NETWORKS AND DATA COMMUNICATION

Lab7

NETWORKS

A computer network is a set of computers that are connected together so that they can share information. Computer networks can also include multiple devices/mediums which help in the communication between two different devices; these are known as Network devices and include things such as routers, switches, hubs, and bridges.

WHAT DO NETWORKS DO?

FILE SHARING

Users can easily share data between different users or access data remotely

RESOURCE SHARING

Users can share network-connected peripheral devices like printers, scanners and copiers

COMMUNICATION

Users can communicate by email, instant messenger, and group-collaboration tools

FILE SERVERS

Data can be stored and accessed on a central server, enabling file-sharing, efficiency-of-management, and potentially better security

SOFTWARE-AS--SERVICE

Software can be hosted on a remote server, enabling users to access and use software without having to install or configure software on their local machines. Also, different types of computers can connect and use software without needing specific versions of the software

TYPES OF NETWORK

LOCAL AREA NETWORKS (LAN)

Interconnects computers within a limited area such as a residence, school, laboratory, university campus or office building.

VIRTUAL LOCAL AREA NETWORK (VLAN)

A group of devices on one or more LANs that are configured to communicate as if they were attached to the same wire, when in fact they are located on a number of different LAN segments.

WIDE AREA NETWORK (WAN)

A telecommunications network or computer network that extends over a large geographical distance.

VIRTUAL PRIVATE NETWORK (VPN)

Gives you online privacy and anonymity by creating a private network from a public internet connection. VPNs mask your IP address so your online actions are virtually untraceable. Most important, VPN services establish secure and encrypted connections to provide greater privacy than even a secured Wi-Fi hotspot.

PERSONAL AREA NETWORK (PAN)

Used for data transmission amongst devices such as computers, telephones, tablets and personal digital assistants. Example is Bluetooth.

PEER-TO-PEER (P2P)

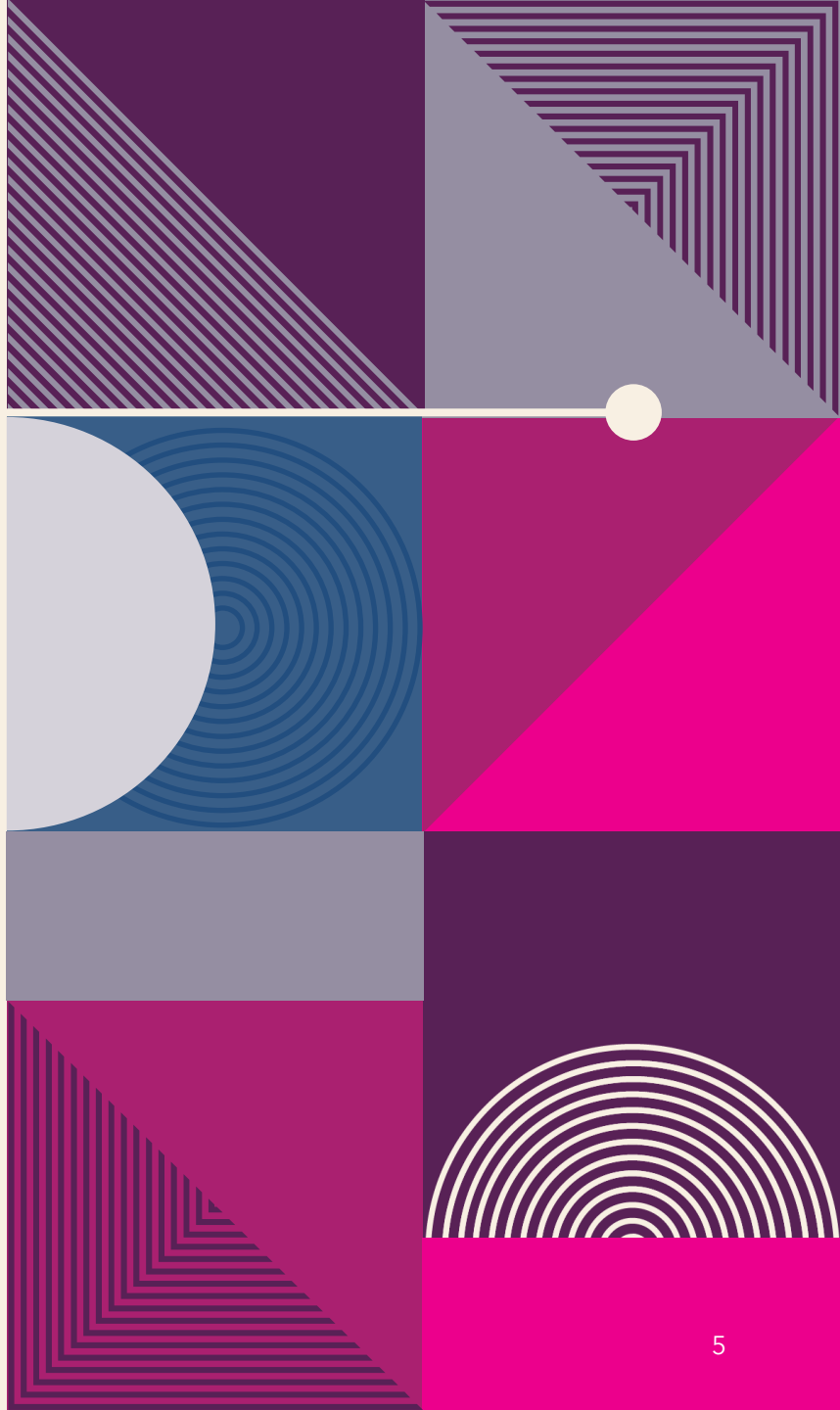
A distributed application architecture that partitions tasks or workloads between peers. Peers are equally privileged, equipotent participants in the application. There is no network administrator and all peers have the same privilege.

WIRELESS LOCAL AREA NETWORK (WLAN)

A wireless distribution method for two or more devices that use high-frequency radio waves and often include an access point to the Internet. A WLAN allows users to move around the coverage area, often a home or small office, while maintaining a network connection.

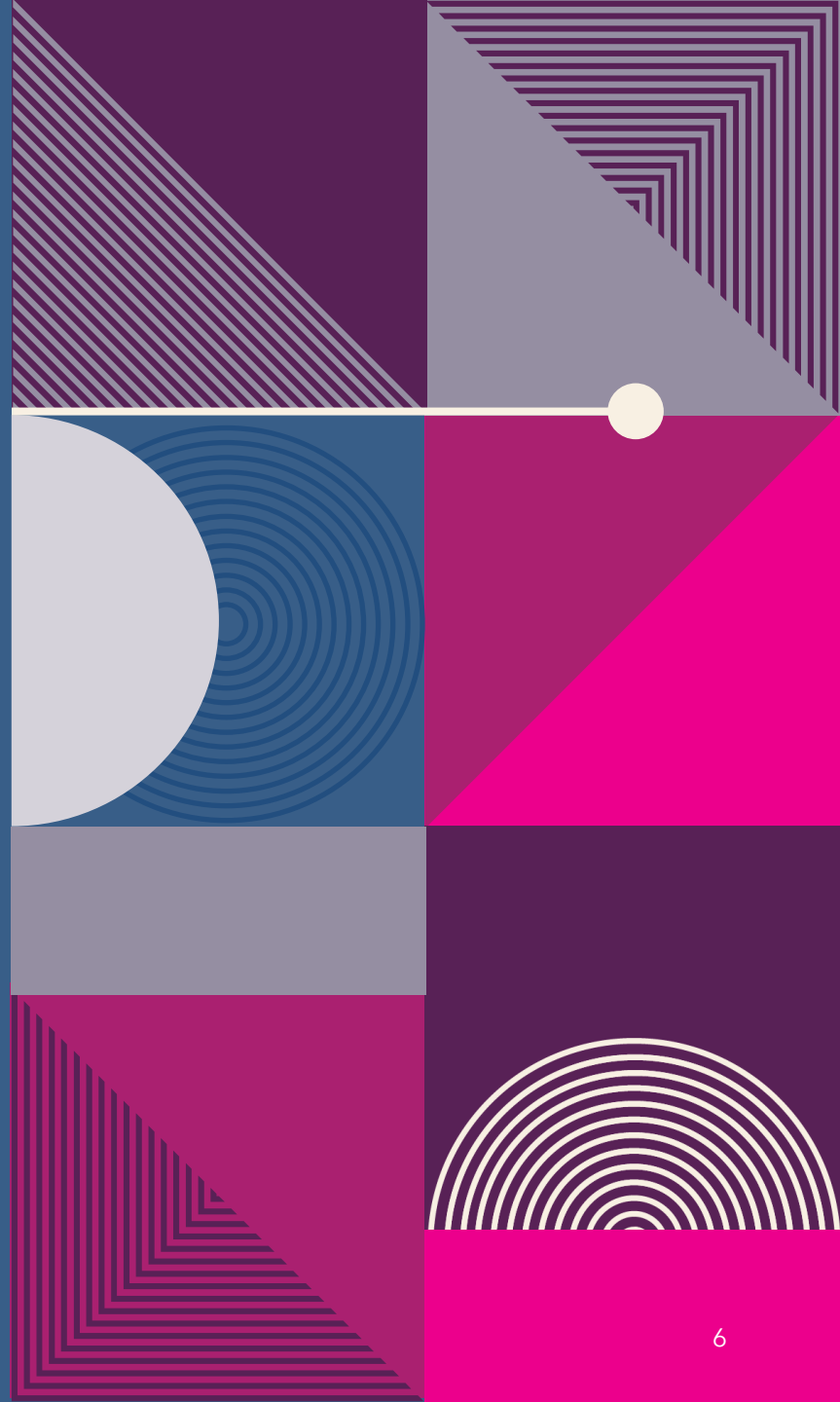
STORAGE AREA NETWORK (SAN)

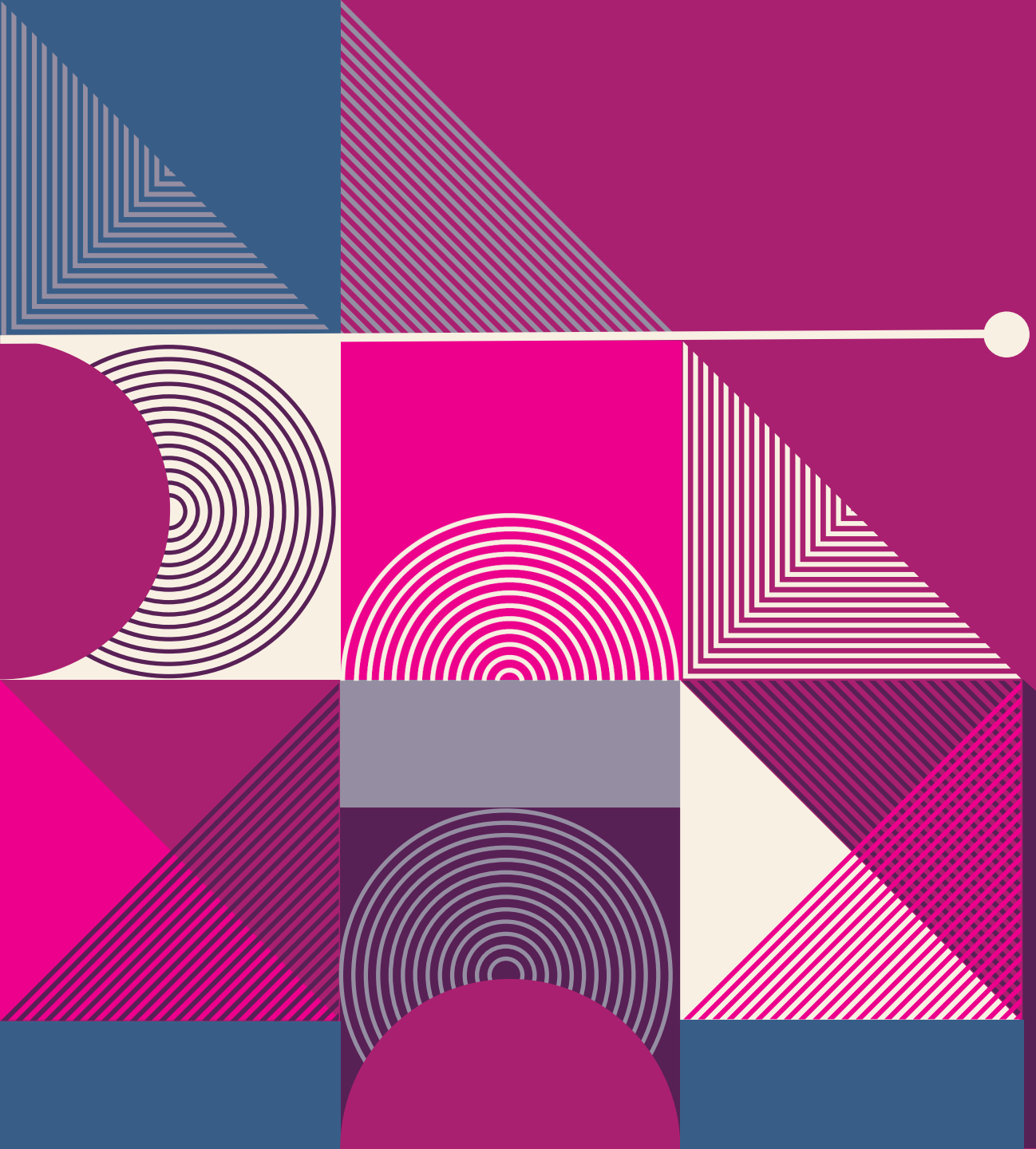
Provides access to consolidated, block level data storage.



NETWORK CONNECTIONS

There are different types of network connections that concern how elements in a network are connected to each other. Topologies are used to connect computers.

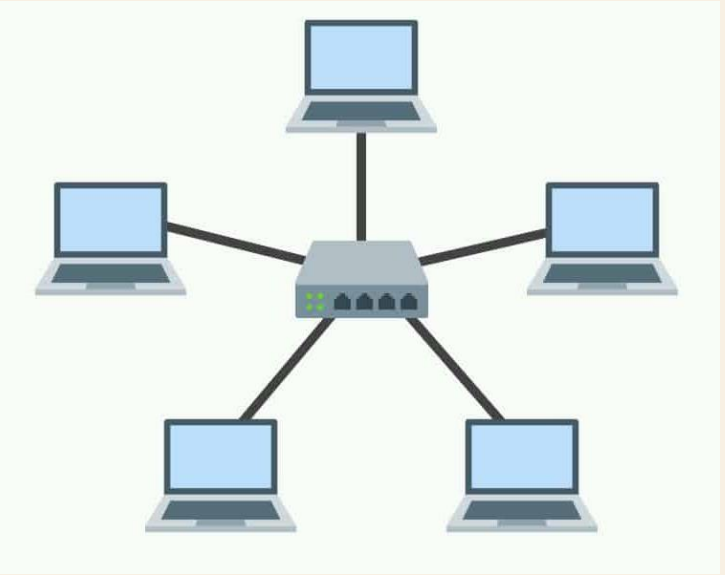




TYPES OF NETWORK CONNECTIONS

STAR TOPOLOGY

A central node connects a cable to each computer in the network in a star topology. Each computer in the network has an independent connection to the center of the network, and one connection breaking won't affect the rest of the network. However, one downside is that many cables are required to form this kind of network.

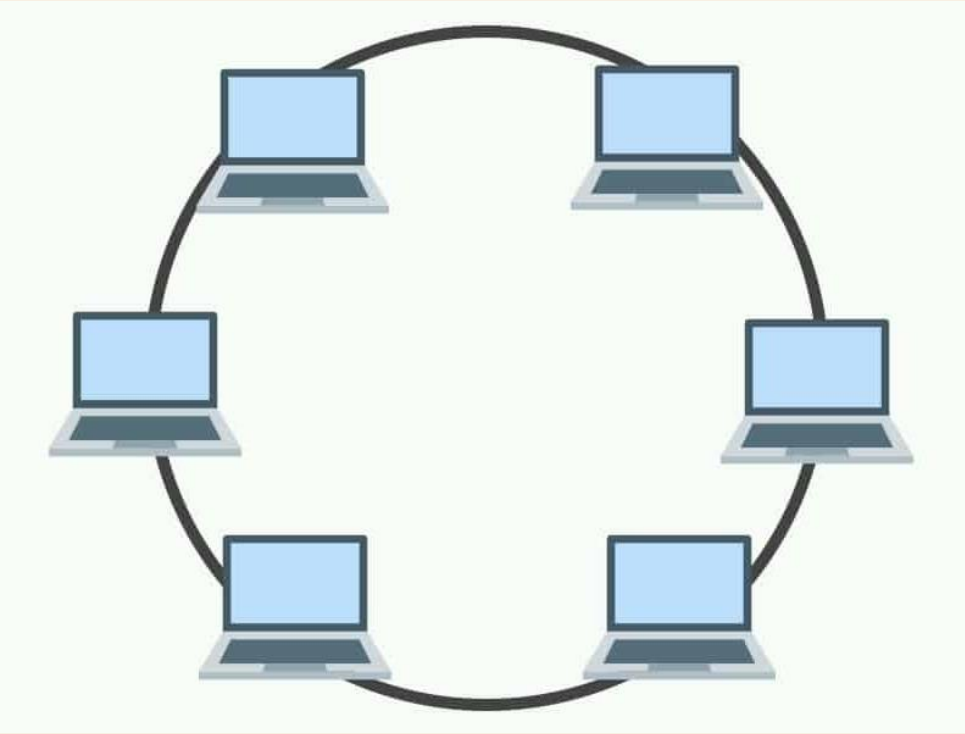


RING TOPOLOGY

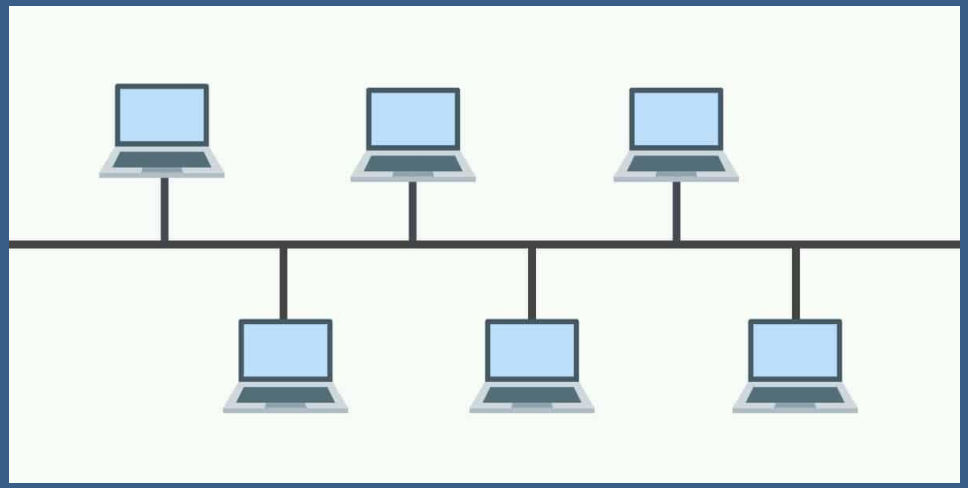
A ring topology is a network configuration where device connections create a circular data path. Each networked device is connected to two others, like points on a circle. Together, devices in a ring topology are referred to as a ring network.

In a ring network, packets of data travel from one device to the next until they reach their destination. Most ring topologies allow packets to travel only in one direction, called a unidirectional ring network. Others permit data to move in either direction, called bidirectional.

The major disadvantage of a ring topology is that if any individual connection in the ring is broken, the entire network is affected.



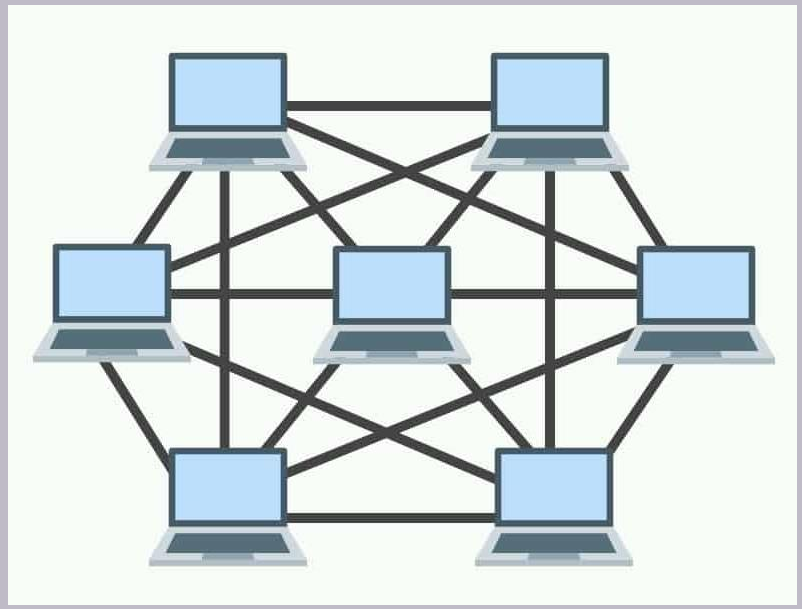
BUS TOPOLOGY



In a bus topology network connection, one cable connects the computer. The information for the last node on the network has to run through each connected computer. There is less cabling required, but if the cable breaks it means that none of the computers can reach the network.

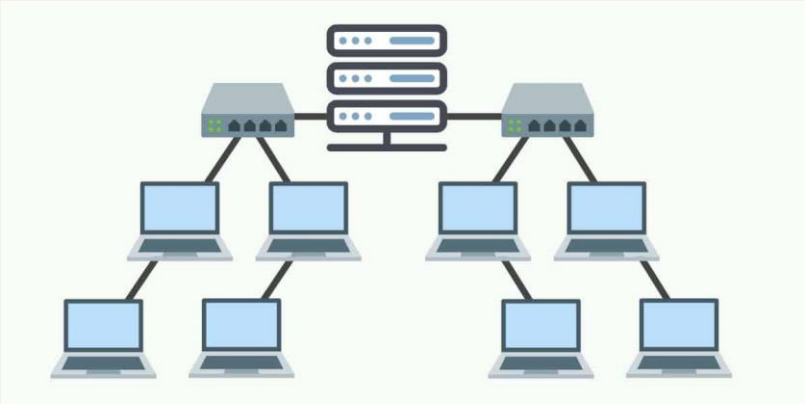
MESH TOPOLOGY

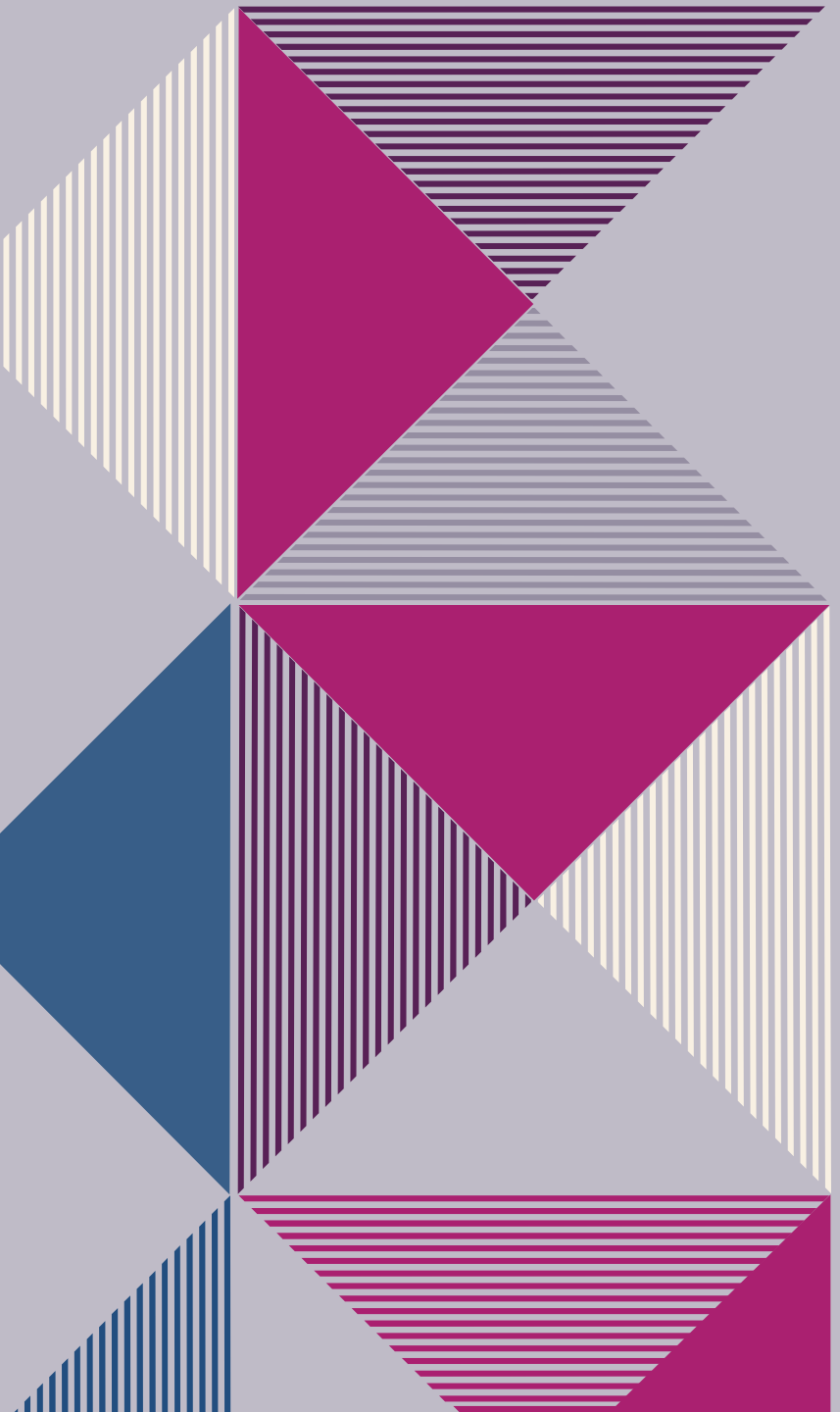
The mesh topology has a unique network design in which each computer on the network connects to every other. It develops a P2P (point-to-point) connection between all the devices of the network. It offers a high level of redundancy, so even if one network cable fails, still data has an alternative path to reach its destination.



TREE TOPOLOGY

Tree topologies have a root node, and all other nodes are connected which form a hierarchy. So it is also known as hierarchical topology. In computer networks, a tree topology is also known as a star bus topology. It incorporates elements of both a bus topology and a star topology. If the main cable (trunk) between the two star topology networks failed, those networks would be unable to communicate with each other. However, computers on the same star topology would still be able to communicate.





DATA COMMUNICATION

Data communication refers to the exchange of data between a source and a receiver via form of transmission media such as a wire cable. A network allows computer to exchange data. The device that transmits the data is known as source and the device that receives the transmitted data is known as receiver.

COMPONENTS OF A DATA COMMUNICATION SYSTEM

MESSAGE

It is the information or data to be communicated. It can consist of text, numbers, pictures, sound or video or any combination of these.

SENDER

It is the device/computer that generates and sends that message.

RECEIVER

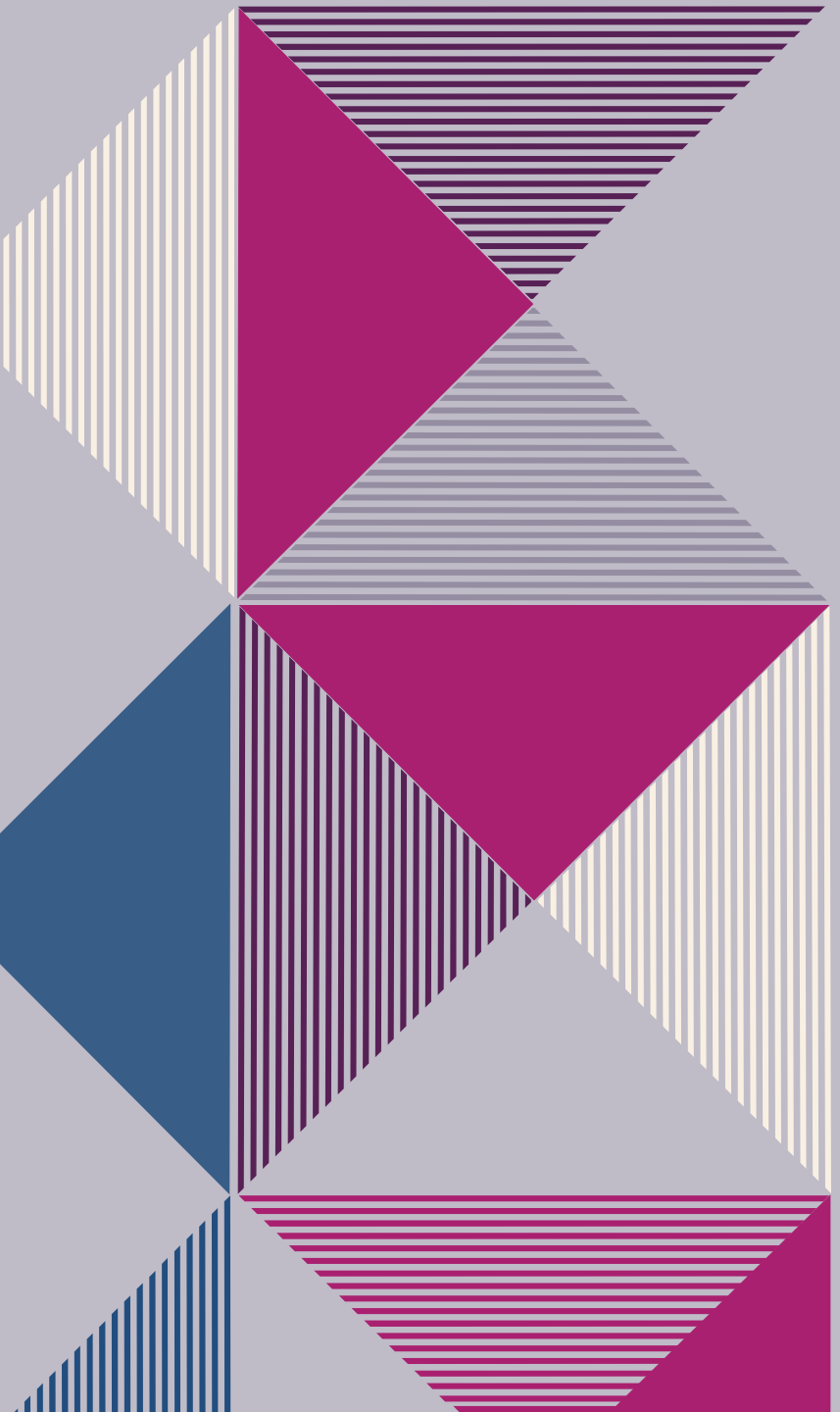
It is the device or computer that receives the message. The location of receiver computer is generally different from the sender computer.

MEDIUM

It is the channel or physical path through which the message is carried from sender to the receiver. The medium can be wired like twisted pair wire, coaxial cable, fiber-optic cable or wireless like laser, radio waves, and microwaves.

PROTOCOL

It is a set of rules that govern the communication between the devices. Both sender and receiver follow same protocols to communicate with each other. Common protocols are TCP and UDP protocols.



EXAMPLE

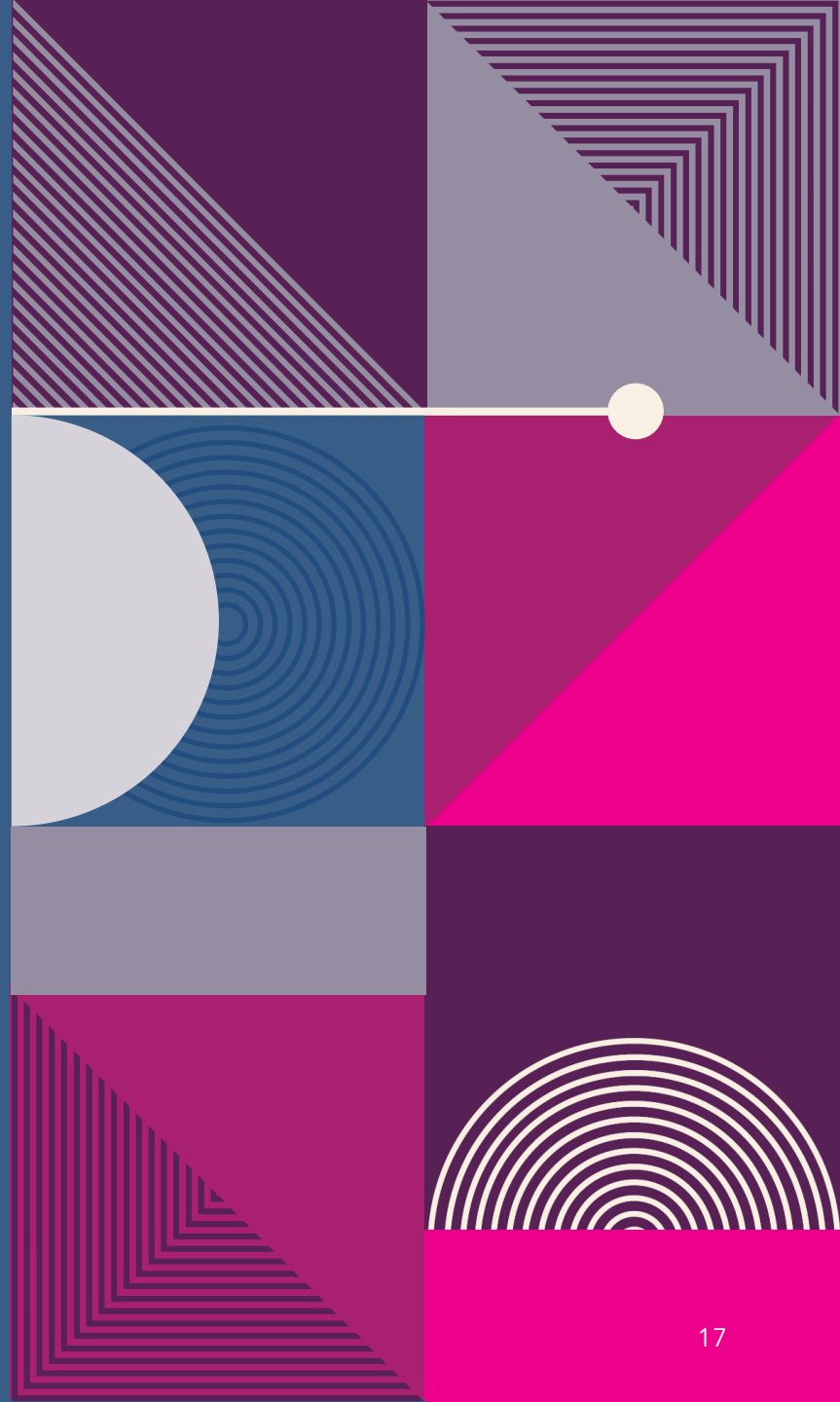
A typical example of a data communication system is sending an e-mail. The user which sends an email acts as a sender, message is data which the user wants to send, and receiver is the one whom the user wants to send message to. There are many protocols involved in this entire process, one of them is Simple Mail Transfer Protocol (SMTP). Both sender and receiver must have an internet connection which uses a wireless medium to send and receive email.

INTERNET

A network of networks is called an internetwork, or simply the internet. It is the largest network in existence on this planet. The internet hugely connects all WANs and it can have connection to LANs and Home networks. Internet uses TCP/IP protocol suite and uses IP as its addressing protocol. Present day, Internet is widely implemented using IPv4.

Internet enables its users to share and access enormous amount of information worldwide. It uses WWW, FTP, email services, audio and video streaming etc. At huge level, internet works on Client-Server model.

Internet uses very high speed backbone of fiber optics. To inter-connect various continents, fibers are laid under sea known to us as submarine communication cable.



THANK YOU