

Basic Network Concepts

Overview

- Introduction to networks.
- Need for networks.
- Classification of networks.

Introduction to Networks

- A network is a connection of two or more entities or objects sharing resources and information. or
- A computer network is a connection of two or more computing devices sharing resources and information.
- The network becomes a powerful tool when computers communicate and share resources with other computers on the same network or entirely distinct networks.

Introduction to Networks

- Computers on a network can act as a client or a server.
- A client is a computer that requests for resources.
- A server is a computer that controls and provides access to resources.

Need for Networks

- A computer that operates independently from other computers is called a **stand-alone computer**.
- The process of printing or transferring data from one system to another using various storage devices is called ***sneakernet***.

Need/Advantages for Networks

1. Enhance communication.
2. Share resources.
3. Facilitate centralized management.
4. Information Sharing: Easy accessibility from anywhere (files, databases), Search Capability (WWW).
5. Remote computing
6. Distributed processing (GRID Computing)

1.Enhance Communication

- Computer networks use electronic mail (e-mail) as the choice for most of the communication.
- By using networks, information can be sent to a larger audience in an extremely fast and efficient manner.

2.Share Resources

- A copy of data or application stored at a single central location is shared over a network.
- Computer peripheral devices, referred to as additional components, can be attached to a computer and be shared in a network.

Share Resources

- Peripheral devices include faxes, modems, scanners, plotters, and any other device that connects to the computers.
- Equipments having common requirements can be shared in order to reduce maintenance cost.

Share Resources

- Important data can also be stored centrally to make it accessible to users, thereby saving storage space on individual computers.
- Computer applications, which take up a considerable amount of storage space, can be installed centrally on the network, saving storage space.

3.Facilitate Centralized Management

- Networks are used to assist in management tasks associated with their own operation and maintenance.
- Using networks results in increased efficiency and a resultant reduction in maintenance costs.

Facilitate Centralized Management

Software:

- Software is a set of instructions or programs that control the operation of a computer.
- Software can be installed at a central location using servers, where the installation files are made accessible over the network.

4.Information Sharing

- Easy accessibility from anywhere (files, databases)
- Search Capability (WWW)

5.Remote computing

- Remote access - The ability to log onto a network from a distant location

6.Distributed processing (Grid computing)

- is the collection of computer resources from multiple locations to reach a common goal. The **grid** can be thought of as a distributed system with non-interactive workloads that involve a large number of files.

The Disadvantages (Costs) of Networking

- Network Hardware, Software and Setup Costs
- Hardware and Software Management and Administration Costs
- Undesirable Sharing
- Illegal or Undesirable Behavior
- Data Security Concerns

Classification of Networks

- i. Classification by network geography.
- ii. Classification by component roles.

i. Classification by Network Geography

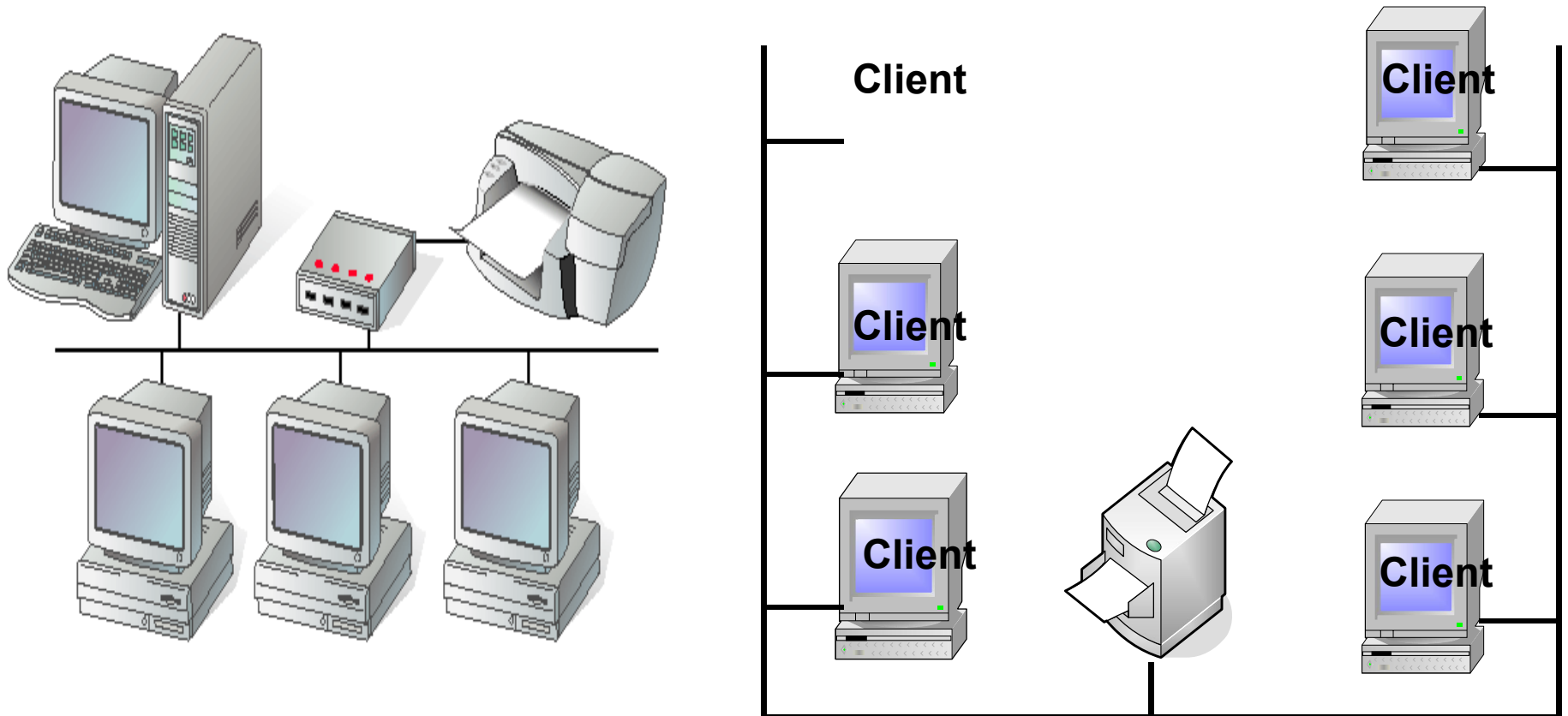
- Networks are frequently classified according to the geographical boundaries spanned by the network itself.
- LAN, WAN, and MAN are the basic types of classification, of which LAN and WAN are frequently used.

Classification by Network Geography

Local area network (LAN):

- A LAN covers a relatively small area such as a classroom, school, or a single building.
- LANs are inexpensive to install and also provide higher speeds.

Classification by Network Geography



Local area network

Classification by Network Geography

Metropolitan area network (MAN):

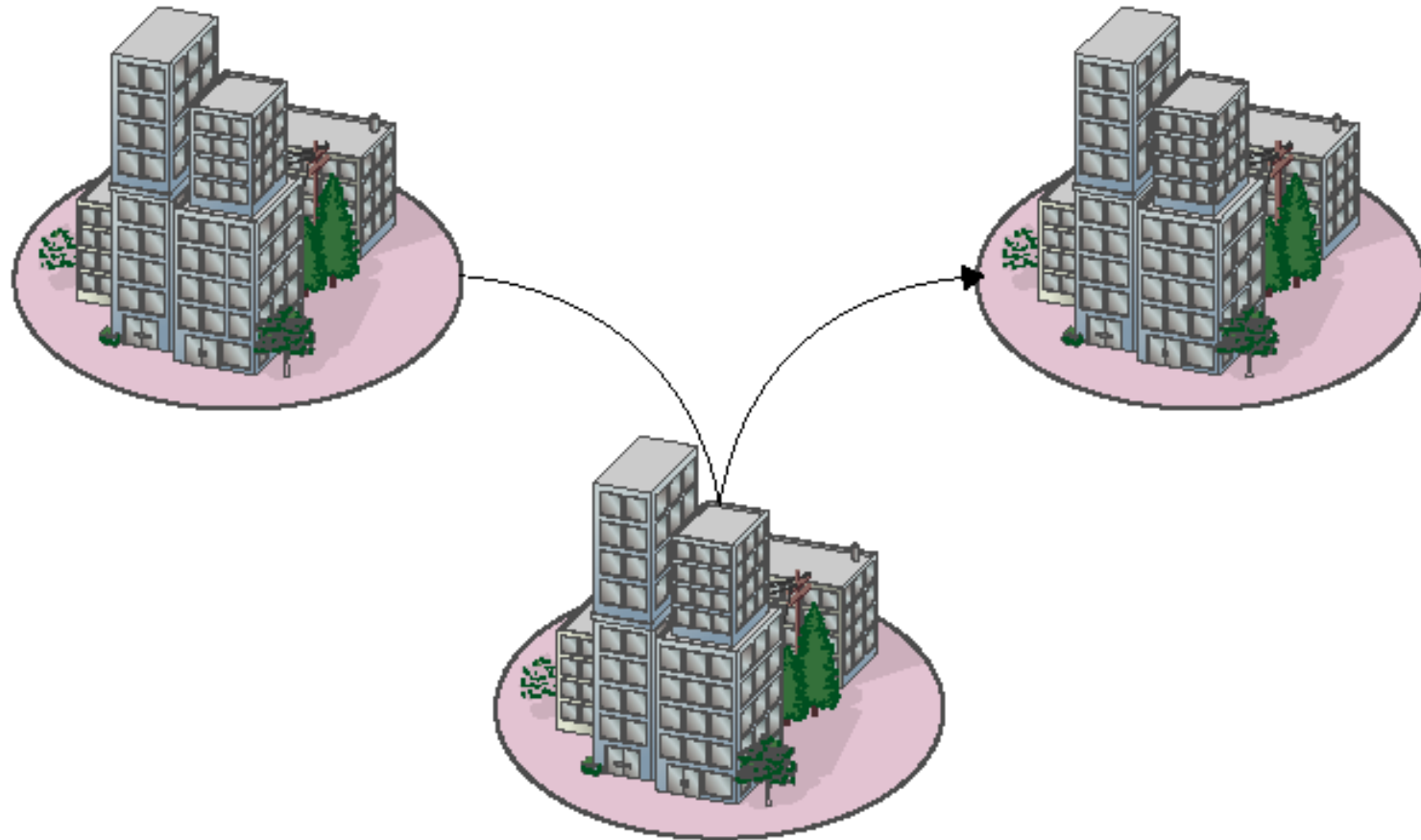
- A metropolitan area network (MAN) is a network that interconnects users with computer resources in a geographic area or region larger than that covered by even a large local area network (LAN) but smaller than the area covered by a wide area network (WAN).
- The term is applied to the interconnection of networks in a city into a single larger network (which may then also offer efficient connection to a wide area network). It is also used to mean the interconnection of several local area networks by bridging them with backbone lines. The latter usage is also sometimes referred to as a campus network.

Classification by Network Geography

Metropolitan area network (MAN):

- A MAN spans the distance of a typical metropolitan city.
- The cost of installation and operation is higher.
- MANs use high-speed connections such as fiber optics to achieve higher speeds.

Classification by Network Geography



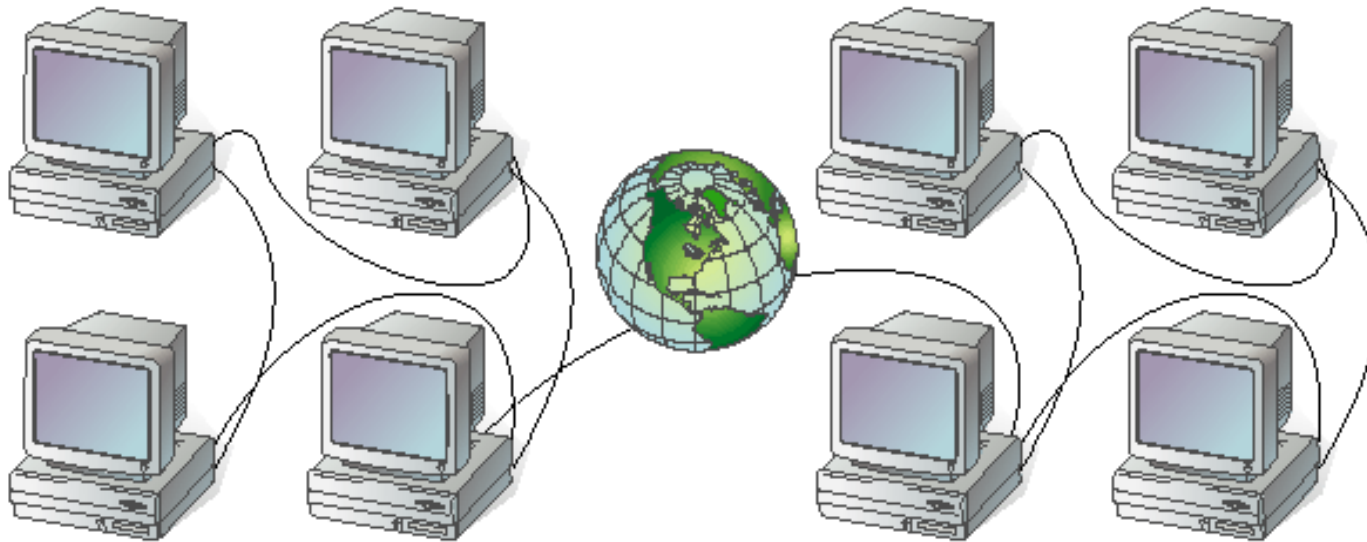
Metropolitan area network

Classification by Network Geography

Wide area network (WAN):

- WANs span a larger area than a single city.
- These use long distance telecommunication networks for connection, thereby increasing the cost.
- The Internet is a good example of a WAN.

Classification by Network Geography



Wide area network

ii. Classification by Component Roles

- Networks can also be classified according to the roles that the networked computers play in the network's operation.
- *Peer-to-peer, server-based, and client-based* are the types of roles into which networks are classified.

Classification by Component Roles

Peer-to-peer:

- In a peer-to-peer network, all computers are considered equal.
- Each computer controls its own information and is capable of functioning as either a client or a server depending upon the requirement.
- Peer-to-peer networks are inexpensive and easy to install.
- They are popular as home networks and for use in small companies.

Classification by Component Roles

Peer-to-peer (continued):

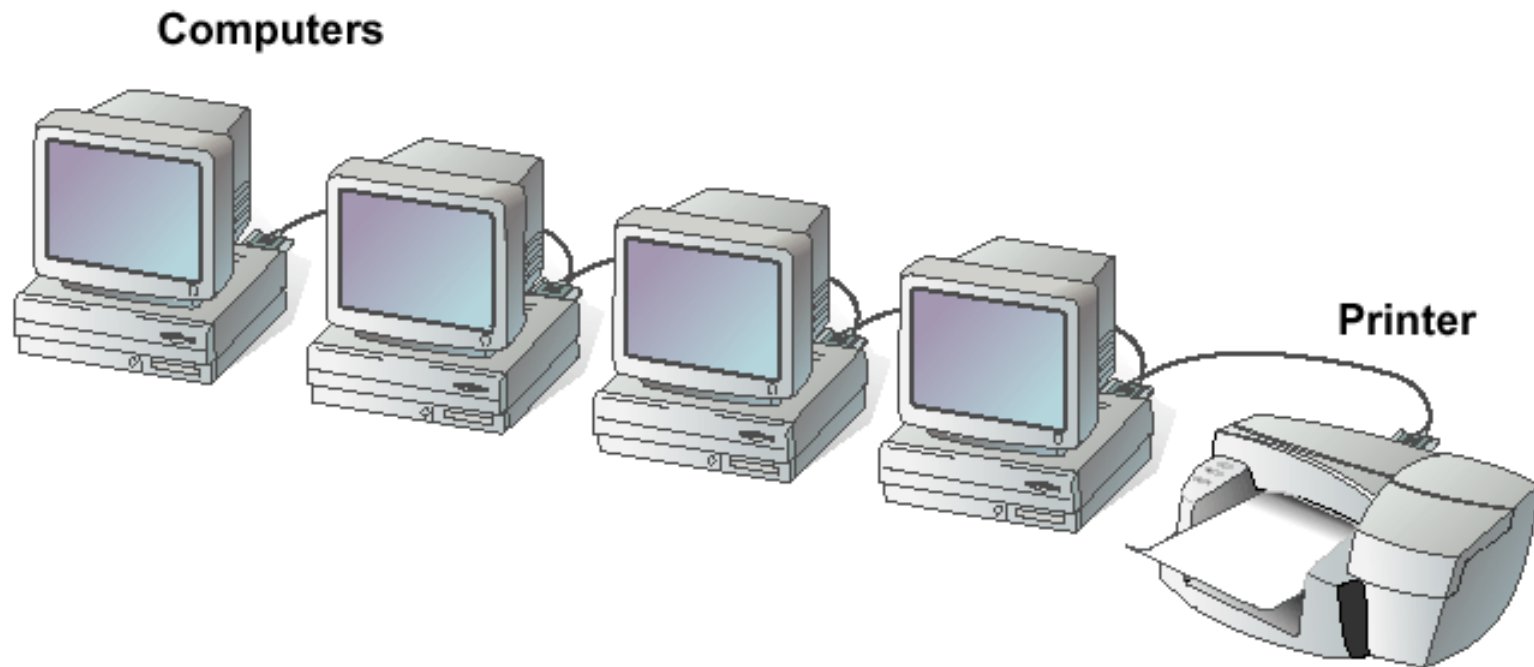
- Most operating systems come with built-in peer-to-peer networking capability.
- The maximum number of peers that can operate on a peer-to-peer network is ten.
- Each peer shares resources and allows others open access to them.

Classification by Component Roles

Peer-to-peer (continued):

- Peer-to-peer networks become difficult to manage when more security is added to resources, since the users control their security by password-protecting shares.
- Shares can be document folders, printers, peripherals, and any other resource that they control on their computers.

Classification by Component Roles



Peer-to-peer network

Classification by Component Roles

Server-based:

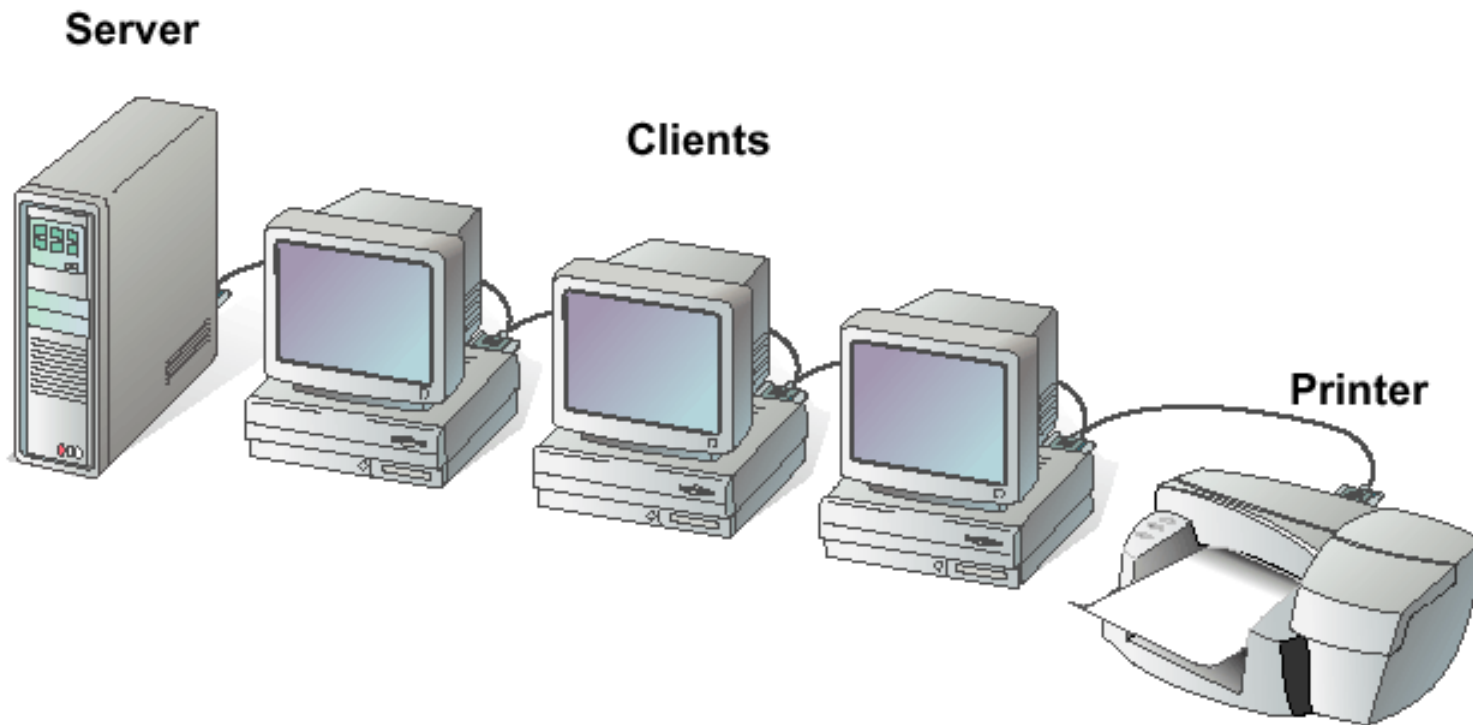
- A server-based network offers centralized control and is designed for secure operations.
- In a server-based network, a dedicated server controls the network.

Classification by Component Roles

Server-based (continued):

- A dedicated server is one that services the network by storing data, applications, resources, and also provides access to resources required by the client.
- These servers can also control the network's security from one centralized location or share it with other specially configured servers.

Classification by Component Roles



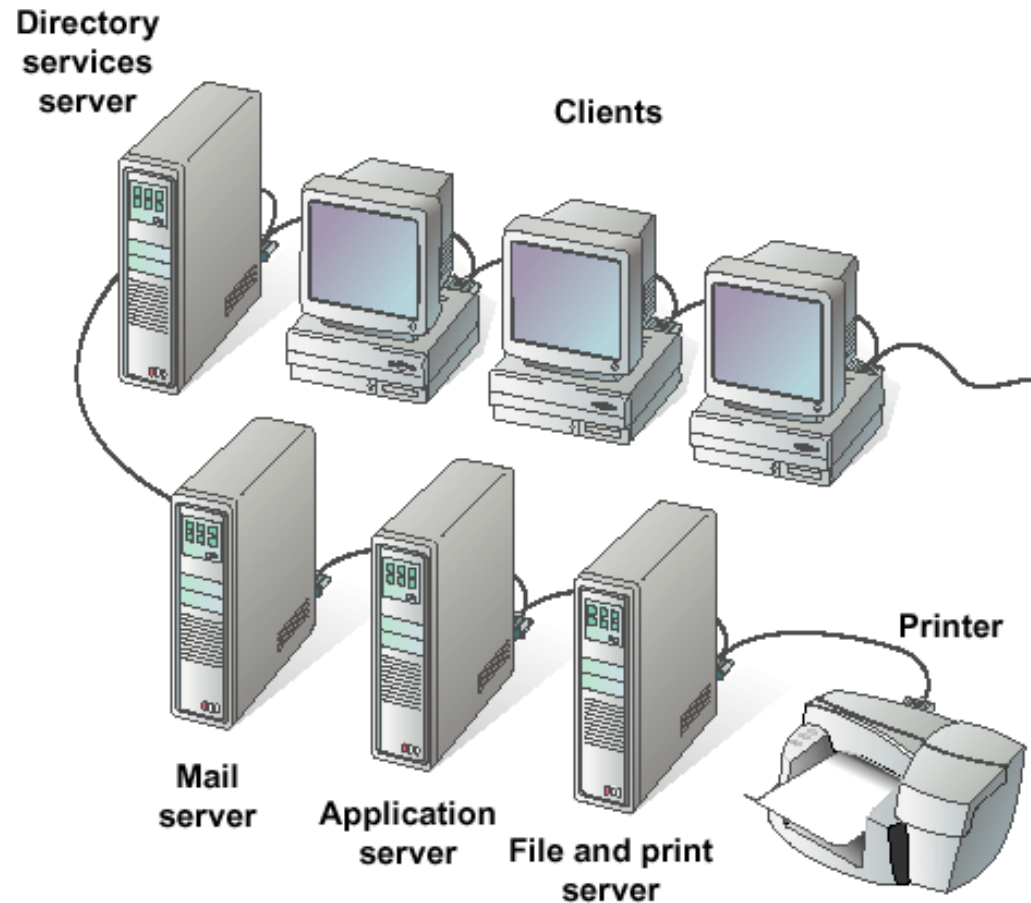
Server-based network

Classification by Component Roles

Client-based:

- Client-based network servers process requests from clients and return just the results.
- These networks take advantage of the powerful processing capabilities of both the client and the server.
- Application servers and communications servers are examples of client-based networks.

Classification by Component Roles



Client-based network

Summary

- A network consists of two or more entities sharing resources and information.
- A computer network consists of two or more computers that are connected and are able to communicate.

Summary

- The basic purpose of networks is to enable effective communication, share resources, and facilitate centralized management of data.
- Networks can be classified according to their geographical boundaries or their component roles.