

## **The three LANs of our time: Microsoft, Banyan and Novell - analysis of the three leading local area network operating systems - Connectivity**

George Schussel

For a technology that began with a modest goal, it's now apparent that the local-area network (LAN) operating system (O/S) is one of downsizing's critical enabling technologies.

The LAN O/S was originally created to function as a collection of utilities capable of sharing files and support services among PCs. As PC networks expanded, however, it became clear that networks, PCs, and servers had the capabilities necessary to replace mainframes.

As a result, adequate software had to be created to allow task management and co-ordination across the network. The LAN O/S is now assuming this sophisticated role in managing network cooperative processing transactions.

Prior to LAN O/Ss, the problem in recreating functionality of mainframe software system across networks and workstations was there was no PC or LAN equivalent to the full functionality of any mainframe software environment, with the exception of application development languages. In a mainframe environment, operating systems, transaction monitors, time-sharing monitors, database management systems and development languages are assembled in a co-ordinated fashion to complete the transaction processing functions.

So, in order to write real-time, interactive, transaction processing systems, software developers must have an O/S that provides multi-user, multi-tasking, re-entrant and preemptive services. The question is, how do you proceed on a PC LAN if you want to create comparable mainframe O/S and transaction monitor functionality?

The answer is the PC LAN O/S. This technology, originally developed for a simpler purpose, is now expanding to complement single-user PC operating systems.

In a mainframe environment, the central computer is constantly responding to terminal messages; it is never disconnected. In terminal-to-terminal communications, all messages are sent through the mainframe. Communications in a downsized environment will be more "peer-to-peer" with computers directly interfacing to co-operatively process a message.

Over time, PCs have emerged as single-user devices, which raises the question of how to manage, from a software point of view, a network of single-user devices operating in concert as a multi-tasking, multi-user system.

The answer has been to connect another server onto the existing network and provide services to other users through the LAN O/S. In effect, the combination of single-user operating systems running on clients over a LAN network allows the network and its constituents to emulate mainframe

communication and connectivity functionality. Of course, I'm using the word "emulate" loosely since the network can handle the transaction workload of the mainframe at a fraction of the total hardware/software cost.

Ultimately, networks will supply graphical interfaces, run Lotus 1-2-3 and Word for Windows and do a host of things that mainframes can't handle.

As a guide to LAN O/S functionality, the following is a list of services currently provided by many O/Ss:

- \* account for network and resource usage;
- \* assign tasks to idle workstations;
- \* audit trails;
- \* remotely administer the server;
- \* inter-process LAN communication;
- \* monitor performance;
- \* provide access to multiple servers; and,
- \* support security through passwords and other devices.

Three of the most widely sold product sets for LAN O/Ss are supplied by Novell, Banyan and IBM/Microsoft. While there are other vendors with smaller market shares, companies building large networks capable of serious, high-end applications should choose a product from one of these vendors. The choices these market leaders provide are interesting as the flavors and characteristics of the products vary so greatly.

Characterizing the products in short form, one would describe Microsoft's LAN Manager as the product with a Presentation Manager and IBM SAA flavor; Banyan's Vines as the high-end, full-function product with a Unix flavor; and, Novell's NetWare as the market leader with the fastest product best suited to office environments.

With over 50 per cent of the total market, NetWare has been the industry winner. What propelled Novell to the top was that it targeted the office systems market which originated from a desire to share files, printers and other peripherals.

Novell responded to the market demands with a product that has allowed LAN networks evolve from simple office support functions into their new roles as enablers for serious applications. Novell is under attack from Microsoft and a host of Microsoft value-added resellers, the largest of which is LBM.

NetWare offers many benefits as a LAN O/S, but I want to discuss some of NetWare's problems rather than advantages. NetWare is vulnerable as an office support product because it wasn't designed for the types of robust database applications that are necessary when replacing mainframes and minis. Key

elements lacking in the Novell environment are memory protection, pre-preemptive scheduling and virtual memory.

A lack of memory protection means that all of the applications are running within one effective partition. This is the equivalent of multi-tasking without task isolation (the way Windows 3.0 operates when used for more than one program at a time). This is a serious problem for some applications since without task isolation, if just one application aborts, it will take down the entire network and all applications.

Another problem is that no-one really knows how to debug in an unprotected environment. It's almost impossible to exactly replicate the conditions that existed when a program aborted.

The lack of pre-preemptive scheduling prevents different jobs from being assigned priority levels. This means that application developers have to decide when their applications should relinquish control. Most MIS organizations feel that it's much more efficient to have these kinds of decisions handled centrally by one individual, perhaps a database administrator.

The lack of virtual memory also places a burden on the developer to handle paging, and it is usually considered less efficient for the application builder.

NetWare's weaknesses open the door for Microsoft (and IBM) to steal market share from Novell with their LAN Manager/LAN Server products. These products take advantage of the protected, multi-tasking OS/2 environment. To date, the problem with these applications has been that they offer no advantages over NetWare other than that they run in a protected environment.

In fact, most users have felt that NewWare is more mature, easier to use, more reliable and faster than LAN Manager, and have been willing to sacrifice some security for performance.

LAN Manager sales have also been hampered by the fact that it can only go where OS/2 is running, and the sales of OS/2 have been less than robust. Now, even though OS/2 Version 2 (with a 32-bit base and improvements that correct many of the existing problems) is about to ship, it seems that relief might not be in sight as the divorce between IBM and Microsoft may threaten LAN Manager's success once again.

The third major player in the LAN O/S field is Banyan. Its product, Vines, is based on Unix in the same way that LAN Manager/Server is based on OS/2. Banyan has carved out the high ground in this fray by offering a higher level of management services for networks. This is especially useful for companies that want to run wide-area networks with many local-area drops.

Banyan takes advantage of Unix's built-in connectivity features to interface with the largest number of foreign environments. Vines' largest disadvantage has been a benchmark record that shows decidedly slower transaction processing than its competitors.

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