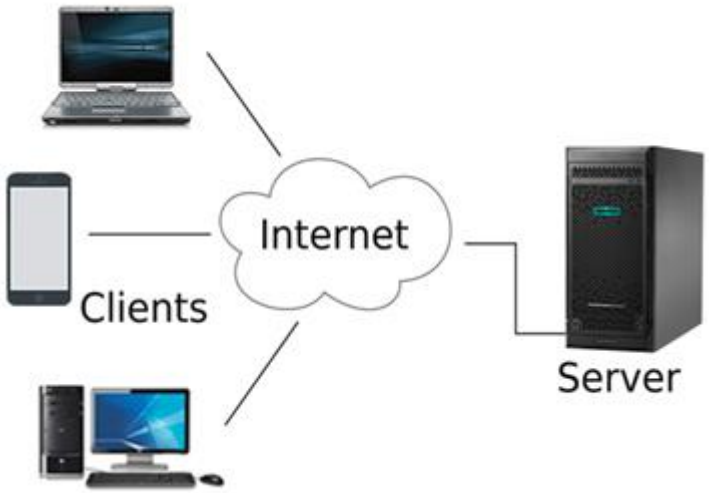
- Architectures
- Network Types
- Topologies

Network Architectures

Network Architectures

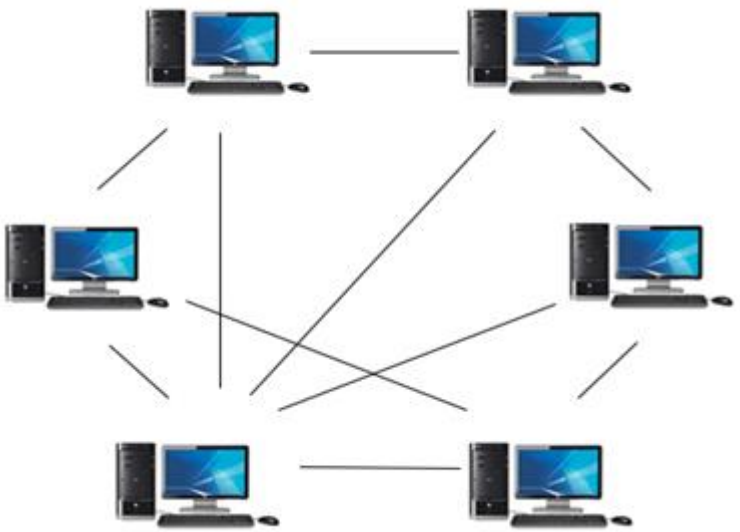
- Network Architectures
  - Physical and logical design of software, hardware, protocols, and data transmission media
- Types of Network Architectures
  - Client / Server Network
  - Peer-to-Peer Network

Client / Server Network



- Clients - end users
- Servers - central controller, provides resources
- Clients access resources from a server (example. Web pages from web servers)
- Multiple clients communicate to each other via server.
    - Client 1 communicate client 2
    - Client 1 sends data to server
    - Client 2 gets data from server

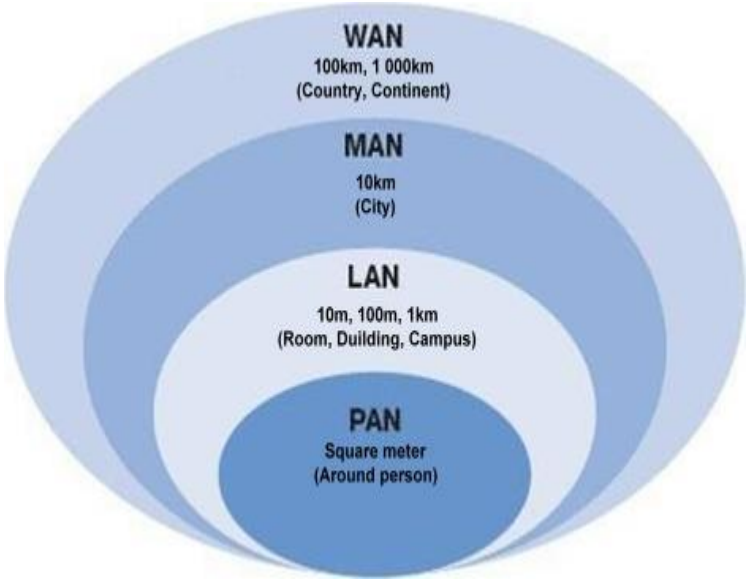
Peer to Peer Network



- All computers linked together with equal privilege and responsibilities
- No dedicated server
- Useful for small environments, 10 computers or less

Network Types

Network types



- Categorized by geographic coverage
- Increasing size
- Different technologies, protocols, softwares, and hardwares are used.

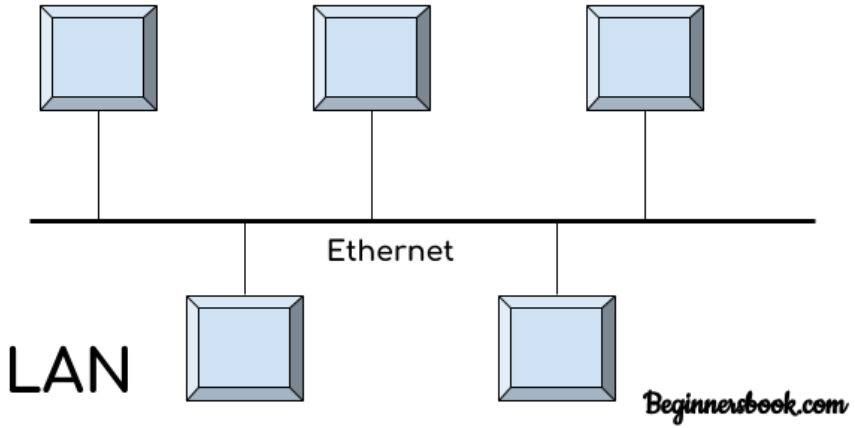
- Personal Area Network (PAN)
- Local Area Network (LAN)
- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)

Personal Area Network (PAN)

- Network of devices arranged within an individual person
- bluetooth, infrared
- Examples: mouse, headset

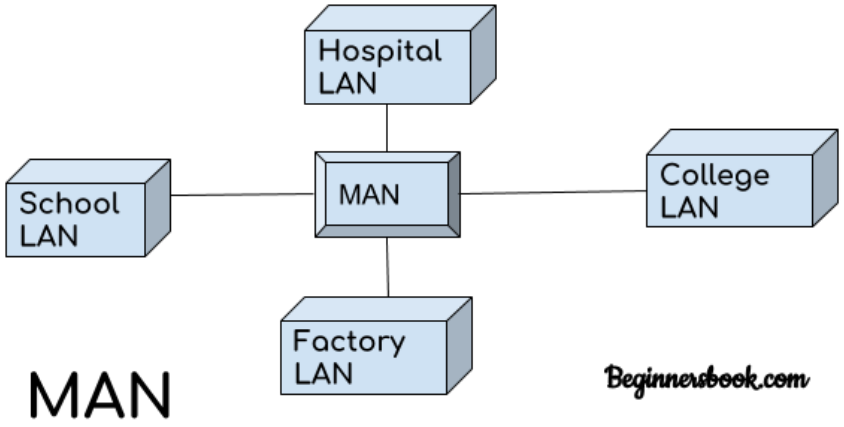
Local Area Network (LAN)

- Group of computers connected in a small area (home, office, building)
- Network switch, network router, WiFi



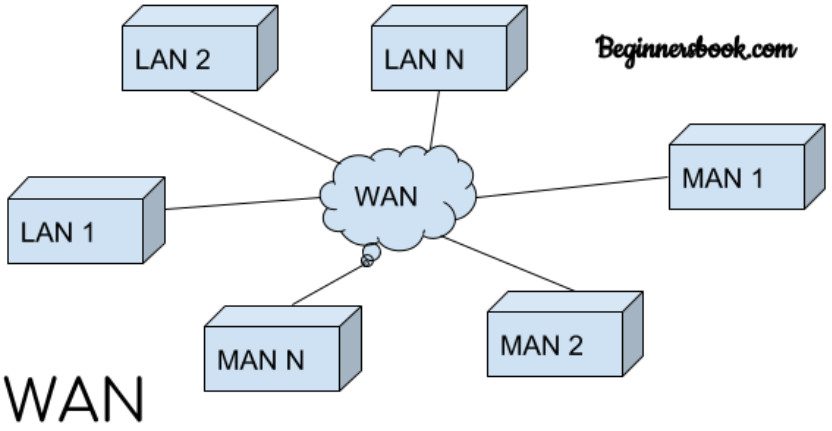
Metropolitan Area Network (MAN)

- Network that covers large geographic area by interconnecting LANs
- Cable TV Network, telephone networks, fiber optic



Wide Area Network (WAN)

- Network that spans over large geographic area
- Interconnects MANs and LANs
- Internet is WAN



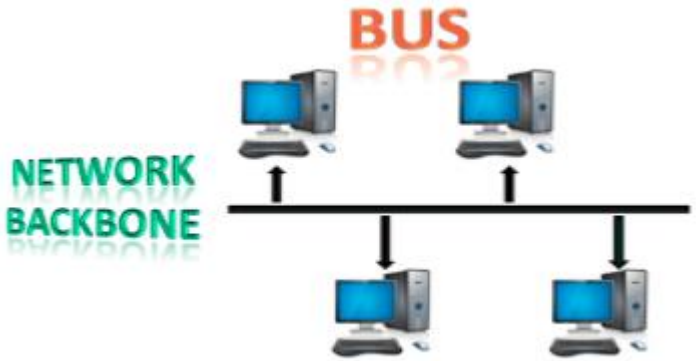
Network Topologies

Network Topology

- Topology defines the structure of the network and how all components are interconnected to each other.

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

Bus Topology

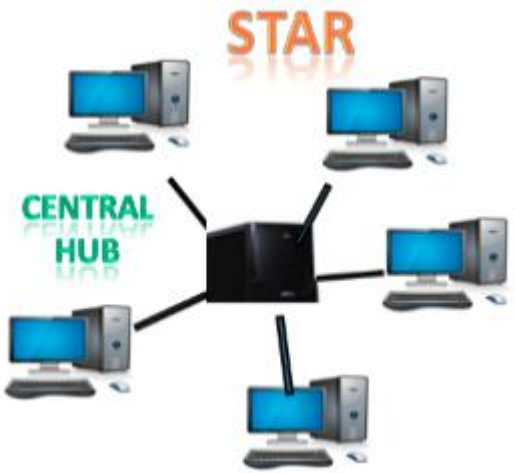


- All nodes (computers) connected to the network backbone cable
- If a node sends a message, will be received by all other nodes
- Common access method: Carrier sense Multiple Access CSMA - checks if cable is not busy before transmitting
- Advantage
  - Cheap
- Disadvantage
  - Signal interference (message collision)

Ring Topology

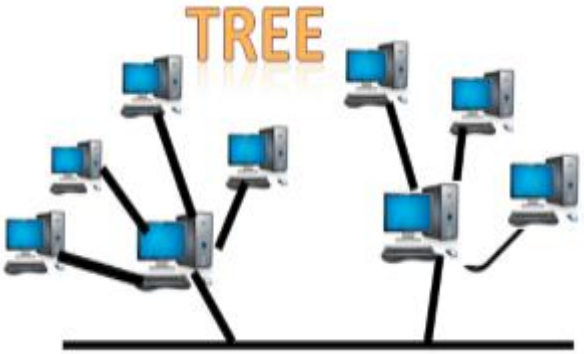
- A node is connected to two other nodes farming a ring
- Data flows in one direction (clockwise)
- Common access method: Token passing - data moves around the network until it reaches its destination
- Advantage
  - Communication is not dependent on single cable
- Disadvantage
  - Slow - communication delay

Star Topology



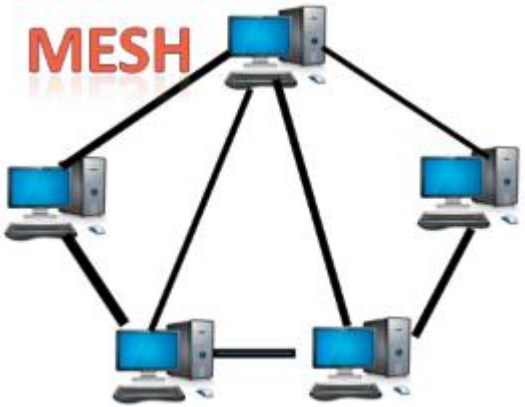
- Every node (client) is connected to a central hub (server)
- Most popular in network implementation
- Advantage
  - Central Control
- Disadvantage
  - Central point of failure

Tree Topology



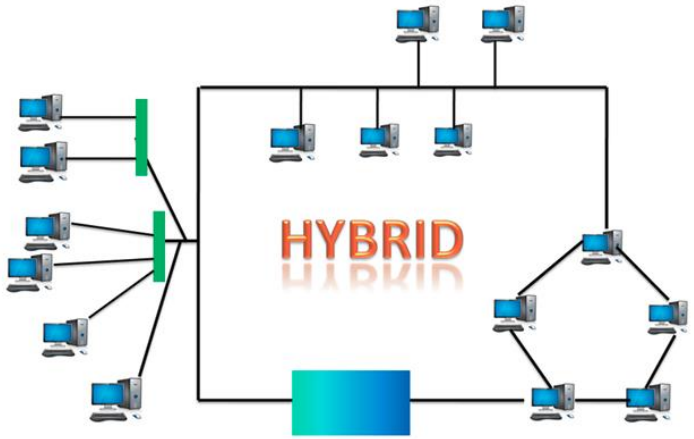
- All nodes are connected in a hierarchical fashion
- Only one path exists between any two nodes
- Advantage
  - Easily expandable
- Disadvantage
  - Fault in higher nodes affects more nodes

Mesh Topology



- nodes are interconnected through various redundant connections
- Full mesh - all nodes are directly connected to all other nodes
- Partial mesh - only connected to some nodes
- Mainly used for WAN implementations
- Advantage
  - Reliable
- Disadvantage
  - High cost, relatively low efficiency due to redundancy, hard to manage

Hybrid Topology



- Combination of other topologies
- Advantage
  - Reliable, scalable, flexible, effective
- Disadvantage
  - Complex, costly

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