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STUDY COURSE MATERIAL
COMPUTER
SESSION-2020-21
CLASS-VII

TOPIC: NETWORK COMMUNICATION AND MOBILE OS

DAY-1

❖ **TEACING MATERIAL**

A **computer networking** is a process of connecting two or more **computers** via physical cabling and networking components like **hub**, **router**, **gateways** etc for sharing data or information such as files, documents and resource such as printer, internet, disk storage. Processing load is the main objective of computer networking.

Advantages of Computer Network are:
- Centralized Software Management
- Resource sharing
- Speed
- Cost Efficient
- Security

Types of Network:

a. **PAN (Personal Area Network) : It is a network for communication among personal devices of an individual. The devices can include cell phones, computers, cameras, laptops and tablets.**

b. **LAN (Local Area Network):** Local area network allows for high speed exchange of essential information between key people in organization. It is easy to control and manage the entire *Local Area Network (LAN)* as it is available in one small region.

c. **WAN (Wide Area Network) :** WAN is short for *Wide Area Network*. It is a network which covers a large geographical area. It connects different smaller network such as *Local Area Network (LAN)* , metropolitan area network (**MAN**) . This network is used to connect cities, states, or countries.

d. **MAN (Metropolitan Area Network) :** MAN is short for *Metropolitan Area Network*. It is larger than *Local Area Network (LAN)* but smaller than **WAN**. This network is designed to

extend over an entire city. It is usually owned by single large organization

LINK-1

https://www.youtube.com/watch?v=Dnq7YHIOOfM

❖ **PPT LINKS**

LINK-1

https://www.slideshare.net/sushovan93/networking-ppt-29223825

❖ **DOCUMENTS LINKSj**

https://drive.google.com/drive/u/1/folders/1omfOhFknN8JqQEjV_EU5vw9YTOii6d6g

DAY-2

❖ **TEACING MATERIAL**

NETWORK TOPOLOGY

Network topology refers to the arrangement of computers connected in a network through some physical medium such as cable, optical fiber etc. **Topology generally determines the shape of the network**. The **various types of network topologies are as follows**:
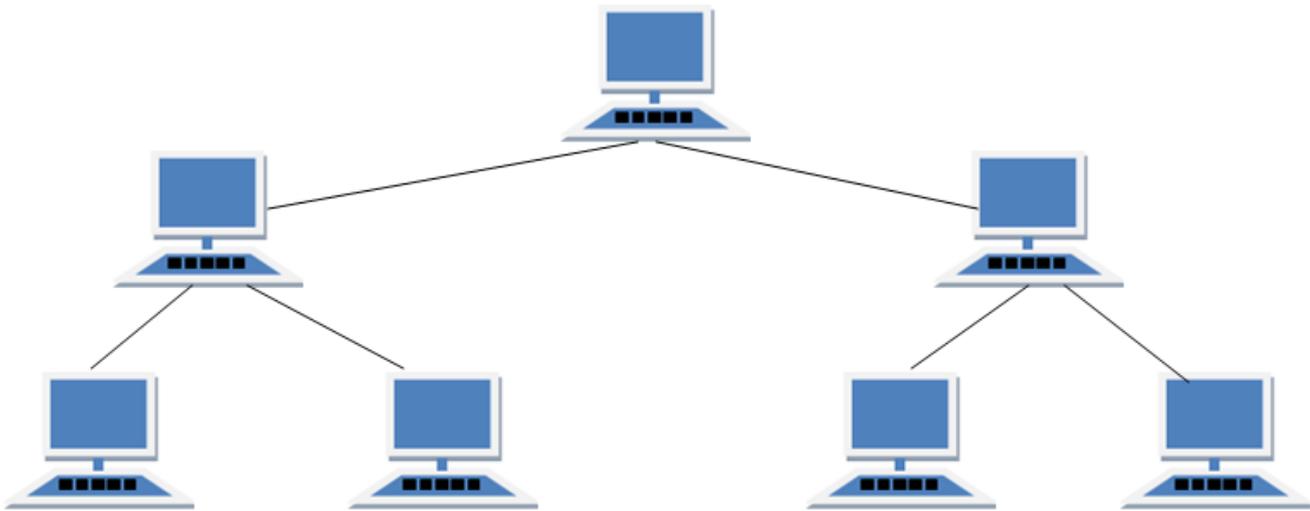
1. Hierarchical topology
2. Bus topology
3. Star topology
4. Ring topology
5. Mesh topology
6. Hybrid topology

1) Hierarchical Topology

The hierarchical topology is also known as tree topology, which is divided into different levels connected with the help of twisted pair, coaxial cable or fiber optics

This type of topology is arranged in the form of a tree structure in which top level contains parent node (root node), which is connected with the child nodes in the second level of hierarchy with point-to-point link. The second level nodes are connected to the third level nodes, which in turn are connected to the fourth level nodes and so on. Except the top-level nodes, each level node has a parent node.

The number of point-to-point links in the hierarchical type of topology is generally one less than the total number of nodes in the structure. The hierarchical topology is symmetrical, having a fixed branching factor, f, associated with each node. The branching factor is the number of point-to-point links between the levels of hierarchy. **Figure 1 shows the arrangement of computers in hierarchical topology**.

Advantages of hierarchical topology are:

- The hierarchical topology is generally supported by most hardware and software.
- In the hierarchical topology, data is received by all the nodes efficiently because of point-to-point link.

The following are the disadvantages of hierarchical topology:

- In the hierarchical topology, when the root node fails, the whole network crashes.
- The hierarchical topology is difficult to configure.

2) Linear Bus Topology

In the linear bus topology, all the nodes are connected to the single backbone or bus with some medium such as twisted pair, coaxial cable etc.

When a node wants to communicate with the other nodes in the network, it simply sends a message to the common bus. All the nodes in the network then receive the message but the node for which it was actually sent only processes it. The other nodes discard the message. **Figure 2 shows the arrangement of computers in the linear bus topology**.
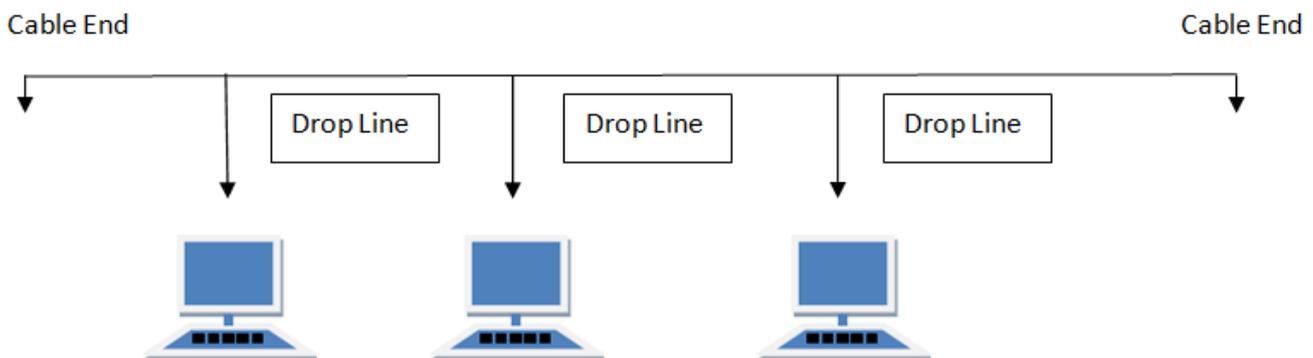
Advantages of linear bus topology are:

- The linear bus topology usually requires less cabling.
- The linear bus topology is relatively simple to configure and install.
- In the linear bus topology, the failure of one computer does not affect the other computers in the network.
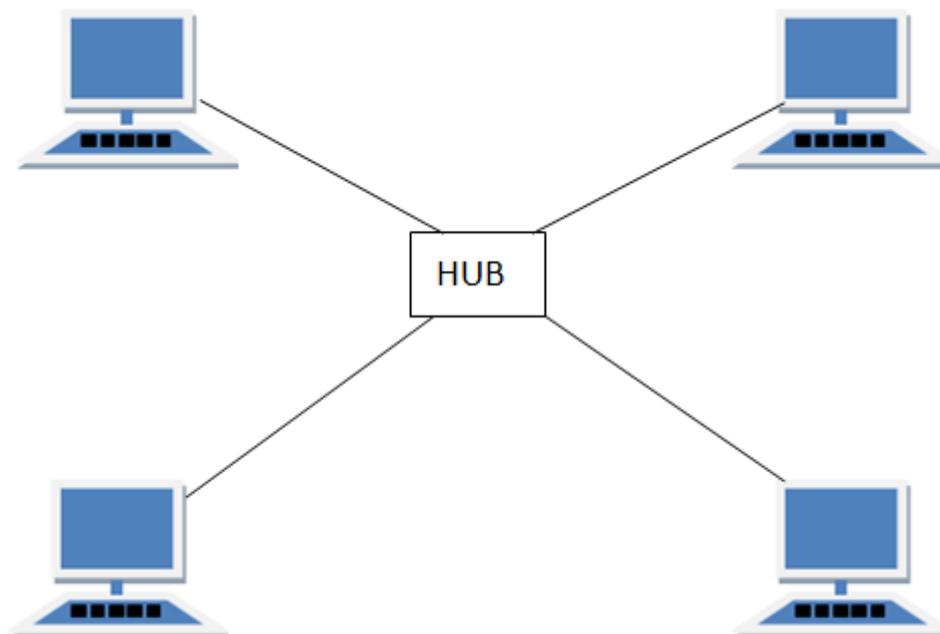
The following are the disadvantages of linear bus topology:

- In the linear bus topology, the failure of the backbone cable results in the breakdown of entire network.
- Addition of computers in the linear bus topology results in the performance degradation of the network.
- The bus topology is difficult to reconstruct in case of faults.

3) Star Topology

In the star topology, all the nodes are connected to a common device known as hub. Nodes are connected with the help of twisted pair, coaxial cable or optical fiber.

When a node wants to send a message to the other nodes, it first sends the message to the hub, which in turn forwards the message to the intended node. Each node in the network is connected with a point-to-point link to the centralized hub. The task of hub is to detect the faulty node present in the network. On the other hand, it also manages the overall data transmission in the network. Figure 3 shows the arrangement of computers in the star topology.

Advantages of star topology are:

- This topology allows easy error detection and correction.
- In the star topology, the failure of one computer does not affect the other computers in the network.
- Star topology is easy to install.

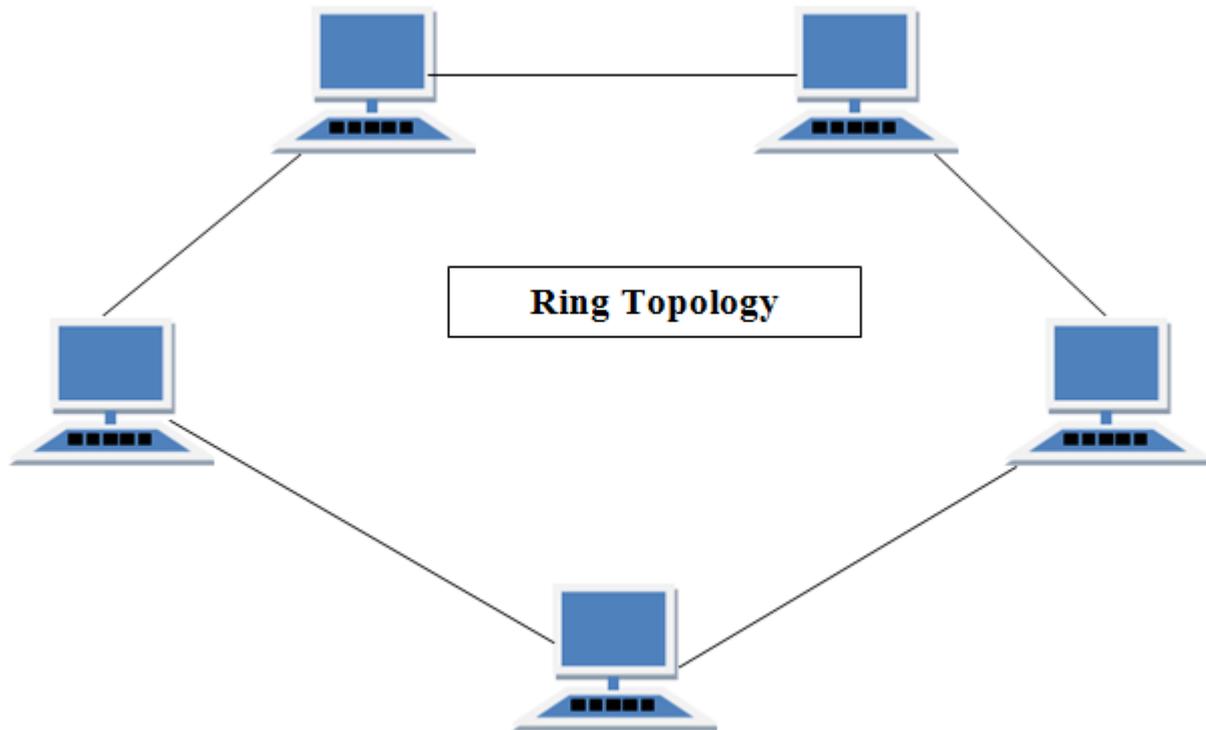**The following are the disadvantages of star topology:**

- In the star topology, the hub failure leads to the overall network crash.
- The star topology requires more amount of cable for connecting the nodes.
- It is expensive due to the cost of the hub.

4) Ring Topology

In the ring topology, the nodes are connected in the form of a ring with the help of twisted pair cable.

Each node is connected directly to the other two nodes in the network. The node, which wants to send a message, first passes the message to its consecutive node in the network. Data is transmitted in the clockwise direction from one node to another.

Figure 4 shows the arrangement of computers in the ring topology. Each node incorporates a repeater, which passes the message to next node when the message is intended for another node.

Ring Topology

Advantages of ring topology are:

- Each node has an equal access to other nodes in the network.
- Addition of new nodes does not degrade the performance of the network.
- Ring topology is easy to configure and install.

The following are the disadvantages of ring topology:

- It is relatively expensive to construct the ring topology.
- The failure of one node in the ring topology affects the other nodes in the ring.

5) Mesh Topology

In mesh topology, each computer is connected to every other computer in point-to-point mode as shown in figure 5. For example, if we have four computers, we must have six links. If we have n computers, we must have n(n-1)/2 links.

A message can take several possible paths to reach a destination.
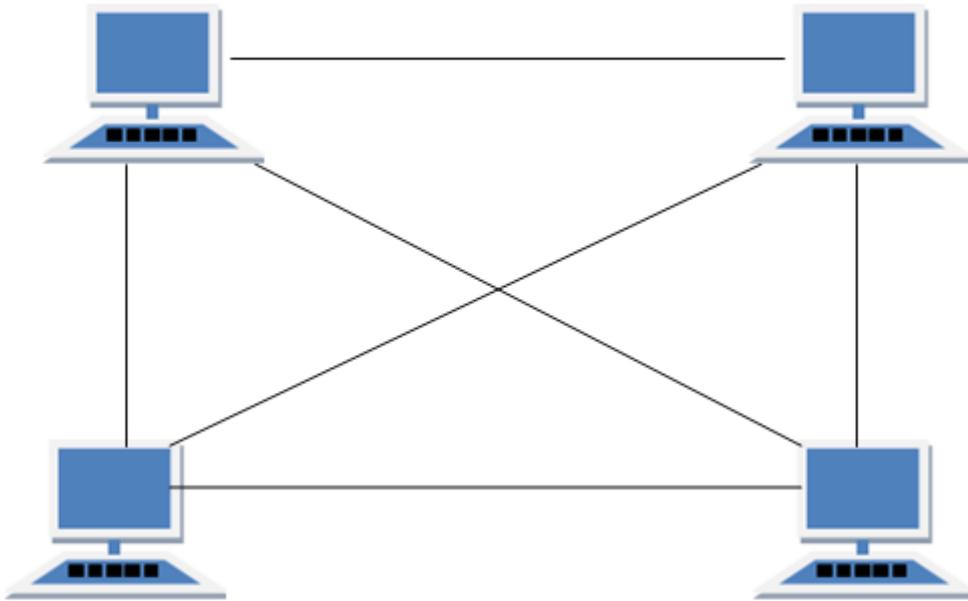
Advantages of mesh topology are:

- Message delivery is more reliable.
- Network congestion is minimum due to large number of links.

The following are the disadvantages:

- It is very expensive to implement.
- It is very difficult to configure and install.

6) Hybrid Topology

The hybrid topology is the combination of multiple topologies, used for constructing a single large topology. The hybrid topology is created when two different network topologies are interconnected.

If two ring topologies are connected then the resultant topology is not the hybrid topology. On the other hand, if the ring topology is connected to the bus topology then the resulting topology is called the hybrid topology. This topology generally combines the features of the two topologies and is therefore more effective and efficient than the individual topologies. **Figure 6 shows a typical arrangement of computers in hybrid topology**.
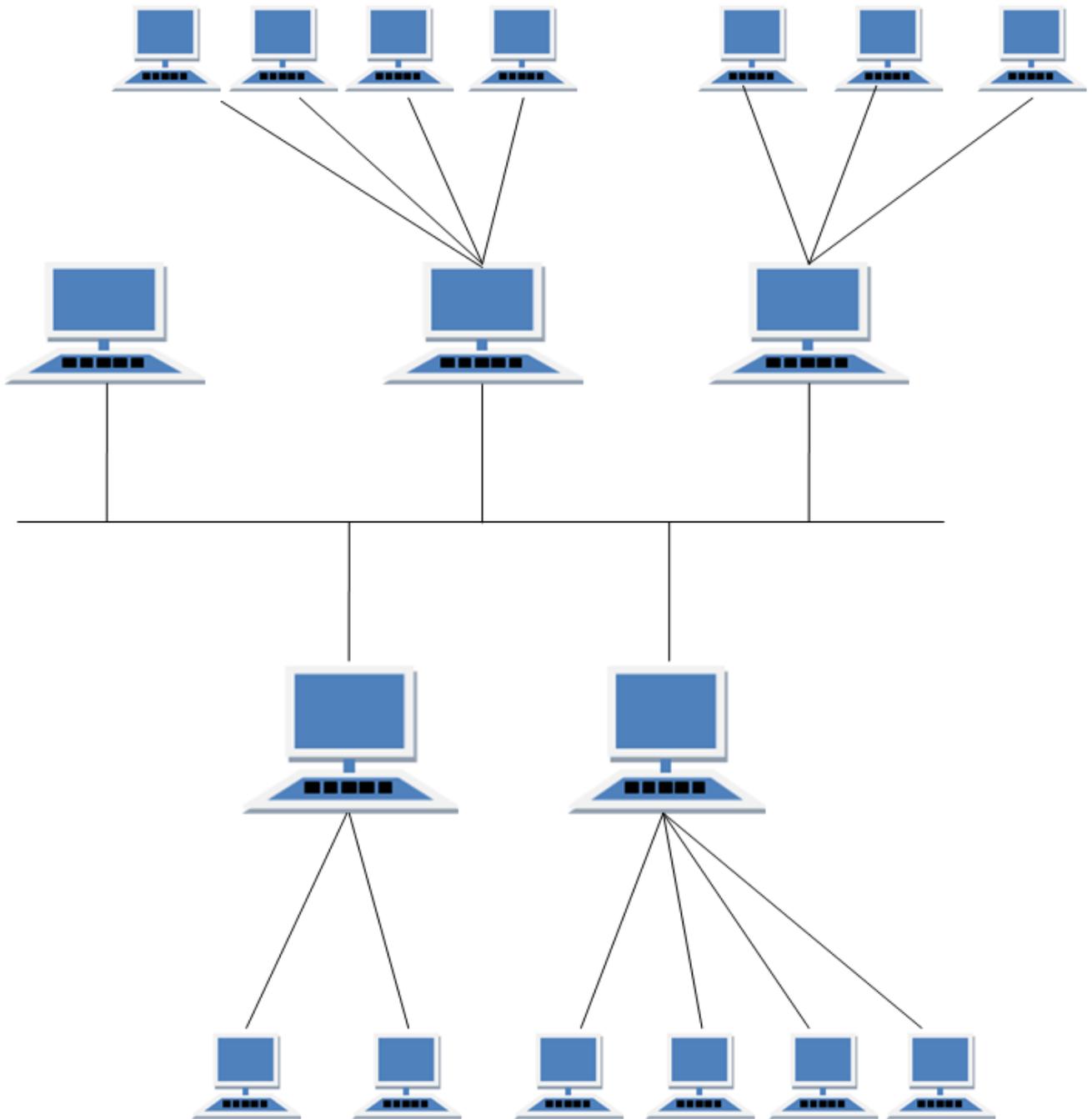
Advantages of hybrid topology are:

- The hybrid topology is more effective as it uses multiple topologies.
- The hybrid topology contains the best and efficient features of the combined topologies from which it is constructed.

The following are the disadvantages of hybrid topology:

- The hybrid topology is relatively more complex than the other topologies.
- The hybrid topology is difficult to install and configure.

https://www.youtube.com/watch?v=F35sSPTahS8

DAY-3

❖ **VIDEO-LINKS**

MUST WATCH

https://www.youtube.com/watch?v=F35sSPTahS8

https://www.youtube.com/watch?v=Dnq7YHIOOfM

https://www.youtube.com/watch?v=zbqrNg4C98U

❖ **PPT LINKS**

jjjjhttps://www.slideshare.net/sushovan93/networking-ppt-29223825

DAY-4

What is a Mobile Operating System (Mobile OS)?

Much like the Linux or Windows operating system controls your desktop or laptop computer, a mobile operating system is the software platform on top of which other programs can run on mobile devices. The operating system is responsible for determining jthe functions and features available on your device, such as thumb wheel, keyboards, WAP, synchronization with applications, email, text messaging and more. The mobile OS will also determine which third-party applications (mobile apps) can be used on your device.

Types of Mobile Operating Systems

When you purchase a mobile device the manufacturer will have chosen the operating system for that specific device. Often, you will want to learn about the mobile operating system before you purchase a device to ensure compatibility and support for the mobile applications you want to use.

9 Popular Mobile Operating Systems

1. Android OS (Google Inc.)

The Android mobile operating system is Google's open and free software stack that includes an operating system, middleware and also key applications for use on mobile devices, including smartphones. Updates for the open source Android mobile operating system have been developed under "dessert-inspired" version names (Cupcake, Donut, Eclair, Gingerbread, Honeycomb, Ice Cream Sandwich) with each new version arriving in alphabetical order with new enhancements and improvements.

2. Bada (Samsung Electronics)

Bada is a proprietary Samsung mobile OS that was first launched in 2010. The Samsung Wave was the first smartphone to use this mobile OS. Bada provides mobile features such as multipoint-touch, 3D graphics and of course, application downloads and installation.

3. BlackBerry OS (Research In Motion)

The BlackBerry OS is a proprietary mobile operating system developed by Research In Motion for use on the company's popular BlackBerry handheld devices. The BlackBerry platform is popular with corporate users as it offers synchronization with Microsoft Exchange, Lotus Domino, Novell GroupWise email and other business software, when used with the BlackBerry Enterprise Server.

4. iPhone OS / iOS (Apple)

Apple's iPhone OS was originally developed for use on its iPhone devices. Now, the mobile operating system is referred to as iOS and is supported on a number of Apple devices including the iPhone, iPad, iPad 2 and iPod Touch. The iOS mobile operating system is available only on Apple's own manufactured devices as the company does not license the OS for third-party hardware. Apple iOS is derived from Apple's Mac OS X operating system.

5. MeeGo OS (Nokia and Intel)j

A joint open source mobile operating system which is the result of merging two products based on open source technologies: Maemo (Nokia) and Moblin (Intel). MeeGo is a mobile OS designed to work on a number of devices including smartphones, netbooks, tablets, in-vehicle information systems and various devices using Intel Atom and ARMv7 architectures.

6. Palm OS (Garnet OS)

The Palm OS is a proprietary mobile operating system (PDA operating system) that was originally released in 1996 on the Pilot 1000 handheld. Newer versions of the Palm OS have added support for expansion ports, new processors, external memory cards, improved security and support for ARM processors and smartphones. Palm OS 5 was extended to provide support for a broad range of screen resolutions, wireless connections and enhanced multimedia capabilities and is called Garnet OS.

7. Symbian OS (Nokia)

Symbian is a mobile operating system (OS) targeted at mobile phones that offers a high-level of integration with communication and personal information management (PIM) functionality. Symbian OS combines middleware with wireless communications through an integrated mailbox and the integration of Java and PIM functionality (agenda and contacts). Nokia has made the Symbian platform available under an alternative, open and direct model, to work with some OEMs and the small community of platform development collaborators. Nokia does not maintain Symbian as an open source development project.

8. webOS (Palm/HP)

WebOS is a mobile operating system that runs on the Linux kernel. WebOS was initially developed by Palm as the successor to its Palm OS mobile operating system. It is a proprietary Mobile OS which was eventually acquired by HP and now referred to as webOS (lower-case w) in HP literature. HP uses webOS in a number of devices including several smartphones and HP TouchPads. HP has pushed its webOS into the enterprise mobile market by focusing on improving security features and management with the release of webOS 3.x. HP has also announced plans for a version of webOS to run within the Microsoft Windows operating system and to be installed on all HP desktop and notebook computers in 2012.

9. Windows Mobile (Windows Phone)

Windows Mobile is Microsoft's mobile operating system used in smartphones and mobile devices – with or without touchscreens.

The Mobile OS is based on the Windows CE 5.2 kernel. In 2010 Microsoft announced a new smartphone platform called Windows Phone 7.

❖ DOCUMENTS LINKS

https://www.slideshare.net/gsantosh031/mobile-operating-system-ppt

❖ VIDEO-LINKS

https://www.youtube.com/watch?v=hhfmiE5Kmxsjjj

DAY-5

NETWORK COMPONENTS

Network Hardware

These are the devices used to interconnect the components of the network, basically the network cards, the cabling between servers and workstations, as well as the cables to connect the peripherals.

Resources to Share

They are resources of both Software and Hardware devices. The most common hardware devices are printers, hard drives, drives, CD ROM drives. Among the Software resources that are shared are programs, files, applications, etc.

File Server

The primary goal of a computer network is to share data among several users. They also make their attached disk drives, printers, modems, and unique communication links available to the various client stations. Providing one computer with one or more hard disks facilitates this. All client stations share these hard disks. Clients can make their requests to access any of the shared facility to the server. The file server is a powerful computer, which runs special software. It provides the files and other shared resources to different users in the network. It provides facilities like user authentication, security to various user programs, and data. It can access through a network operating system (NOS). Typical configurations of a server are Pentium 4 machine with 128MB or higher capacity RAM, 40 GB or higher capacity hard disk, to serve up to 10 nodes or workstations.

All activities of a file server can be monitored and controlled from the monitor called console. The network administrators gave special privileges. They gave supervisory passwords. They perform the network administration operation for the entire network. Any user of the network needs to get a new network service; they have to contact the network administrator and make a request for the specific service they need. The file server has a prodigious memory, which used for caching directories and files and hashing directories. Novell Netware and Windows NT are the two network operating systems that run on a server machine.

Workstation

Another critical component of a network is the workstation or a client. A workstation is an individual computer with capabilities to communicate with other machines. It must equip with the hardware and software necessary to connect to a LAN. Usually, a Network Interface Card (NIC) or an Ethernet card or an Arc net card use for this purpose. Part of the network operating system is also available in the workstation. A workstation can communicate with other workstations or to the server. The hardware requirement for a workstation depends on the application and the size of the network. In a typical LAN of a university

computer center, a Pentium III system with 64MB RAM and 4 to 8GB hard disk capacity, with necessary network interface card can use for a typical workstation. In general, c the memory and hard disk capacity of a workstation are much less than that of the server.

Network Operating Systems

Network operating systems (NOS) is the logical component that controls communications, shared resources on the network, and provides distributed processing capacity. At first, the network operating systems only allowed to share printers and disks. A single station could access a disk volume at a time. Currently, network operating systems provide the basis for creating client/server applications, integrating different types of computers, and forming workgroups.

In most networks, the operating system works in conjunction with the computer's operating system. The computer's operating system first processes system commands. When a local request made, a command that only specifies the resources/devices of the station, this is done at the user station. When a request is made that requires the participation of the logical equipment or network devices, it passed to the network operating system for processing.

Network Interface Unit

Every computer on the network needs one add-on card called the Network Interface Card (NIC) or Ethernet adapter or Network Interface Adapter. The role of NIC is to move the serial signals on the network cables or media into parallel data stream inside the Pc. In some cases, two or more such NIC's are used in the server to split the load. These interface units also have important jobs of controlling access to the media. It includes activities known as carrier sense (listen before transmit), following station number, and token passing. The above activities are known as Media Access Control.

Transmission Media

The data signal travels through this medium. There are two general categories. They are bounded (guided) and unbounded (unguided) medium. Twisted pair, coaxial cable, and fiber optic cables are all bounded media. The data signals travel within the boundaries of the transmission media. On the other hand, microwave and satellite transmissions, both travel through the air, which has no boundaries, hence called unbounded transmission.

Hub

The network hub is a centralized distribution point for all data transmission in a network. Hub may also refer to as a concentrator Data packet from a NIC arrives at the hub. The hub receives and rebroadcasts them to other computers connected to it. In general, the hub network is a passive device. It does not know the destination of a received data packet. Hence, it is required to send copies to all the hub connections. Hubs can classify into the following three categories.
• Stackable and non-stackable hubs
• Active and passive hubs
• Intelligent and non-intelligent hubs
Stackable hubs are hubs that can be stacked or interconnected to make a single hub appearance. They are useful for vendors to make hubs of a size suitable to customer requirement. Non-stackable hubs cannot be interconnected. They always provided only a fixed number of connections.

The hubs that connect to the network backbone are known as active hubs. The hubs, which connect only to active hubs, are known as passive hubs. Intelligent hubs contain a special firmware that can be accessed by remote workstations. The firmware is known as the Simple Network Management Protocol (SNMP). Network performance and Network status data read from SNMP.

Repeater

A repeater is a communication device that connects two segments of the network cable. It retimes, regenerates, strengthens the digital data, and sends them on their way again. Repeaters are often used to

extend the cable length to enlarge LANs. Wide area network contains many repeaters. Ethernet also frequently uses repeaters to extend the length of the bus.

Bridge

A bridge interconnects two networks using the same technology (such as Ethernet or Arc net). The bridge is more sophisticated than a repeater. A modern bridge reads the destination address of the received packet and determines whether the address is on the same segment of the network cables of the originating station. If the destination is on the other side of the bridge, the bridge transmits the packet into the traffic on that cable segment. Local bridges are used to connect two segments of the same LAN. Remote bridges are used to link local LAN cables to thin long distance cables to link two physically separated networks. Network administrators often use bridges to split the big networks into several small networks. Bridges are easy to install. They provide an easy way to perform network management functions.

Router

A router transfers data between networks. It is also possible for a router to transfer data between different compatible network technologies such as Ethernet and IBM token ring. Since the Internet consists of thousands of different network technologies, routers are an integral part of the Internet. A router has the address on the network. A bridge does not have an address. Hence, a router can act as an intermediate destination. In other words, a computer can send a data packet to the router of another network. The router transfers   the   packet   to   the   other   network.
On the other hand, the bridge must examine all the packets to determine which packets to transmit between networks. As such, computers never send packets directly to a bridge. A router examines a packet only if it contains   the   router's   address.
A router also can act as a bridge. Such a router is known as a router. The router receives the packet and examines whether it supports the protocol used by the packet. If not, it only drops the packet. The packet is bridged using the physical address information.

Gateway

Two different networks can be connected using a gateway. For example, a mainframe can be connected and accessible to a PC network using a gateway. Unlike routers, a gateway converts the format of the data sent between two networks. A router adds only addressing information to the data packet. Routers never change the content of the message. However, a gateway has to identify the protocols used in the networks, and recognize the data format and convert the message format into a suitable format to be accepted by the other network. Wide area networks often use gateways because there is a large number of different networks present in a WAN. Gateways provide excellent connectivity to different kinds of networks on the Internet.

Modem

Another significant network component is modern. The term Modem is the shortened version of the name modulator-demodulator. Modern provides two-way communication facility between a computer network and telephone network. As Wide Area Network uses the existing telephone network to connect to a distant network, it always uses a modern to dial-up the telephone network. The modem converts the digital data from the computer into useful analog signals that can transmit through a telephone network. Similarly, signals from the telephone channels are converted back into digital data s1suitable for a computer.

❖ DOCUMENTS LINKS

http://ecomputernotes.com/computernetworkingnotes/computer-network/computer-network-components

❖ VIDEO-LINKS

http://ecomputernotes.com/computernetworkingnotes/computer-network/computer-network-component

EXERCISE:

10. Medium used for transmission of data between the nodes on a network is called transmission channels. These channels can be wired or wireless.

11. Wired transmission channels refer to transmission of data over a wire based networking. For example, twisted pair, coaxial cable and fibre-optic.

12. Wireless communication is the transfer of information over a distance without the use of wires. Microwaves, bluetooth, infrared rays are used in wireless communication.

13. Development of both computer and mobile OS is different for different set of users.

14. Some of the mobile OS are Android by Google, iOS by Apple, Windows phone by Microsoft, BlackBerry OS by RIM, webOS by HP and Symbian OS by Nokia.

15. Mobile application development is a set of instructions written to develop applications for smartphones and mobile devices.

EXERCISE

A. State true or false.

1. Bluetooth technology is a form of wireless communication.

2. In a bus topology, all workstations are connected to the central hub.

3. A mobile phone is capable of handling unlimited memory.

4. Androids are more prone to malwares and data stealing.

5. webOS is a Linux based open source operating system.

B. Fill in the blanks.

1. Types of transmission channels are .... and ....

2. .... is a computer that manages storage and retrieval of files.

3. In .... computers are interconnected within a limited geographical area.

4. .... is a set of instructions written to develop applications for smartphones and mobile devices.

5. .... is one of the most popular operating systems designed by Android, Inc.

C. State the differences between:
1. LAN and MAN
2. Star and Bus topology
3. Desktop and Mobile OS
4. Android and iPhone OS
5. Client/server and Peer-to-peer architecture

D. Match the following.

1. Android	a. Apple products
2. webOS	b. Small software units with limited functions
3. Smartphones	c. Linux based OS
4. IOS	d. Compact computers
5. Mobile apps	e. Prone to malware threat

E. Answer the following questions.
1. What is networking? State its advantages and disadvantages.
2. What are the different components of a computer network? Explain them briefly.
3. What is a topology? Explain the different types of topologies used in computer networks.
4. What is Mobile OS? Give few examples.
5. Give two reasons for developing a mobile app.

LAB WORK

A. Find out the topology of the network used in your school's computer lab. Find out the main reason for implementing that specific topology in the lab. Write an article in MS Word 2010 stating the definition, advantages and disadvantages of using that specific topology. Insert a few relevant pictures using the Internet.

B. How do cell phones work? Try to find out the technology used and the wireless transmission channel used in the cell phone technology. Take help of the Internet to research on this topic.

C. Make a presentation on different types of Mobile OS. Take help of the Internet to get information and insert pictures wherever possible.

D. These days we can buy and sell products like clothes, cars, furniture, medicines, cosmetics and lot more through mobile apps. Make a document of any five most commonly used apps for buying and selling products these days. Also, name a few websites associated with these specific apps listed by you.

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