

Networking Basics - Network Operating Systems

Client/Server

The client server model uses a central computer, (fileserver, main frame, master node), that serves files to the clients, or nodes. Fileservers are computers whose only function in life is to serve the clients. No one actually sits down at the fileserver to do his or her daily work. The application programs loaded on the fileserver are accessed from one of the clients and not directly at the fileserver.

In the old days, the clients were simply 'dumb tubes'. They had a monitor and a keyboard. This type of system is still common in banks and hotels where storage of data locally at the client is undesired or unnecessary. The trend has been to use 'smart' clients in most new client/server networks. Smart clients will have their own local storage of data and programs and offer far more flexibility.

The advantages to the Client/Server structure are that security, data backups, and device sharing can be administered centrally. Good examples of client server networks include: Novell Netware and Unix. There are many variations of Unix out there, some of which are proprietary and only run on the hardware supplied by the vendor.

A network with smart clients has many operational advantages due to the fact that storing applications and data locally, when appropriate, will take large burdens off the central/shared computer. For example, if everyone on the network uses the same word processing or spreadsheet software, it is operationally better to store the program files on the workstation/client.

At this point, it is necessary to distinguish between program files and data files. Program files are what you buy from the vendor. These are the files that exist after the initial installation of the program. Data files are the files you create with the program. Databases or accounting programs are significantly different from other applications because the data created with them is integrated into the application.

To clarify, a user can write a letter and save that document on either the workstation or the fileserver. The same user might even copy it to a floppy disk and walk away with it. A user cannot copy an 'account', (i.e. vendor or customer file), from the accounting software on the network to his hard drive or floppy disk. Loading application software locally on the clients avoids huge amounts of network traffic every morning when, otherwise, each user would need to load it from the fileserver.

In contrast to this, accounting programs would not want to store data on local hard drives. The difference between these scenarios stems from the nature of the data. Word-processing and spreadsheet programs **do not** change from day to day. Accounting programs **do** change everyday. Efficiently structure networks typically store 'static' programs locally on the smart clients and the data, (documents, spreadsheets, etc...), generated by these programs on the fileserver. Likewise 'dynamic' applications normally reside on the fileserver since maintaining multiple copies of databases becomes unfeasible very quickly.

The most important fact to keep in mind is that if you want the data to be 'backed up' it should be on the fileserver. The rule of thumb is to back up your data as often as it would be inconvenient to lose it. If you only enter new data into the system once a week, then backing up once a week is sufficient. Most networks make backup copies of data at least once a day.

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Peer-to-Peer

The second type of network is peer-to-peer. The significant characteristic of a peer to peer network is that there is no central computer. Each node may have programs or devices it offers to share with other nodes but the configuration of security, backups, and device sharing is dependent on the individual node(s).

Peer-to-peer networks often run on a linear-bus wiring topology. Many small companies will get their feet wet in networking with a peer-to-peer network. They find this type of network attractive because they avoid the additional expense of a fileserver and coax cabling can just be dropped behind everyone's furniture to make the job quick and easy.

There are peer-to-peer networks that run on CAT5 using a star networking topology. Star networks necessitate a hub – another expense customers avoid by going with linear-bus. Peer-to-peer networks typically have huge security holes since users can change their own settings. They also characteristically need more technical support for the same reason. Good examples of peer-to-peer networks include: LANtastic, Netware Lite, and MS Win'95 networking.

Hybrid

Microsoft builds peer-to-peer networking into their operating systems from the ground up. NT networks are a perfect example of a hybrid network for this reason. The two systems essentially run on top of each other.

Users can share files on their workstations in addition to the resources available to them on the network. The focus of the network however, remains on the fileserver and users are normally discouraged from using the peer-to-peer functionality available to them.

Device Sharing via Network Operating System

A key driving force in decisions to network computers at all is the sharing of devices. The two most beneficial devices to share centrally are hard drive space and printers.

The central sharing of hard drives enables the company to invest in one large, high quality, fast hard drive system. It also permits the company to store all important data in a central point to make backing up (and restoring lost data) much easier. Central data storage also permits the use of central application programs like integrated accounting software and databases.

Sharing printers via a network is usually the first benefit of networking realized by end users. For example, instead of buying a dozen inkjet printers to deploy at a dozen workstations, the company can buy one or two high performance, high quality laser printers and make them available to everyone.