

CHAPTER XVII**INFORMATION
SYSTEMS****17.1 Introduction****17.2 Information Systems****17.3 Classification of Information Systems****17.4 Information Technology****17.5 Internet**

Concepts & Issues that emerge from the content

- ❖ Introduction
 - + Data & information
 - + Data processing
 - + Characteristics & classification of information
- ❖ Information systems
 - + Necessity & importance
 - + Roles of information systems
- ❖ Classification of information systems
 - + According to the level of usage
 - + According to the usage
 - + According to the management function
- ❖ Information technology
 - + Introduction
 - + Technologies related to IT
 - + Importance & benefits of IT
- ❖ Internet
 - + Introduction
 - + Services provided by internet
 - + Social media networks



17.1 INTRODUCTION

What is an Information System?

An information system can be defined technically as a set of inter-related components that collect (or retrieve), process, store & distribute information to support decision making & control in an organization.

Source – Management Information Systems (5th edition) – Kenneth & Jane

An information system (IS) is a system composed of people & computers that process or interpret information.

Source – www.wikipedia.org

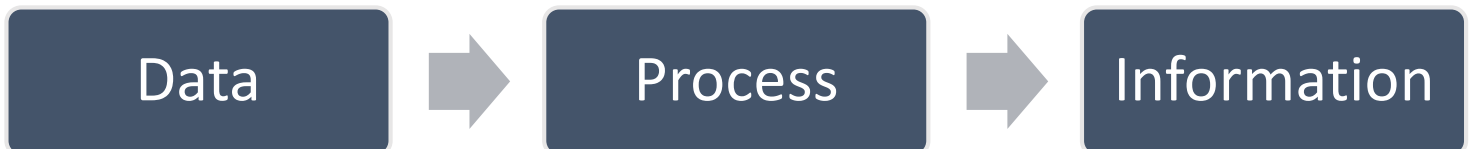
Information system is an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products.

Source – www.brittanica.com

A combination of hardware, software, infrastructure and trained personnel organized to facilitate planning, control, coordination, and decision making in an organization.

Source - www.businessdictionary.com

What are the Components of an Information System?



Data

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 In other words, Basic facts & numbers generated by various events that take place in the environment or in the organization & by business transactions are known as data.

Types of Data can be;

1. Pictorial Data
2. Numerical Data
3. Audio Data
4. Video Data

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Note -

Process

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In other words, the set of manual & written activities involved in converting the data into information, so that decisions can be made.

Note –

Information

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In other words, the data that has gone through the conversion process & is now in the understandable form & can be used to make decisions.

Ex –

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How can data & information be differentiated?

Data	Information

What are stages of Evolution in Information Systems?

1. Nomadic Era
2. Agricultural Era
3. Industrial Era
4. Information Era

What are the functions of a data processing process?

1. Classifying
2. Sorting
3. Calculating
4. Summarizing



How can the data processing technology be classified?

1. Manual System

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2. Semi-manual System

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3. Electro-mechanical System

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4. Electronic System

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Why Information is important for a Business Organization?

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What are the qualities & features of good information?

- 1. Accuracy
- 2. Completeness
- 3. Confidence / Reliability
- 4. Understandability
- 5. Relevancy
- 6. Availability
- 7. Timely
- 8. Cost effective
- 9. Comparability

- 10. Descriptive
- 11. Protected / Safe
- 12. Flexible

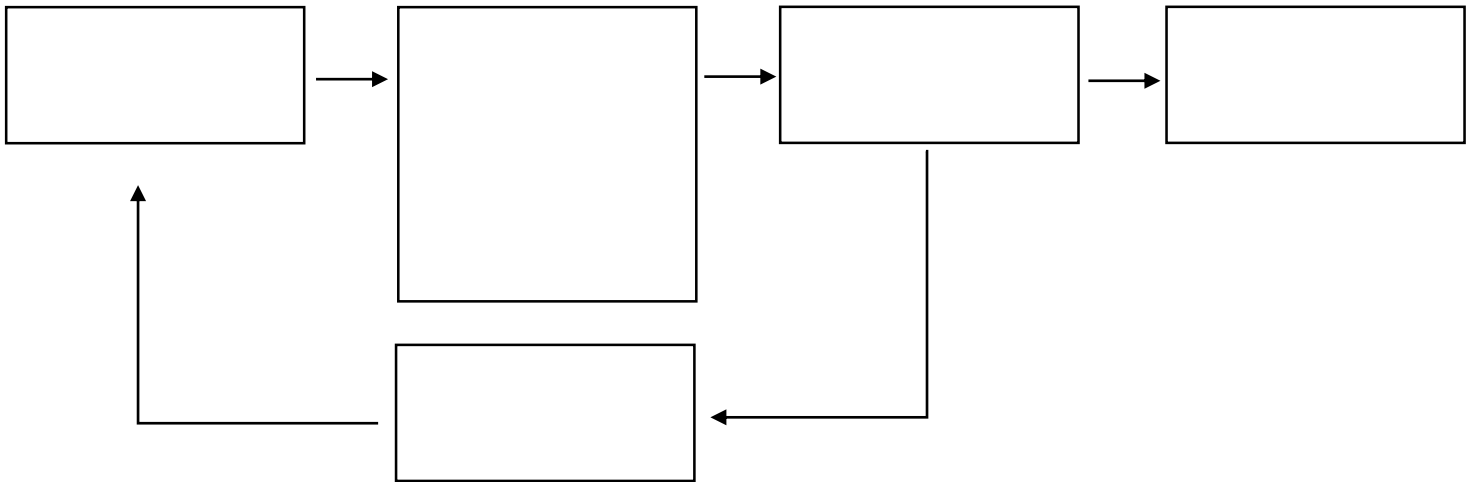
How to classify information?

Base	Classification	Explanation
Source	External	
	Internal	
Nature	Qualitative	
	Quantitative	
Occurrence	Routine	
	Non-routine	
Probability	Deterministic	
	Probabilistic	
Collectiveness	Aggregated	
	Disaggregated	
Time	Past	
	Present	
	Future	

Management Requirement	Finance Operations Marketing HR	
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17.2 INFORMATION SYSTEMS

How can a basic information system look like?



What are the functions of an information system?

1. Input

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Input Devices can be;

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2. Processing

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3. Output

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Output Devices can be;

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4. Storage

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Storage Devices can be;

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5. Feedback

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What are the components of a Computerized Information System?

1. Hardware

This is the set of equipment & components that are used or included in a computer system. In other words, all physical components in an information system are known as hardware.

Ex -

2. Software

These are the programs that are required to run & control the necessary duties in a computer system. In other words, these are Computer programs used for data processing. Software can be classified into 3 as;

A. Operating System (OS)

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B. Utility Programs

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C. Application Software

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3. Live-ware

These are the human beings using the information system. In other words, the users or consumers of the information system are known as live-ware.

Ex -

4. Firmware

Firmware is a software program or set of instructions programmed on a hardware device. It provides the necessary instructions for how the device communicates with the other computer hardware. In other words, Computer programs stored permanently in the components within the computer & provides instructions on how the devices should operate. Firmware cannot be changed or deleted by a user without the aid of special programs. Updates to firmware are provided by the manufacturer.

Ex -

5. Data

This is the input in an information system to enable the process of creating information. In other words; basic facts, numbers, words etc entered into the information system in order to process.

6. Procedures

This is basically how the data processing will be done. In other words, the agreements, regulations & policies established to control the functions & components of the information system. If there are no procedures, the possibility of fraud & errors are high.

What is the importance & necessity of Information Systems?

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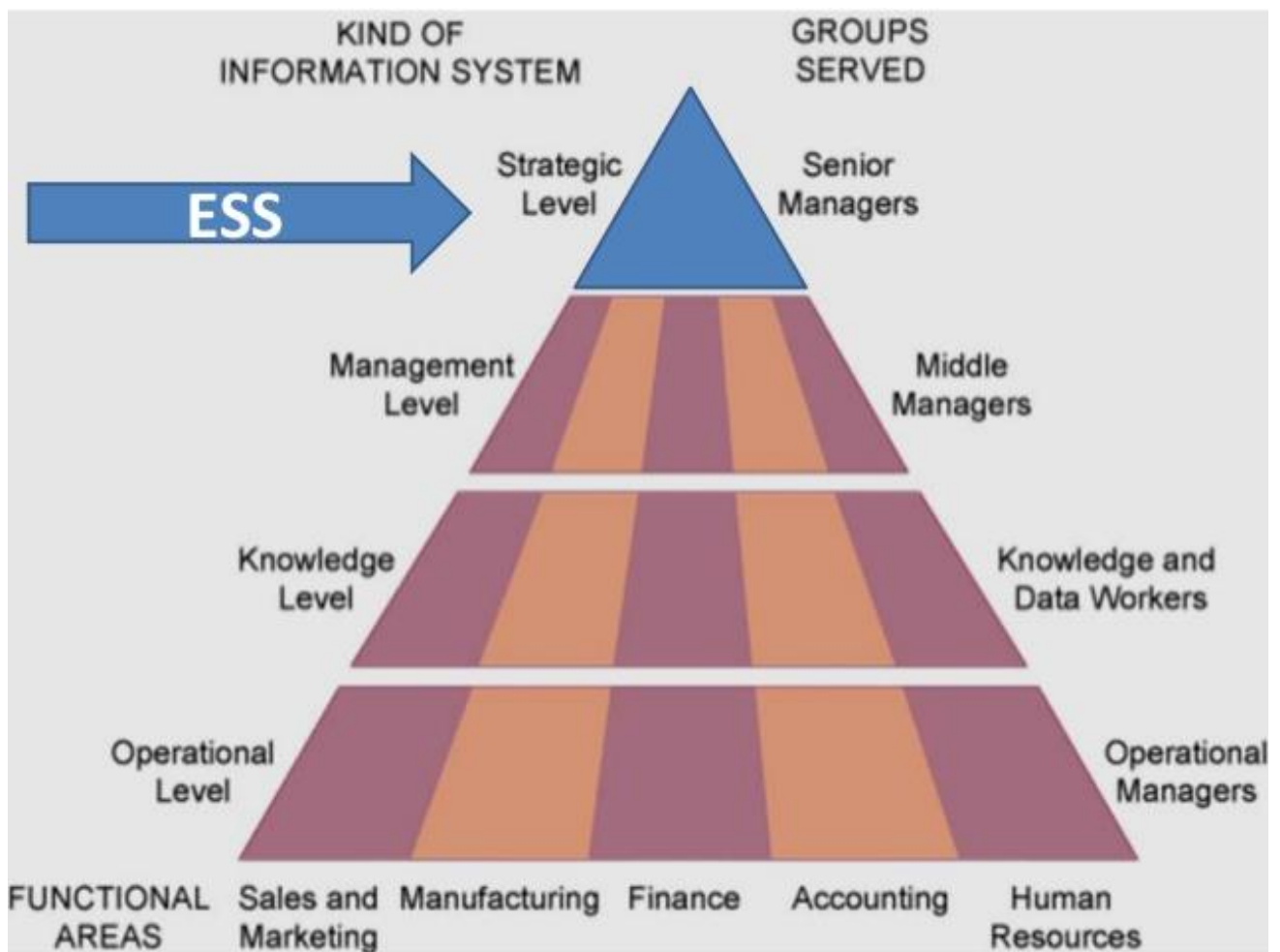
What are the roles of an effective information system?

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17.3 CLASSIFICATION OF INFORMATION SYSTEMS

How can Information Systems be classified?

Usage	Levels using	Functions
TPS	Operational level IS	Operations IS
OAS	Knowledge Level IS	Marketing IS
KWS	Managerial Level IS	Finance IS
MIS	Strategic Level IS	HR IS
DSS		R&D IS
ESS		
BIS		



How can Information Systems be classified based on levels of usage?

1. Operational level information systems

This is the system that helps operational level managers to identify & control an organization's day to day routine transactions & activities such as, turnover, pay sheets, material consumption, employee attendance, purchases etc. It helps assist operational managers to make decisions on basic activities & transactions of the business.

Type of Information System used is;

2. Knowledge level information systems

This is the system which assists knowledge & data workers in an organization in work stations & office systems. Knowledge level employees are the professionals such as lawyers, accountants, auditors, engineers, system analysts, IT managers etc who generate information.

Types of Information Systems used are;

3. Tactical level information systems

This is the system that assists middle level managers in monitoring, controlling, decision making & administrative activities. This systems is used to implement & control the activities accordingly to with the decisions made by strategic level managers. Marketing managers, financial managers, production managers & human resource managers are some of the managers who use information systems of this level.

Types of Information Systems used are;

4. Strategic level information systems

This is the system used to assist the top level management to make long term decisions & adjust long term trends while solving internal & external problems. The decisions made here may affect 5 years & above & this information is mostly summarized.

Type of Information System used is;

How can Information Systems be classified based on usage?

1. Transaction Processing System (TPS)

This is a computerized system used to record day to day routine transactions & events in a business organization. The focus here is mostly short term.

These are the systems used to process basic data generated through frequently occurring functions. Reporting & necessary updating of the data relevant to daily operations are done using these systems. There can be several transaction processing systems for each department such as;

- A. Marketing –
- B. Operations –
- C. Finance –
- D. HR –
- E. Other –

2. Office Automation System (OAS)

This is a system used to assist day to day office activities of an organization. These systems can copy data and information electronically & to communicate them in the same form. 3 basic activities of an OAS can be; Storage of information, data exchange & data management. Such office activities can be;

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3. Knowledge Level System (KWS)

This is the system used by knowledge & data workers to create new information & knowledge. This information systems that generate information required by knowledge employees such as engineers, doctors, lawyers and researchers etc.

Data workers are employees involved in usage & providing information such as;

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Knowledge workers are employees who create & promote new knowledge using data & information, such as;

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4. Management Information System (MIS)

This is a system providing the required information to middle level managers to plan, control & make mid-term decisions. The MIS would summarize the operational details & present it to the user, where the source for MIS is TPS.

This system provides information in the form of reports at a special requirement or periodic requirements in a uniform way as daily, weekly, monthly & annually.

Ex –

Periodical reports – Daily sales reports,

Monthly – Receipts from debtors reports

Special reports – Providing a report regarding a specific debtor when the management wants.

5. Decision Support System (DSS)

This is a system used to assist the middle level managers to make sudden decisions which are not pre-determined, always changing & non-routine. This system will analyze the data & present it to the user so that decisions can be made easily. The source of information for DSS will be MIS & TPS. The decisions can be;

Structured decisions – Calculating of the EOQ according to the formula

Semi-Structured decisions – Investment evaluating decisions

6. Executive Support System (ESS)

This is a system which assists the top level management to make long term strategic decisions on the organization. The MIS & DSS will be the source for ESS which will summarize the data & present information to the top level to make decisions. The strategic level managers often have to make non structured non structured decisions using ESS because a pre-determined problem solving structure



cannot be used for decision making most of the time. The decisions made here are effective for at least 5 years & above.

7. Business Intelligence System (BIS)

The technology, methods & applications used for the integration & presentation of business information, is known as Business Intelligence System. The business decisions making made by an enterprise is supported by the BIS.

Through business intelligence, one is enabled to have a more tactical and meaningful business decision. In other words, it is also the process of transforming raw data into meaningful information to make an informed business decision that helps in the growth of the business. It is comprised of a combination of data analysis applications and data of varied kinds transformed into data that gives a business enterprise capability to make wise business decisions

How can Information Systems be classified based on Management Functions?

Marketing Information Systems	
Finance Management Information Systems	
Operations Management Information Systems	
HR Management Information Systems	
Research & Development Information Systems	

17.4 INFORMATION TECHNOLOGY

What is Information Technology?

Information technology (IT) is the use of computers to store, retrieve, transmit, and manipulate data, or information, often in the context of a business or other enterprise. In other words, the study or use of systems (especially computers and telecommunications) for storing, retrieving, and sending information. IT is a combination of the following;

1. Computing technology

In other words, a computer network is a set of computers & devices connected together for the purpose of sharing resources. The connection may be physical, electronic or virtual where most common resource shared today is connection to the Internet. Other shared resources can include a printer or a file server. Networks are commonly categorized based on their characteristics.

How to classify Computer Networks?

Connection / Setup	Expansion / Size	Users / Purpose
Bus	LAN	Intranet
Ring	WAN	Extranet
Star	MAN	Internet
Tree		

How to classify computer networks as per Connection / Setup / Topology?

1. Bus Network

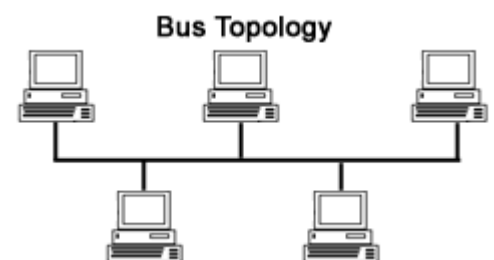
Alternatively referred to as a line topology, a bus topology is a network setup in which each computer and network device are connected to a single cable or backbone. Depending on the type of network card used in each computer of the bus topology, a coaxial cable or an RJ-45 network cable is used to connect them together.

Advantages of bus topology can be;

- ✓ It works well when you have a small network.
- ✓ It's the easiest network topology for connecting computers or peripherals in a linear fashion.
- ✓ It requires less cable length than a star topology.

Disadvantages of bus topology can be;

- ✓ It can be difficult to identify the problems if the whole network goes down.
- ✓ It can be hard to troubleshoot individual device issues.
- ✓ Bus topology is not great for large networks.
- ✓ Terminators are required for both ends of the main cable.
- ✓ Additional devices slow the network down.
- ✓ If a main cable is damaged, the network fails or splits into two.



2. Ring Network

A ring topology is a network configuration in which 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.

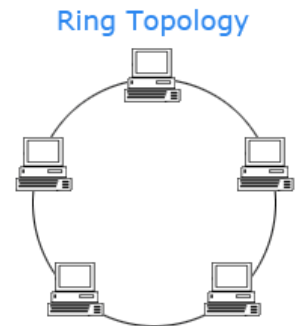
In a ring network, packets of data travel from one device to the next until they reach their destination. Most ring topologies allow packets to travel only in one direction, called a unidirectional ring network. Others permit data to move in either direction, called bidirectional.

Advantages of ring topology can be;

- ✓ All data flows in one direction, reducing the chance of packet collisions.
- ✓ A network server is not needed to control network connectivity between each workstation.
- ✓ Data can transfer between workstations at high speeds.
- ✓ Additional workstations can be added without impacting performance of the network.

Disadvantages of ring topology can be;

- ✓ All data being transferred over the network must pass through each workstation on the network, which can make it slower than a star topology.
- ✓ The entire network will be impacted if one workstation shuts down.
- ✓ The hardware needed to connect each workstation to the network is more expensive than Ethernet cards and hubs/switches.



3. Star Network

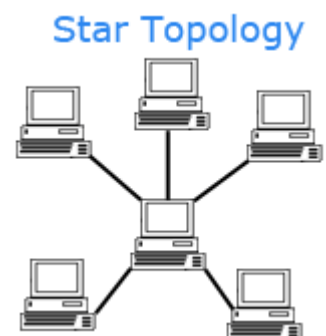
Alternatively referred to as a star network, star topology is one of the most common network setups. In this configuration, every node connects to a central network device, like a hub, switch, or computer. The central network device acts as a server and the peripheral devices act as clients. Depending on the type of network card used in each computer of the star topology, a coaxial cable or an RJ-45 network cable is used to connect computers together.

Advantages of star topology can be;

- ✓ Centralized management of the network, through the use of the central computer, hub, or switch.
- ✓ Easy to add another computer to the network.
- ✓ If one computer on the network fails, the rest of the network continues to function normally.

Disadvantages of star topology can be;

- ✓ May have a higher cost to implement, especially when using a switch or router as the central network device.
- ✓ The central network device determines the performance and number of nodes the network can handle.
- ✓ If the central computer, hub, or switch fails, the entire network goes down and all computers are disconnected from the network.



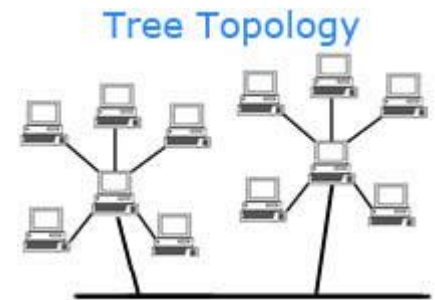
4. Tree Network

A tree topology is a special type of structure in which many connected elements are arranged like the branches of a tree. For example, tree topologies are frequently used to organize the computers in a corporate network, or the information in a database.

In a tree topology, there can be only one connection between any two connected nodes. Because any two nodes can have only one mutual connection, tree topologies form a natural parent and child hierarchy.

Advantages of tree network can be;

- ✓ Can easily connect a computer into a sub server
- ✓ A computer connected to a given server can function as a server to another set of computers
- ✓ Suitable when the organization is large in scale
- ✓ Suitable when operations are geographically dispersed



Disadvantages of tree network can be;

- ✓ Breakdown in the main server will affect all connected devices
- ✓ An error in the main server will affect other connections
- ✓ Might be difficult to spot the exact point of error

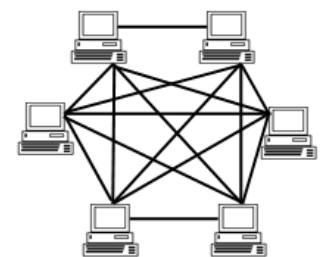
5. Mesh Network

A network setup where each computer and network device is interconnected with one another, allowing for most transmissions to be distributed even if one of the connections go down. It is a topology commonly used for wireless networks. A mesh topology can be a full mesh topology or a partially connected mesh topology.

Advantages of a mesh topology can be;

- ✓ Manages high amounts of traffic, because multiple devices can transmit data simultaneously.
- ✓ A failure of one device does not cause a break in the network or transmission of data.
- ✓ Adding additional devices does not disrupt data transmission between other devices.

Mesh Topology



Disadvantages of a mesh topology can be;

- ✓ The cost to implement is higher than other network topologies, making it a less desirable option.
- ✓ Building and maintaining the topology is difficult and time consuming.
- ✓ The chance of redundant connections is high, which adds to the high costs and potential for reduced efficiency.

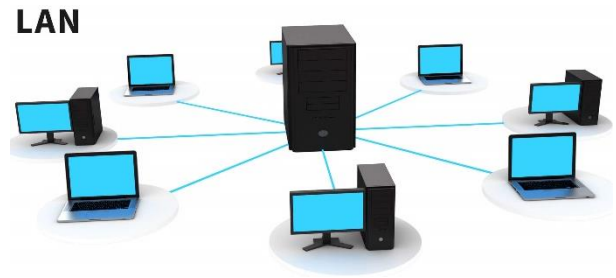
6. Hybrid Network

A hybrid topology is a type of network topology that uses two or more differing network topologies. These topologies include a mix of bus topology, mesh topology, ring topology, star topology, and tree topology.

How to classify computer networks as per expansion / size?

1. Local Area Network (LAN)

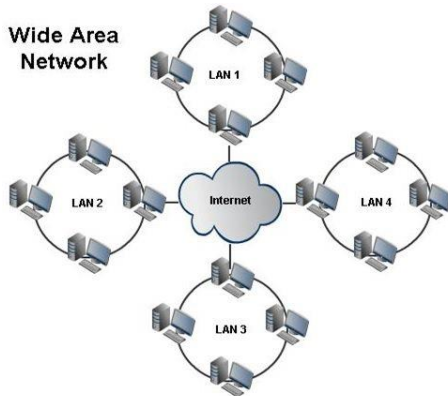
A LAN has networking equipment or computers in close proximity to each other, capable of communicating, sharing resources and information. For example, most home and business networks are on a LAN. Most LAN's connect work stations & PC's & those devices are mostly connected by a network cable.



2. Wide Area Network (WAN)

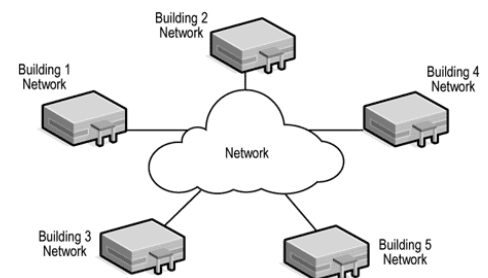
Short for wide area network, WAN is a collection of computers and network resources connected via a network over a geographic area. Wide area networks are commonly connected either through the Internet or special arrangements made with phone companies or other service providers. WAN is mostly a combination of several LAN's & connected through a telecommunication connection.

A WAN is different from a MAN because of the distance between each of the networks. In a WAN, one network may be anywhere from several hundred miles away, to across the globe in a different country. The same difference applies to a LAN. Computers in a LAN are usually close to each other, but a WAN can have larger distances between computers and networks in the WAN.



3. Metropolitan Area Network (MAN)

MAN is a network that is utilized across multiple buildings. A MAN is much larger than the standard LAN (local area network), but is not as large as a WAN (wide area network). A MAN is commonly used in school campuses and large companies with multiple buildings.



4. Home Area Network (HAN)

Short for home area network, a HAN is a network within a user's home that typically consists of a broadband modem and router. A multitude of devices may be connected to the network, including computers, laptops, smartphones, smart appliances, tablets, and video game consoles.



17.5 INTERNET

How to classify computer networks as per user?

1. Internet

The internet is an international network of networks that is both commercially & publically owned. The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get

information from any other computer. In other words, the worldwide system of computer networks which can communicate with one another.

2. Intranet

This is an internal or private internet that exists within an organization. In other words, an intranet is a private network that is contained within an enterprise. Only those with permission can access & that computer cannot be accessed outside of the local network unless given permission through the Internet.

3. Extranet

This is the intranet accessible by selected outsiders, who are usually parent companies, subsidiaries, sister companies etc. In other words, an extranet is a local network accessible to specific outside users or businesses, but still inaccessible to the general public. Although a user may have access to an extranet, the extranet may only display information that he or she is privileged to see or only allow access to specific sections of the extranet.

What are the requirements to connect to the internet?

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What are the services that can be obtained from the internet?

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What is World Wide Web (WWW)?

The Web, or World Wide Web (W3), is a computer system which links documents & pictures into a database that is stored in computers in many different parts of the world & that people everywhere can use. It is basically a system of Internet servers that support specially formatted documents. The documents are formatted in a markup language called HTML (HyperText Markup Language) that supports links to other documents, as well as graphics, audio, and video files.

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Some important terms found in the WWW can be;

1. .com –
2. .edu –
3. .int –
4. .mil –
5. .org –
6. .net –
7. .biz –
8. .lk –
9. .jp –
10. .info –
11. http –
12. HTML -

Some famous search engines & web directories found in the WWW can be;

Search Engine	Web Directories

What is E-mail?

This is a system of exchanging messages between computers or any similar device through the internet. Here both devices of sender & receiver are identified by their e-mail addresses which contains the “@” sign in it. Even though this was initially developed to send only text, today large multimedia files can be sent.

The advantages of e-mail can be;

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What is Tele-computing?

This is basically being in one location & accessing a computer in another location through the internet from your computer. For example accessing your office computer from your home PC. The unethical & illegal version of it is called “Hacking”.



What is online chat?

Online chat refers to any kind of communication over the Internet that offers a real-time transmission of text messages from sender to receiver. Chat messages are generally short in order to enable other participants to respond quickly. The 3 common types of chat can be;

1. Text chat
2. Voice chat
3. Video chat

What is File Transfer Protocol (FTP)?

File Transfer Protocol is the most common way of sending and receiving files between two computers. In other words, File Transfer Protocol is a standard network protocol used for the transfer of computer files between a client and server on a computer network. This transfer will occur by one party uploading & the other downloading.

What is a Newsgroup?

A newsgroup is a location where individuals can discuss a particular topic by posting messages on a news server. In many ways, a newsgroup may be similar to a forum, where users can read posts from other users and submit their own. A good example of a newsgroup is a "computer help" group where individuals assist each other with computer problems. Here persons with similar interests will interact with each other online by exchanging info.

What is Multimedia?

This is a technology that combines text, graphics, sounds, videos, animations etc (2 or more) through the use of computers. In other words, any visual representation that has a combination of audio, video, animation, or graphics. A multimedia file can be any computer file that plays audio and video, audio only, or video only. Some examples of popular multimedia files include the .mp3 audio file, .mp4, video, and avi video, and wmv files.

What is Database?

This is basically a collection of data used for various activities in a business. In other words, a database is an organized collection of data, generally stored and accessed electronically from a computer system. Here the needed data is stored, while the not needed is deleted. This storing is done in a way, where it can be retrieved at any time.

What is Tele-conferencing, Video conferencing & Data conferencing?

Tele-conferencing is where more than 2 people are connected at the same time over a telephone line or internet, without physically meeting each other. Here all can talk at the same time with each other.

Video conferencing is where more than 2 people are connected at the same time through a computer, mobile phone or tab with both audio & video connectivity. Therefore communication takes place between all parties at the same time in both audio & video.

Data conferencing is where 2 or more users would communicate at the same time over a telephone line or internet in order to edit or modify data files.

What is Cloud computing?

Cloud computing is a term used to describe services provided over a network by a collection of remote servers. This abstract "cloud" of computers provides massive, distributed storage and processing power, which can be accessed by any Internet-connected device running a web browser. In other words, the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.

Advantages of cloud computing can be;

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Disadvantages of cloud computing can be;

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What is Social Media Networks?

Alternatively referred to as a virtual community or profile site, a social network is a website that brings people together to talk, share ideas and interests, or make new friends. This type of collaboration and sharing is known as social media. Unlike traditional media that is typically created by no more than ten people, social media sites contain content created by hundreds or even millions of different people.

Social networks help people keep connected with their friends and family and are an easy way to find what everyone is up to each day in your social circle. Social networks can also be used to find fun and interesting things on the Internet since often your friends and family will share many of the same interests as you.

The process to create a new account for a social network differs for each social network. In general, visit the social network website where you want to create a new account and look for a link near the top of the page named "Sign Up," "Create New Account," or something similar. Follow the account creation steps to create your new account. You will likely need to provide your name, age range, and e-mail address at a minimum. Additional information may be required, depending on the requirements of the social network.

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What are the business benefits of social media networks?

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What are the new trends created due to development of IT?

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What steps can be taken to protect an information system?

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