Network Topologies

S.P.I.R.I.T
- ✓ **Independence**
- ✓ **Perseverance**

Monday, 04 April 2022

Learning Intention

To develop knowledge by understanding that networks have different theoretical layouts

To secure understanding by exploring the features of different network topologies

To achieve excellence by. Comparing bus, ring, star and mesh topologies in terms of their advantages and disadvantages

Bottlenecking
When too much data flows through the network at one time causing delays

Node
Any device connected to a network

Tier 2 word – theoretical
Something that is based only on the ideas that relate to a subject, not the practical uses of that subject

What is a Network Topology?

S.P.I.R.I.T
- ✓ Independence
- ✓ Perseverance

A ne  is **the**

theoreti **mputer**

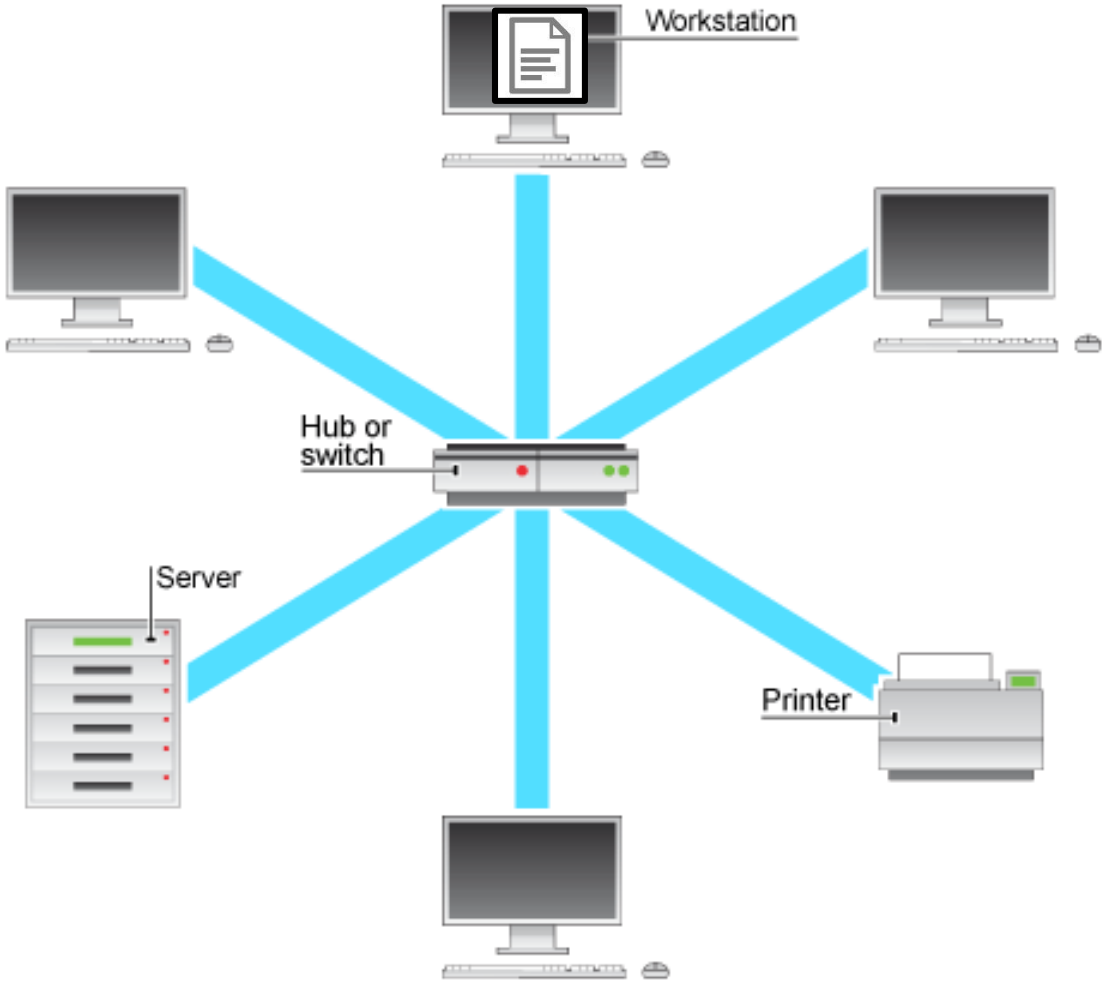
sys **ork.**

Theoretical
In terms of topologies:
The connections of computers and hardware would match the layout but the actual physical layout is usually different

To develop knowledge by understanding that networks have different theoretical layouts

Star Topology

To secure understanding by exploring the features of different network topologies



In a star network, each computer system is connected to a central node, also known as a hub or switch.

So if the workstation wants to print then the following will happen.

Star Topology

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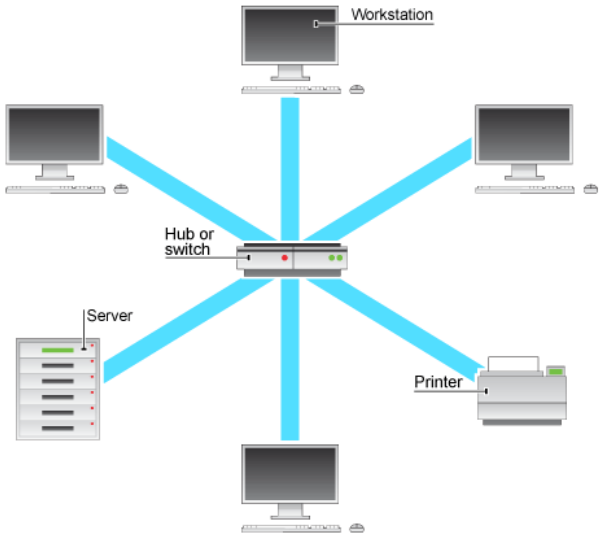


Advantages

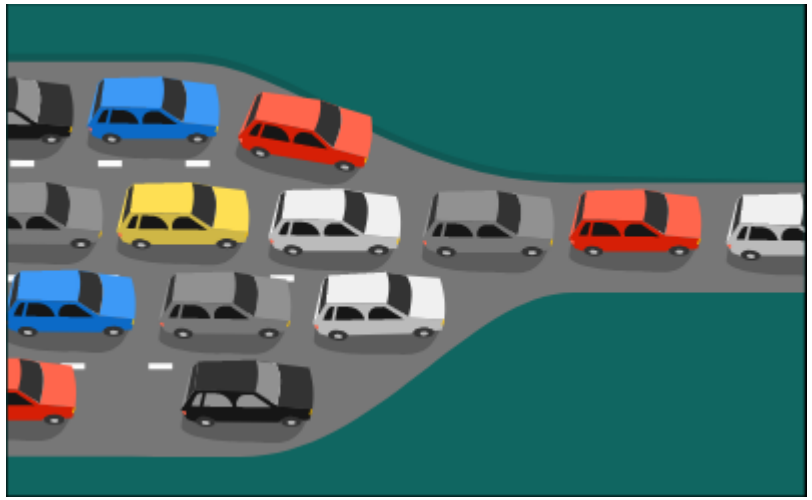
- ✓ Very reliable
- ✓ high data transfer speeds are possible (fewer collisions)
- ✓ easy to identify faults.

Disadvantages

- X Can be expensive to set up as switches and cabling expensive
- X if main switch fails, the network fails
- X bottlenecking can occur if too much data is passing through the central switch.

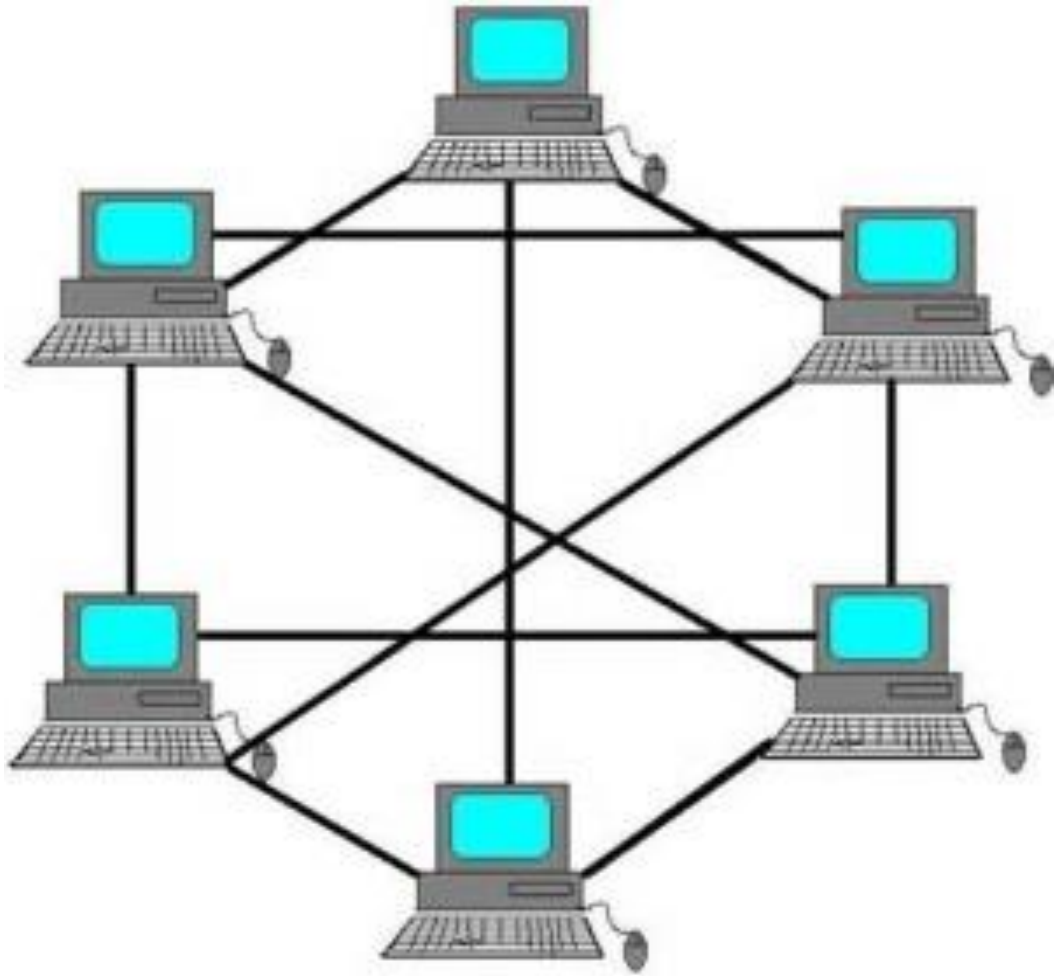
Bottlenecking

When too much data flows through the network at one time causing delays



Mesh Topology

To secure understanding by exploring the features of different network topologies



In a mesh topology, each computer system is connected directly to each of the others. Each node relays data for the network

Mesh Topology

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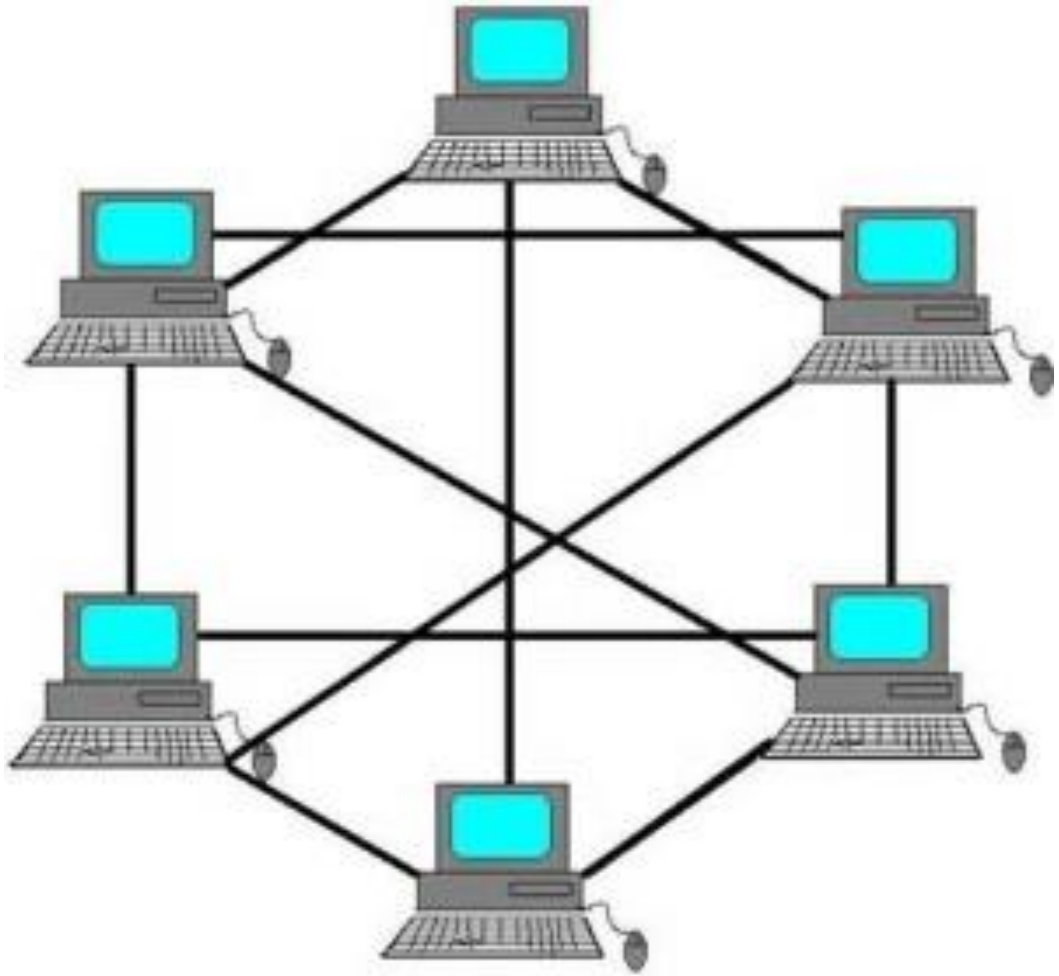


Advantages

- ✓ Very reliable
- ✓ Can 'self-heal' by reconfiguring itself around broken paths. easy to identify faults.

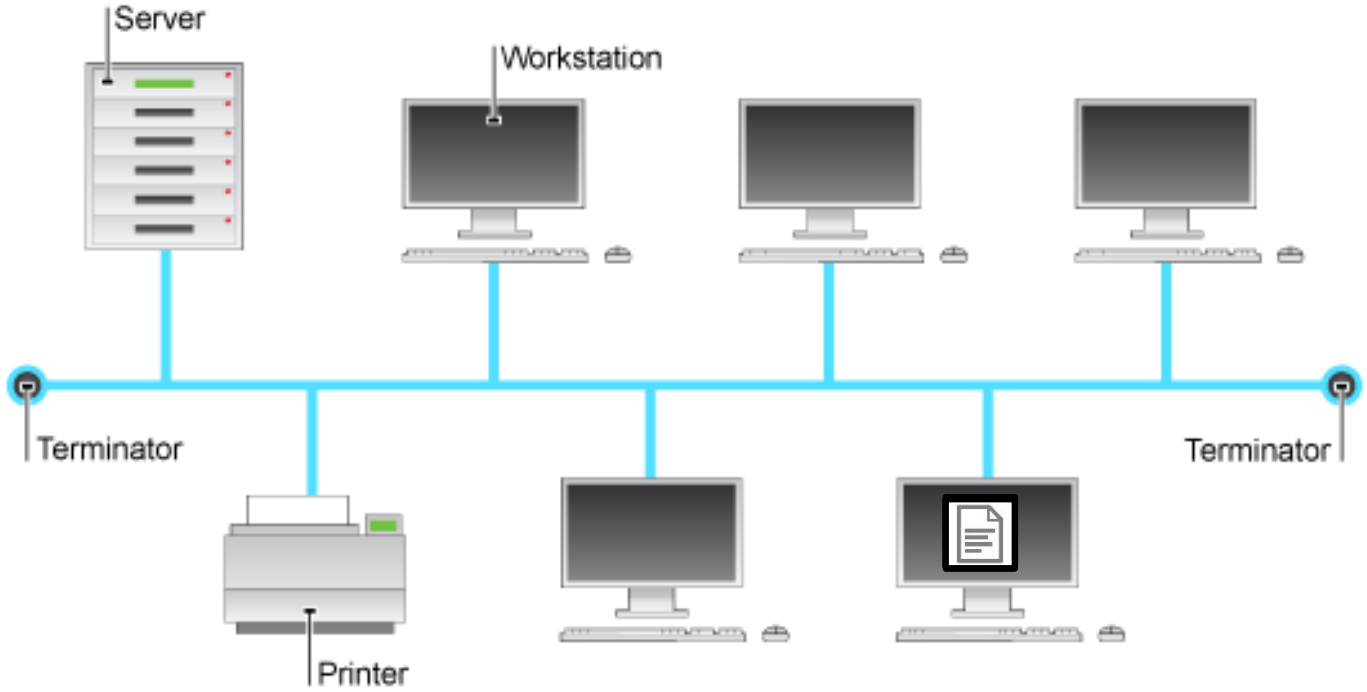
Disadvantages

- X Complex
- X Expensive and difficult to set up
- X A large part of the network may be redundant.

Bus Topology

To secure understanding by exploring the features of different network topologies

Node
Any device connected to a network



- The nodes are each connected to a single cable on which data can be sent, called the bus. A bus network has terminators on each end, which is needed to ensure that the network functions correctly.

- The bus carries packets along the cable. As the packets arrive at each computer system, it checks the destination address contained in the packet to see if it matches its own. If the address does not match, the computer system ignores the packet. If the address of the computer system matches that contained in the packet, it processes the data.

- **So if the bottom right computer saves some data, the following will happen.**

Ring Topology

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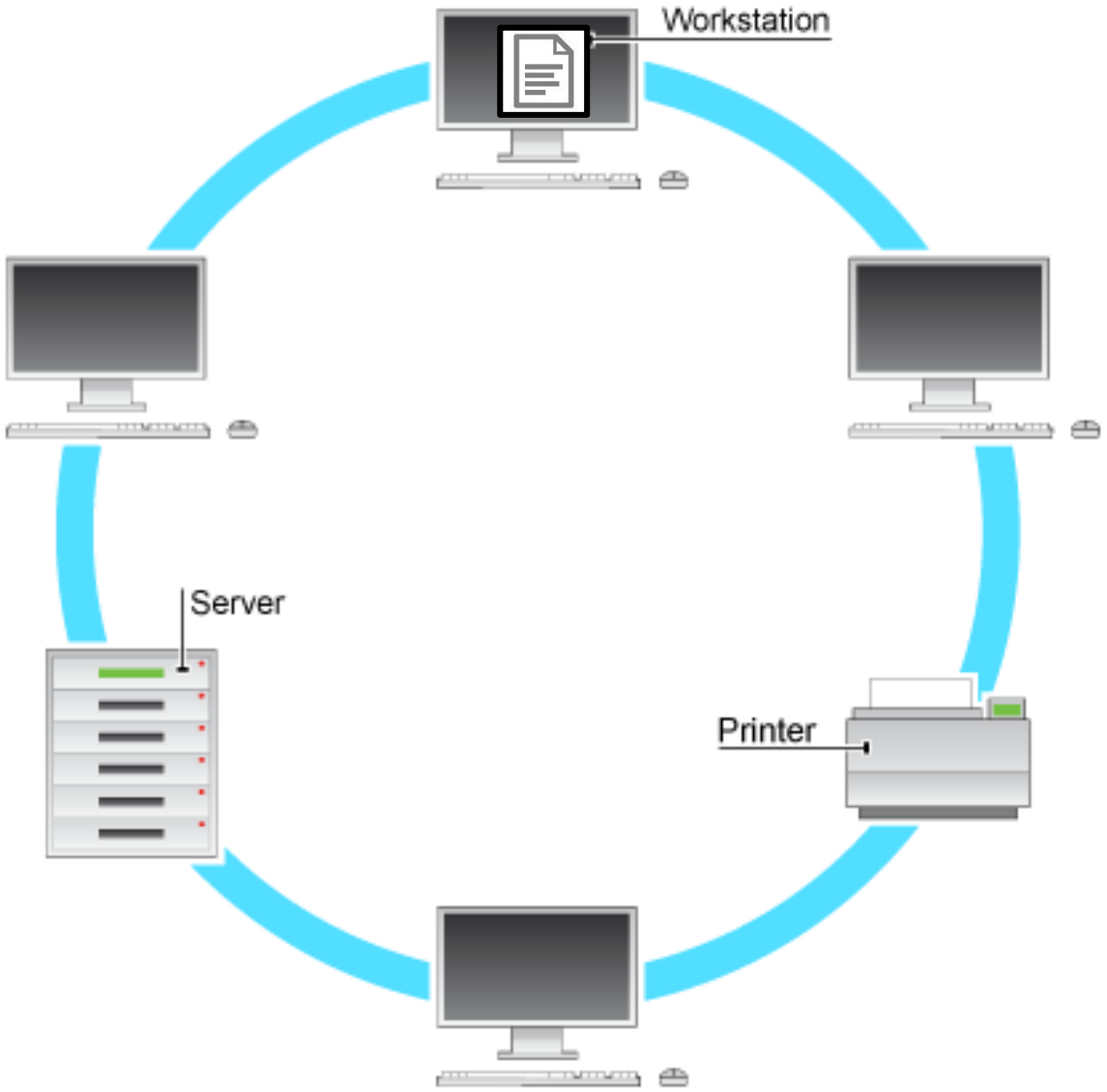

In a ring network, computer systems are connected in a ring or a loop.

Around the ring, packets are sent, being passed from one computer system to the next until they arrive at their destination.

So if the workstation wants to save a file the following will happen:

Advantages/disadvantages

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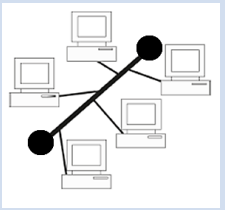
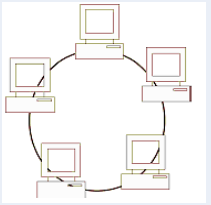
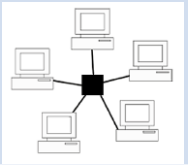
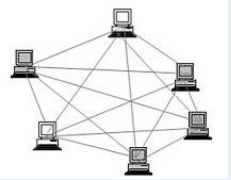
Every topology has advantages and disadvantages over other topologies for example:

Topology	Advantage	Disadvantage
BUS 	Easy to implement and add more computer systems to the network	If there is a problem with the main cable or connection, the entire network goes down
RING 	The transmission of data is relatively simple as packets travel in one direction only	If any of the computer systems fail, the ring is broken and data cannot be transmitted efficiently
STAR 	Good performance/fast network speed	Expensive to install – more cabling required
Mesh 	Very robust. If one path fails, the others can still be used	The number of connections increases rapidly as more nodes are added

Task

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- ✓ Perseverance

Complete the mind map you have been given.

- Draw a diagram in the first box, then do the descriptions, advantages and disadvantages.
- Resources/Notes can be found here in same folder:

THINK IT:
Apply knowledge of topologies by completing the exam questions

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Exam questions

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2 A small business has three stand-alone computers, a printer and an internet connection in an office.

(b) Describe, using a diagram, how the computers can be connected to each other using a star topology stating what hardware will be needed.

(b) Star topology networks are more commonly used than Bus topology networks. Give **two** advantages and **two** disadvantages of a Star topology network compared to a Bus topology network. [4]

Advantages: .....

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Disadvantages: .....

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