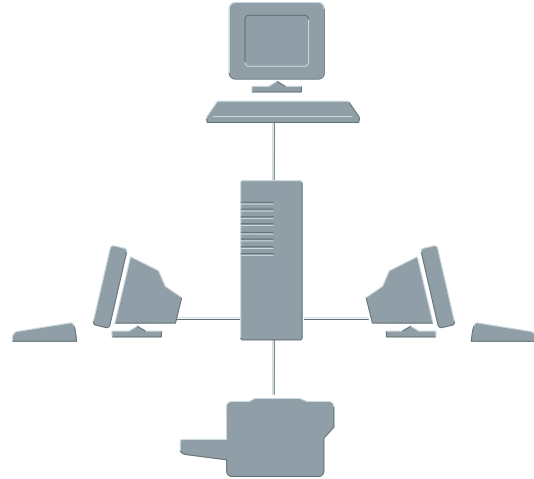


My dictionary defines **Network** as "a chain of interconnected people or operations". A computer network would be any arrangement of computers that are connected together, and able to communicate with each other or to share resources.



It was probably only a short time after the second computer was built that someone wanted to move data from one to the other. The history of computer networks is almost as old as the history of computers. However, when the personal computer first arrived, the emphasis was usually on 'personal'. As in "Keep your hands off my personal computer". Sharing computer resources was for the big main-frame computers, and PCs were for 'private' computing.



If you wanted to share data from your PC, you could always copy the data onto a floppy or some other media, and then carry that over to the other computer and put it in. The unofficial name for this is "**sneaker-net**". Not that computer users always wear sneakers. This wasn't very efficient, naturally, and also didn't allow sharing of printers or other resources. And e-mail? Forget it.

It wasn't too much longer before we figured out that connecting PCs together in networks gave us the advantages of both worlds. We can share resources such as printers and phone lines, have e-mail, and share files if we want to. On the other hand, we can also do 'private' computing, organize our own files any way we want, and not share the files that we don't want to share.

*Note: Resources only available to our own computer are Local Resources, but those available to all are Network or Global Resources. If a printer is shared with everyone on the network, it's a global printer, but if it's just attached to one system and not shared, it's a local printer.*

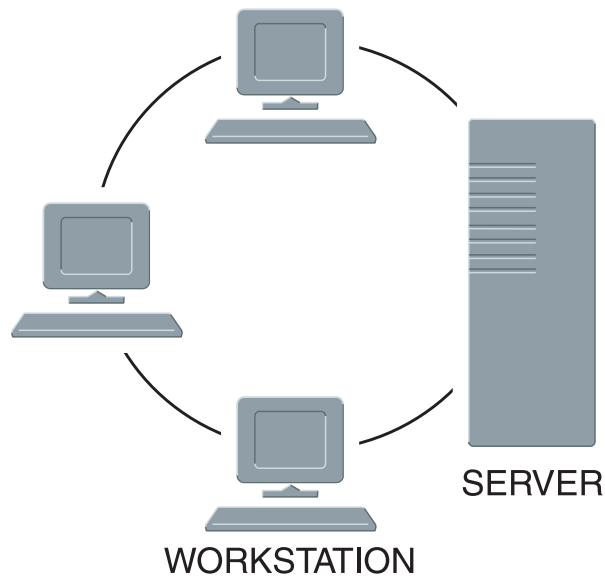
For companies there is another very big advantage. If a company is hiring 100 employees this year and another 100 next year, should they buy a mainframe computer big enough for 200 and have it sitting mostly idle for the first year, or do they buy one just big enough for 100 and trade it in next year on a bigger model? And what if they change plans and only hire 50 next year? With PCs, they can buy systems as needed and connect another one to the network each time a new employee starts. Very efficient. Thanks to these advantages, networks of PCs have replaced the mainframe computers at all but the largest companies and institutions.

Since the habit of connecting PCs together has become so widespread, we'd better take a look at some of the ways this is done.

## LOCAL AREA NETWORK

In many offices, all of the computers that we want to connect are in the same building, or even on the same floor. In this situation, it is possible to run a cable to each PC, or from one PC to the next. This is called a **Local Area Network**, often abbreviated as a **LAN**.

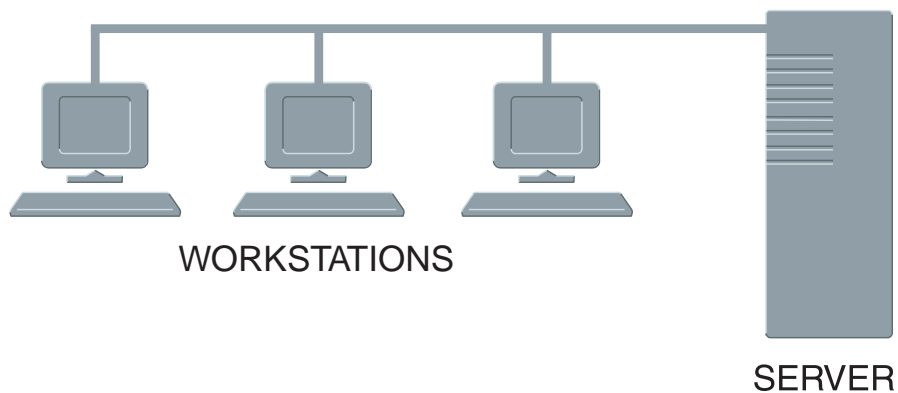
The cables connecting the computers in a LAN can be arranged in several ways. For instance, the cable can run from one computer to the next and eventually back to its starting point in a big ring. This is called a **Ring Network**, and the pattern is a **Ring Configuration** or **Ring Topology**. *Configuration* means the method of arrangement, and *topology* means the complete outline or shape formed by the individual parts. In computer usage, both of these just mean the way things are connected or put together. Another term you might come across is **Network Architecture**, and again this just means how the network is put together.



Topology diagram of a Token Ring Network

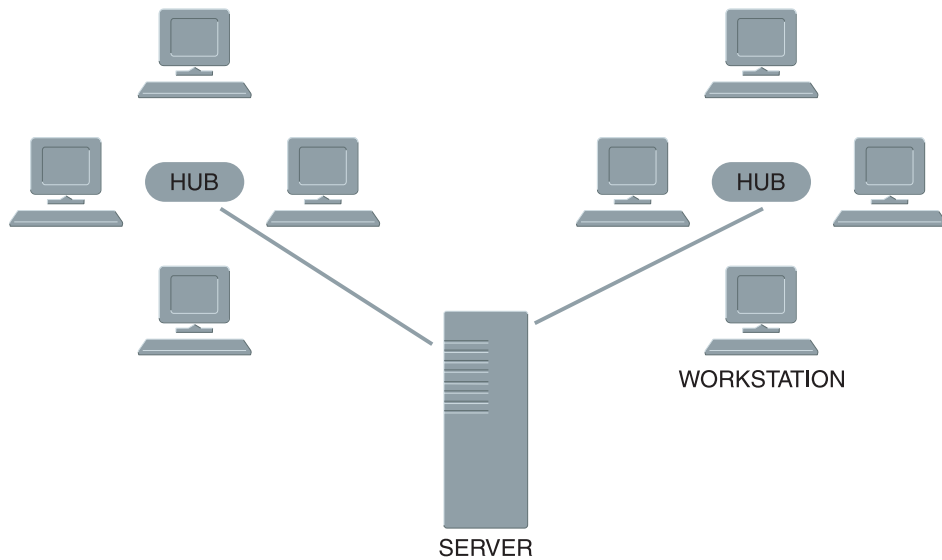
Since all the PCs are connected in a circle, there must be a way to determine whose turn it is to talk on the network. A signal called a **Token** is sent around the circle, and each PC that wants to send data on the network must do so by attaching its data to the token. The token continues around the circle, and the data is removed when it gets to its destination. If the token is in use, your PC has to wait. The circle network pattern is sometimes referred to as a **Token Ring** Network or Token Ring Topology.

In another network pattern, the cable can go in a line from one end to the other, and each PC can tap into it along the way, much like the bus on a motherboard. This is a **Bus Network**, and the most common version is called **EtherNet**, named by the Xerox Corporation who helped to develop it.



*Topology diagram of a EtherNet Network.*

When more than three or four computers are involved, the most flexible method, and therefore the most popular, uses a hub that each PC plugs into. This is called a **Hub Network** or a **Star Network**. Different size hubs can have different numbers of PCs plugged into them, and by using one of the hub's connections to connect to another hub, very large and complex networks can be easily put together.



*Topology diagram of a Star/Hub Network*

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One thing to consider in a LAN is which PC is in charge of what. In a small network, it is possible to have all PCs equal, and completely in charge of whatever they are doing. This is called a **Peer-to-Peer network**, since a Peer means "one who is equal in status".

In larger networks, it works much better to put one computer in charge of certain activities, such as printing. The computer in charge is called the **Server**. In the case of the printer, it would be the **Print Server**. If a computer was in charge of storing files for several users, that machine would be a **File Server**, and one that distributed the e-mail would be the **E-mail Server**, etc. The PCs that use the services of the server are called **Clients**, and this method of configuring a network is called **Client-Server Architecture**. The client systems are also sometimes referred to as **Workstations**.

One thing to keep in mind about servers is that they have to be **Online**. That means that they are ON and connected to the network. For instance, if the print server is turned off or disconnected from the network, it is **Offline** and you won't be able to print to the printer it serves, no matter what you do at your own workstation. And if the file server is offline, you won't be able to get to those files. The other side of this coin is that your own machine must be online also, in order to use anything on the network or to share your own files on the network.

For a Client system, Online means not only on and physically connected, but also that the user is Logged On. The procedure to Log On will vary from one network to another, and it may involve entering a **Password** and a **User ID**. These are not the same. The user ID is the name the network has been assigned for you. It may be the same as your real name, or some variation like your first name and the initial of your last name, or it may be something completely made up. It doesn't matter. When you type it in, the network will know who you are, even if you happen to be sitting at someone else's computer. Just to make sure it's you and not someone pretending to be you, it will also ask you for your secret password, which the network also has on file for you. Two forms of ID, just like when you cash a check in a strange town.

Back to servers. In some networks, a server can only be used for the server functions. This would be a **Dedicated Server**. That doesn't necessarily mean it has to be a server for just one function. Usually, the print server, e-mail server and so on can all be the same machine.

In other networks, the servers can also be used for client functions. However, these client functions will usually run more slowly because of the server traffic, so don't be too hasty to volunteer your system to be the print server, just so you can get that new laser jet printer placed near your desk.