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Lock and Load!

CENTRALLY MANAGING, SECURING, AND DELIVERING AN OS/2 DESKTOP OVER ANY LAN

BY ERIC OSMANN

OS/2 has become a corporate workhorse since its inception several years ago. Yet many questions have arisen on how to manage the workplace shell and, most important, secure it and the applications it helps launch.

There are a few tools which advocate their ability to manage the shell - most work best in a stand-alone mode. Still, the corporate environment demands efficient centralized management and security optimized for networks. This requirement, combined with my background in development of the OS/2 workplace shell, has led to a careful examination of OS/2 security and commitment to The Desktop Observatory by Pinnacle Technology. This paper discusses the requirements and the features built into Pinnacle's unique technology.

Requirements

Although pure file level security requires IBM's Security Enabling Services (Pinnacle has been a member of Beta efforts and is architected to support these key features already available for 2.11), there are critical elements in OS/2 security that go well beyond the simple ability to restrict right mouse button options. These include: 1) ease of creating desktops; 2) network design; 3) additional security elements; and 4) flexibility.

Ease

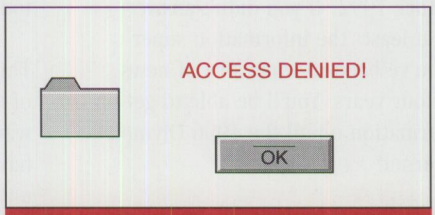
Pinnacle has developed a powerful SOM based tool called "Finder". Finder allows an administrator to quickly create a desktop, snap a picture of it (including all of those oblique DOS settings) and save it to Pinnacle's bandwidth-sensitive file (patent pending). Files can, of course, be saved anywhere on the network and instantly be built at any machine. There is no need for an administrator to know REXX, although those who do will appreciate Pinnacle's ability to associate "events" (programs, etc.) with objects and the pure speed at which it builds desktops.

Eric Osmann was a member of OS/2 Workplace Shell development team at IBM and left in late 1995 to lead development at Pinnacle Technology, Inc. He resides with his family in Colorado Springs and can be reached through electronic mail at helpdesk@pinnacletech.com.

The above is an advertisement, Copyright 1995, Pinnacle Technology Inc.

Network Design

The Desktop Observatory was designed with networks in mind. Administrators will appreciate Pinnacle's small file size of less than 10k per desktop and its ability to work over any protocol and NOS. With this bandwidth, lap tops can be secured over a phone line!



The Desktop Observatory is able to limit users to a centrally managed specific list of applications. User attempts to cleverly create objects via ProgMan, word processors, or REXX will result in a security violation!

Another feature of the Desktop Observatory is that it allows administration of OS/2 clients with the current security server for network based applications. Regardless what NOS is being utilized by a firm, The Desktop Observatory will not build an object unless it can resolve its security checks. It cannot resolve these check unless users are correctly authenticated. The result is a user gets his/her appropriate desktop *whenever and wherever* they log on and the administrator does not have to redundantly maintain rights. No desktop need be provided until *after* a user has been authenticated (those interested in Single Sign-On should contact Pinnacle).

More on Security

Auditing is a common requirement for the security conscious. A full capability is built into The Observatory. This is integrated with the security daemon which includes the ability to restrict clever users from building their own objects to violate client security. Also, great pains are taken to reduce all exposures between power-on and the workplace shell. A special program was created to start the shell (dskshell.cmd), insure networking starts correctly, and inhibit user's ability to interrupt the process via a cntl-break. Disabling the Alt-Fx function is a feature that can be engaged, if desired. Users can enable their hardware boot protection in the bios or call Pinnacle for a centrally distributable software solution.

Flexibility

There are circumstances where corporations do not need high security and only need the ability for users to get the appropriate desktop. In fact, this may be combined with the need for users to be able to modify their own desktop yet move from machine to machine–or what some customers refer to as a "follow me" desktop. Pinnacle uses MID (Mobile Independent Desktops) to provide this flexibility. MID simply utilizes the Finder function mentioned earlier to "snap" the desktop at log off and save the appropriate file to the network so it can be delivered at the next log on. This process applies to PowerPC desktops as well (the Observatory is provided on the PowerPC–OS/2 Application Sampler). End Users should not care what type of OS/2 machine they log onto and with Pinnacle's technology they don't have to.

Summary

Whether you are interested in security or centralized management and delivery of OS/2 desktops, the technology available through Pinnacle can save a great deal of heartache and headaches.

Pinnacle Technology, Inc. was founded in 1992 to bring four key elements to OS/2: 1) Centralized Management; 2) Security; 3) user-proof; and 4) bandwidth sensitivity. Pinnacle's unique means of efficiently delivering desktops (patent pending) is used on over 100,000 OS/2 workstations worldwide. Current products include The Desktop Observatory V4 (centralized desktop management and security), The Desktop Commander (centralized desktop management), and Kid Proof/2 (for stand-alone machines). They can be reached at (800)-525-1650, (317)-279-5157, www.pinnacletech.com, or ehenning@pinnacletech.com.

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IBM and the Internet Go to the Olympics

For the 1992 Olympic Games, the much-talked-about innovation was the broadcast of the Games in their entirety on cable TV. Oh, sure, people would pay to watch hours of "milling around" and "also-rans"! Well, that was one idea that didn't fly.

What's the biggest, most visible advance in information technology since 1992? If you didn't answer "the Internet" or at least "the information superhighway," then you've been in some sort of news warp for the last four years. You'll be able to get up-to-the-minute information on all the 1996 Olympic Games on the Internet!

IBM, the worldwide information technology sponsor of the 1996 Olympic Games, in partnership with the Atlanta Committee for the Olympic Games (ACOG), has developed the official Olympic Web site (`http://www.atlanta.olympic.org`). Billed as a "virtual venue" for Olympic fans, the Web site today contains information on the upcoming events, including participating athletes, schedules for team competitions, pictures of Olympic sporting and cultural events, and other breaking pre-Olympic news. In addition, using a secure electronic commerce application developed by IBM, you can now purchase tickets through the Web.

IBM is also working with ACOG to plan and implement one of the most advanced information technology infrastructures ever built. With reliability and usability critical, the specifications for this solution are far more stringent than for most of IBM's commercial clients. The systems have to work. And they have to work for the thousands of volunteers who will be using them. OS/2 Warp and OS/2 Warp Connect PC clients and servers are responsible for calculating, ranking, and distributing scores to scoreboards, TV commentators, satellite feeds, other venues, and the entire Olympic community.

Whew! That's a lot of requirements for something that is only going to last a little over two weeks! The amazing thing to me is that what we didn't even dream four years ago, we take for granted today.

Think ahead four years—"the year 2000," "the turn of the century," "the millennium"—whatever you want to call it. What we only dream of now will have long been a reality, while the completely unimaginable will be emerging technology. I don't know about you, but I am breathless with anticipation. We are truly living in the greatest of times. So let's celebrate this summer as the world comes together in Atlanta to compete, to make friends, and to anticipate the future.

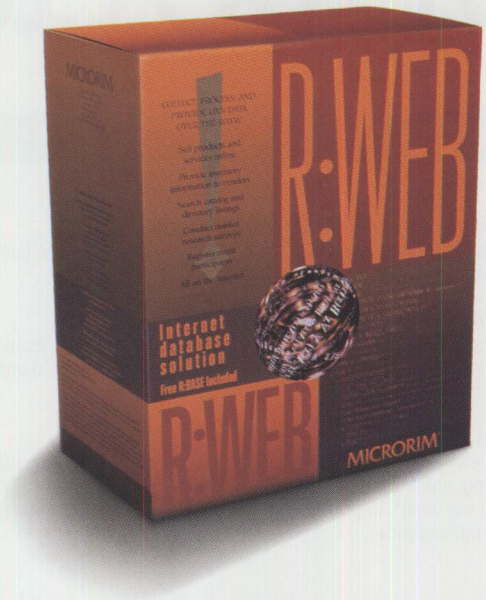
The Future for *Personal Systems*

In the coming months, we are planning to bring you more information on developing applications, on client/server products, and on network-centric computing. If we aren't covering your interest areas, let us know. You've got my phone number, my Internet ID, and my promise to pay the postage on the survey card found between pages 52 and 53. *Personal Systems* is also on the Internet at `http://pscc.dfw.ibm.com/psmag/`. Visit our home page—you can connect from there to the Olympic home page and check up on the Games!

Betty Hawkins

Betty Hawkins, Editor

The only things you need to link your Database to the Web.



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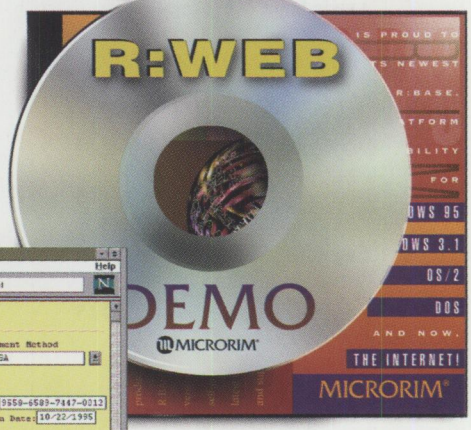

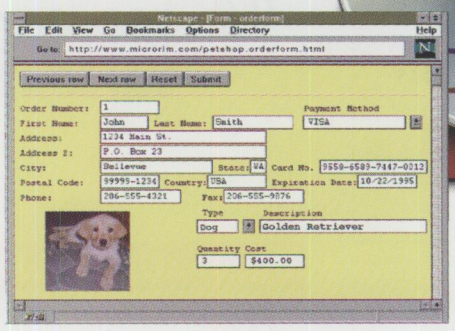

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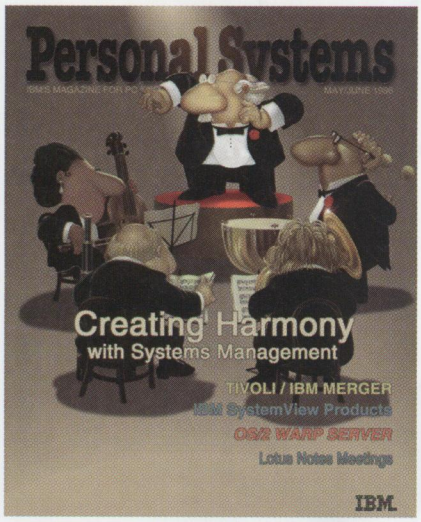

ABOUT THE COVER

A systems administrator, like an orchestra conductor, strives to keep disparate components working together in harmony. With management, the individual parts operate as a harmonious system. Noted Dallas artist Bill Carr's whimsical cover illustration reflects this analogy.

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Contents

FOCUS

6 **Managing a Systems Management Merger**
This article, reprinted from IBM's *SQ* magazine, describes the benefits of the IBM Tivoli merger to the technology industry.

8 **IBM's OS/2 Warp Server is HOT. . .HOT. . .HOT!**
Nick Marc of Sausilito, Calif., a self-proclaimed OS/2 supporter at Chauvet & Company in San Francisco, expresses his thoughts after attending IBM's demonstration of OS/2 Warp Server.

10 **What's New?**
This issue's "What's New?" highlights a variety of products, including calendaring and scheduling, anti-virus security, authoring and development, and year 2000 solutions. Also find out what's in print to help you with visual application development, multimedia networking, and more.

TECHNICAL

26 **SystemView in OS/2 Warp Server**
SystemView, included in OS/2 Warp Server and also sold separately as SystemView for OS/2, provides a robust set of functions to help administrators manage their PC workstations and servers. This article covers SystemView's major capabilities.

33 **Implementing PC SystemView (NetFinity) in Real-World Environments**
This article discusses factors to consider when implementing PC SystemView (recently NetFinity) in large- and small-scale environments. It also briefly discusses SystemView's architecture, features, and new functions, plus lists additional resources for PC SystemView and other SystemView products.

40 **Lotus Notes-Based Meetings**
This article discusses using Lotus Notes in support of meetings, including face-to-face, telecons, and videocons. Find out how you can improve information-sharing and reduce paper waste by conducting meetings using Lotus Notes.

44 **OS/2 Warp Server: An Architectural Primer**
If you are an existing LAN Server user or are considering moving to a local area network (LAN), IBM OS/2 Warp Server has many appealing features and benefits. This article reviews basic LAN architecture and then discusses unique features of OS/2 Warp Server.

LITTLE SOLUTIONS

69 **Corrective Service Information**
Refer to this section for the latest maintenance release levels and other software service information.

20 **Avarice Preview: Software Development as an Audience Participation Sport**
Game enthusiasts won't want to miss this review of Avarice Preview, an interactive multimedia game from Stardock Systems. Find out what's hot about this precursor to the final game, how it works, and what's in store for the final version.

24 **PartitionMagic 2.0—Now Even More Magical**
Personal Systems asked Steve Schneer to take a look at the latest version of PartitionMagic and tell you about the product's new functions and features.

50 **OS/2 Warp Server: An Installation Primer**
OS/2 Warp Server provides a massive number of services and capabilities that allow the construction of simple LANs as well as large, complex, enterprise LANs. This article describes a typical OS/2 Warp Server installation and gives tips and techniques for making your own installation a breeze.

56 **OS/2 Warp Server Performance Highlights and Tuning Tips**
This article discusses the performance capabilities of LAN Server 5.0, a key component of OS/2 Warp Server and features the OS/2 Warp Server Tuning Assistant, a utility that assists a LAN administrator in configuring and tuning a system for optimum performance when several OS/2 Warp Server services (applications that come with OS/2 Warp Server) will coexist in that system.

63 **TCP/IP CID Client/Server Setup Procedure**
This article provides a step-by-step procedure for building a TCP/IP OS/2 remote installation code server using the LAN CID Utility as the software distribution manager.

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Editor and Publisher
Betty Hawkins
(817) 962-5799
bhawkins@vnet.ibm.com

Assistant Editor
Lia Wilson
(817) 962-6267
lia@vnet.ibm.com

Business Manager/ Circulation Manager
Van Landrum
(817) 962-5810
vlandrum@vnet.ibm.com

Editorial Assistant
Jeffrey Miller
(817) 962-5823
bonziman@vnet.ibm.com

Subscription Manager
Rose McAlister
(817) 962-5821
rmcalister@vnet.ibm.com

Business Processes Assistants
Dustin Lyon
Terri Sharp-Kubica

Publication Services, Typesetting, and Design
Terry Pinkston/Corporate Graphics
Arlington, Texas

Illustrator
Bill Carr
Dallas, Texas

Printing
Dave Willburn/Motheral Printing
Fort Worth, Texas

Editorial Services
Mike Engelberg/Studio East
Boca Raton, Florida

Executive Publishers
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Managing a Systems Management Merger

By Alan E. Hodel

"IBM and Tivoli can provide an unmatched line of systems management solutions that are open, easy to customize, and scale from small departments to the largest global enterprises."– Lou Gerstner, IBM CEO

"Demand for distributed systems management products is exploding." – Frank Moss, Tivoli CEO

So said IBM's and Tivoli's CEOs about their merger earlier this year. The following article is reprinted from IBM's SQ magazine and describes the benefits of this merger to the technology industry.

"With the IBM/Tivoli merger, our customers will be able to look to one company to provide systems management solutions from the desktop, to the host, to the Internet," says John M. Thompson, IBM's top software executive. "We'll do it across all major vendors' platforms and at all levels of software, whether it's operating systems or databases or applications. And we'll provide the professional services needed to support customers around the world."

That's how Thompson, IBM senior vice president and software group executive, sums up the impact of a $743 million deal between IBM and Tivoli Systems Inc. that's putting in place a family of offerings that are the industry's most comprehensive open systems management solutions for network-centric computing.

IBM's merger with Austin, TX-based Tivoli combines advanced, object-oriented technology from Tivoli with IBM's industry-leading host-based systems management products and an unparalleled global sales, service, and support operation. Tivoli is a leading provider of systems management software and services that helps users reduce the cost and complexity of managing distributed client/server networks of personal computers and workstations.

"IBM and Tivoli can provide an unmatched line of systems management solutions and services that are open, easy to customize, and scale from small departments to the largest global enterprises," says Lou Gerstner, IBM chairman and chief executive officer (CEO). "The merger greatly strengthens our position in the emerging network-centric computing opportunity."

Systems management software helps companies control their increasingly complex networks of PCs, servers, workstations, host computers, and the applications that run on them. Key functions performed by the software include network management, performance monitoring, problem determination, and administrative tasks such as new user authorization and software distribution.

"Our customers want the flexibility of choice that's offered by open systems," says Thompson. "IBM's success in this market is based on providing customers with the ability to manage very diverse environments composed of many different vendors' products and doing it in a simple way."

"Demand for distributed systems management products is exploding," says Tivoli CEO Frank Moss, who will lead the combined companies' systems management efforts. "Customers are enthusiastically adopting the Tivoli Management Environment. With IBM's global reach and complementary products for hosts and networks, this merger represents a terrific opportunity for our customers."

The Tivoli Management Environment (TME) set of systems and management applications provides a broad range of easy-to-use, automated systems management and administrative tools that simplify the management of widely dispersed UNIX and PC clients and servers. TME is built on object technology, and because it's open, it runs on a wide range of industry platforms such as Sun, HP, and Windows NT. Tivoli also works with major application and database products such as SAP, PowerBuilder, Oracle, Informix, and Sybase.

IBM's flagship SystemView Series systems management product line provides extensive network control functions for managing host-based, UNIX, and PC systems.

"If you write down a list of what TME provides and then another list of all the things that SystemView provides," says Thompson, "there is very, very little overlap." Thompson points to IBM's NetView offerings as an example.

"NetView is an operations piece of software, running down to the network level," Thompson says, "much like OpenView or other operational platforms do. TME sits above that level, taking information that comes out of the network, turning it into a single interface for administrators to manage the entire network.

"So NetView does not change," Thompson stresses. "We will continue to invest in it as we go forward, and it [NetView] becomes a very important base that will integrate tightly with TME."

According to Moss, the merger will "cross fertilize" IBM technologies like NetView with Tivoli's TME. "We'll also look at how

a common platform, if it proves desirable, could be created out of the two," Moss adds.

"Our customers tell us effective systems management is critical to their success, as they increasingly rely on distributed client/server and network-centric computing to run their businesses," says Thompson. "They need to automate systems operational control with sophisticated tools to reduce the cost of managing their information systems."

Citing industry analysts who estimate the cost of managing a distributed or network-centric environment is triple the cost of managing a host environment, Thompson says: "Combining our technologies will help our mutual customers simplify and reduce the cost of managing their systems, networks, and applications."

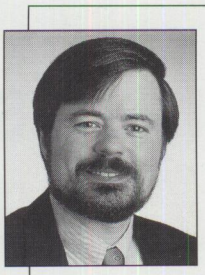
Good Business Sense

"The merger of IBM and Tivoli makes good business sense for IBM, for Tivoli, and for all our customers," says Thompson. "Tivoli gets the full advantage of IBM's global reach and the broad functionality of our enterprise management solutions. IBM takes a dramatic step forward with distributed systems management solutions on multiple platforms, including the Internet. And customers worldwide can take advantage of an end-to-end, integrated line of systems management products and solutions that are open, easy to customize, scalable from small departments to large enterprises, and available on multiple industry platforms."

According to Moss: "Our objective is to create instant, decisive leadership in the management of network-centric computing on a global scale. Tivoli was founded with a single-minded mission of solving the systems management puzzle—the last great barrier for the widespread adoption of networked and client/server computing. This merger is designed to gain the scale required to propel Tivoli and IBM to worldwide leadership in the shortest possible time.

"Now is the right time," adds Moss, "and this merger is the right move."

Editor's note: You can find this and other articles from *SQ: IBM's Magazine of Software Technologies* on the Internet at `http://www.software.ibm.com/sq/`.



Alan E. Hodel has edited and produced both regional and national industry magazines. He is editor and publisher of */AIXtra: IBM's Magazine For AIX Professionals* and editor in chief of *SQ: IBM's Magazine of Software Technologies*. With IBM more than 11 years, Alan serves on the Advisory Board for UNIX Expo, is a member of the Society for Technical Communication and the American Society of Business Press Editors, and has a BS in Journalism from West Virginia University.

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IBM's OS/2 Warp Server is HOT...HOT...HOT!

By Nick Marc

Nick Marc of Sausilito, California, is a self-proclaimed OS/2 supporter at Chauvet & Company in San Francisco. He expressed his thoughts after attending IBM's demonstration of OS/2 Warp Server and posted them to the OS/2 advocacy newsgroup.

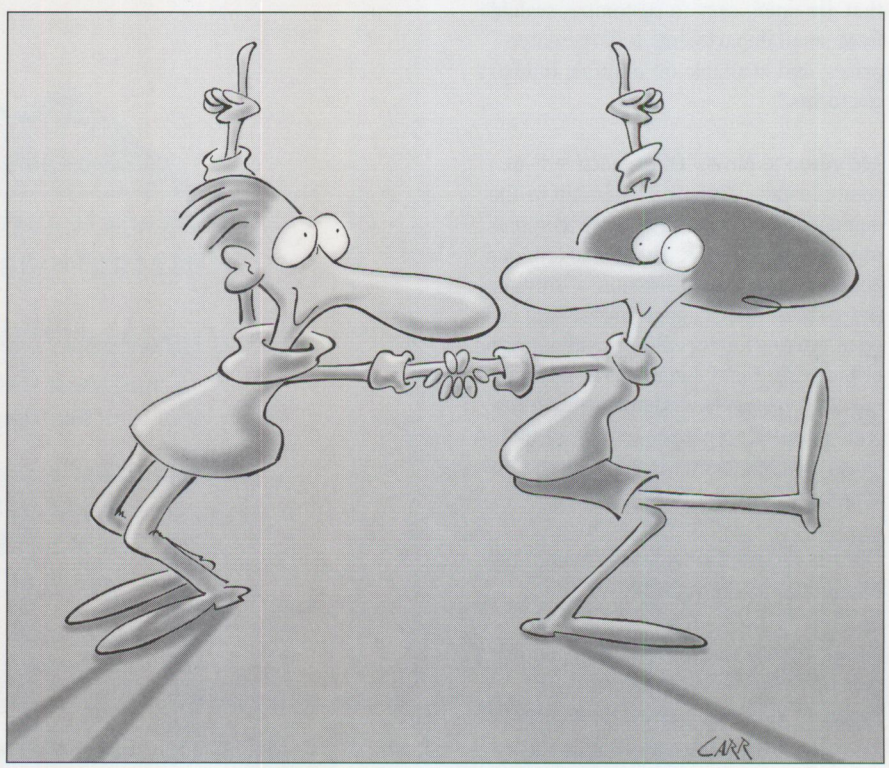
The boss took us to the St. Francis Hotel for IBM's kickoff of OS/2 Warp Server, and they gave a great demonstration (and lunch)! Blew Microsoft's Windows NT away! We knew it was good, but when you see it compared directly to NT's server, you can understand why NT doesn't sell. OS/2's Warp Server is much faster, easier to install and run, and has many more features than NT. Everything about it is drag and drop; it makes efficient use of existing resources; it runs faster; it is more responsive and flexible; and it costs less than NT. You don't need a system administrator–I mean almost anybody can run and maintain it (including me), and it has that great-looking OS/2 interface, which is so much better than NT's.

During the demonstration, this guy from IBM installed it at the same time another guy (an NT expert, believe it or not) installed NT's server. OS/2's server was done in about 20 minutes. The other guy had to feed a bunch of disks and sit there answering all those questions and setting up all those profiles, finding drivers, and doing all kinds of configuration stuff. OS/2 Warp Server comes on a CD and has an easy install button (it has a custom install button too, if you want to "design your own"). The crowd loved it and cheered as the NT guy struggled to set up group profiles and had to use a bunch of security access codes to shift stuff around. OS/2's Warp Server can use just one security code per user no matter where you move them, even if it's clear across the state. And you can install it remotely right from the server machine.

OS/2 Warp Server will support Windows, Windows for Workgroups, Windows 95, Windows NT, AIX, and Mac. It offers file, directory, and printer security; has file backup, third party support, and remote node dial-in support; you can have 1,000 users on it at once, 32 printers, and unlimited directory entries; you can have as many as 64,000 files open at once (although you're limited to 2 gigabytes per file!) and 64 gigabyte partitions; it has peer support; you can use the OS/2 graphical user interface (GUI) or a command line; and it's completely Internet-ready!

We've had OS/2 Warp Server running now for about three months (at the time of this writing), and it's solid as a rock. We've got DSS (IBM's Directory Security Service, currently beta code) installed; it makes the entire system super secure and eliminates the need for our staff to have multiple IDs and passwords, even when used remotely from an employee's home. We've also got AskPSP, a neat little tool for troubleshooting–all I do is supply a basic description of the problem (and I do mean basic), and up pops the answer. And the best part is that it tells me how to fix it. I love that! People here think I'm a genius!

We have a program called Mobile File Synchronization that automatically synchronizes the files of home users when they reconnect to the network by caching all files touched while connected. This allows users to work on files when disconnected and have the files updated when they reconnect. Staff are now doing more work from out in the field and from their homes.



When I set up a new workstation, I don't have to go to the physical location of that workstation to install the software. I can configure and maintain it all right from my server machine. This is called CID (configuration/installation/distribution). Installing TCP/IP was so easy because the server acts as the central address source and distributes TCP/IP to staff on demand, so I don't have to go to their workstations and assign a permanent IP address. Do you know how much time this saves me?

I don't need additional software or third party software to back up the system, either–something that I schedule to do automatically in the dead of night when I'm not at work. The backup is also automatically compressed. It's all so easy because I use this great OS/2 interface with graphical "pipes" that work like plumbing, so I know where I'm going and what I'm backing up. I love that!

We get drag-and-drop printing, we can run 14 printers at once, and we can do high-speed, high-volume print jobs, such as catalogs, and send them all over the place. I have remote setup, configuration, and management from my server machine for all those printers. The users have direct display of actual print jobs and printer status so they don't have to run back and forth to the group printers to check their print jobs.

We also get bi-directional printer support, meaning I can get instant information on every printer's status. So when one of my users tells me the printer's broken, I can tell without having to go to that particular printer that it's just a paper jam, out of paper, or low on ink instead of seeing the print job sitting in the print queue and wondering why.

Hey! Here's a big one: Printer drivers are all on my server machine so I don't have to set up separate drivers for each printer. I love *this* feature!

With OS/2 Warp Server, it's silly and a waste of money to even think of buying NT.

Editor's note: To see Nick's comments plus those of other OS/2 enthusiasts, visit the OS/2 advocacy newsgroup at `comp.os.os2.advocacy`.

Nick Marc is the office manager for Chauvet & Company, a financial investment firm in San Francisco. Established in 1981, Chauvet & Company is a group of 25 professionals who manage financial investments for a variety of individuals and organizations.

Nick is also the system operator for Warp City BBS, which originally began as an in-house communications system for Chauvet & Company, then opened to the public in January 1993. The BBS now supports some 1,500 registered members and offers any OS/2 user free access to approximately 6,000 OS/2 files, shareware/public domain applications, demos, and programs.

Chauvet & Company employees are dedicated OS/2 users and use all the native OS/2 applications they can find. Many staff members work out of their homes or while traveling, where OS/2 Warp Server's remote capabilities are a real plus. Nick took the job at Chauvet & Company in 1991 because the company uses OS/2 exclusively—he feels there is no finer operating system.

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Warp Server NEW!
by IBM
OS/2 Warp Server, the comprehensive server software solution, turns an ordinary i486 (or higher) PC into a file, print and application server. Provides compatible and comprehensive networked services.
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Lotus Notes 4 NEW!
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What's New?

Calendaring and Scheduling Across and Beyond the Enterprise

IBM and Lotus Development Corp. have unveiled a comprehensive calendaring and scheduling (C&S) strategy, based upon ***Lotus Notes Release 4*** and the award-winning ***Lotus Organizer*** user interface, that will include fully functional C&S support in all Notes Release 4 clients: ***Notes Mail***, ***Notes Desktop***, and full ***Notes***. Lotus will also provide complete connectivity and interoperability between Notes and Organizer calendars and ***IBM OfficeVision*** calendars to enable C&S users to confirm and schedule group meetings across the enterprise. Scheduling between Organizer and Notes users across the Internet will be provided through the SMTP/MIME gateway for Notes Release 4.

Users will have a choice of clients, including any Notes client that supports OS/2 Warp, Windows 3.1, Windows 95, Windows NT, Macintosh PowerPC, AIX, HP-UX, and Sun Solaris; or an Organizer client that supports OS/2 Warp, Windows 95, Windows NT, or Macintosh System 7.5. These clients will be available in the second half of 1996. Calendaring and scheduling functionality in Notes clients will be identical with core C&S functionality in Organizer 2.1. The C&S data will be stored inside the user's mail database and will appear as a calendar folder as part of the user's Notes mail database. This will provide Notes and Organizer clients with a common look and feel for daily, weekly, and monthly calendar views, as well as common terminology for creating appointments or scheduling meetings.

In the Notes environment, Notes and Organizer clients will be fully interoperable through the Notes data store and common scheduling services, providing users and administrators with the benefits of Notes Release 4's scalability, security, and mobile enhancements. All Lotus C&S users receive the benefits of scheduling meetings, synchronizing their calendars, or making appointments remotely using the Notes client, thus eliminating the need for a real-time connection. When a user replicates his or her Notes client with the Notes server, the other C&S users are automatically notified about the meetings.

Lotus will provide a full-featured C&S client for ***cc:Mail*** users, taking advantage of the next generation cc:Mail DB8 message store as the back-end database for C&S data. In addition to the integration of Organizer with the cc:Mail client and the cc:Mail DB8 message store, cc:Mail users will have C&S interoperability with Notes through the use of the cc:Mail Connector running on the Lotus CommServer.

Lotus' advanced, messaging-based calendaring and scheduling architecture will allow connectivity and integration across enterprise and inter-enterprise networks. Notes and Organizer users will be able to schedule meetings with their colleagues, vendors, customers, and suppliers across the Internet via the SMTP/MIME gateway, a high-fidelity Notes messaging gateway being designed for the Lotus CommServer.

For more information, circle 1 on the reader service card. Check out Lotus' Internet home page at `http://www.lotus.com`.

Remote Print Manager

RPM Remote Print Manager, a server software package that lets you print to a personal computer across the Internet and enterprise networks, is now available from Brooks Internet Software, Inc. RPM is a state-of-the-art LPD server available separately from bundled networking suites. Potential RPM users include sites with mainframes, UNIX, and AS/400 workstations on networks with PCs running Windows.

RPM fully supports the LPD protocol for Internet printing, including `lpr`, `pr`, `lpq`, `lprm`, and `lpstart` commands. It also accepts requests from mainframes running MVS, CMS, and CICS applications.

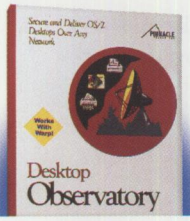
RPM supports multiple, independent queues. Each queue can be configured with its own printer, printer setup, fonts, and margins. RPM can suppress blank pages, remove null characters, wrap lines with several options, and scale the font down to support a given line length. RPM can print to local and networked printers, either formatting the text or sending it directly to the printer. RPM can also run a local program, making possible new and innovative methods of information management on a network without creating custom client/server applications.

RPM's extensive graphical user interface includes windows to monitor print queues and requests, printing activity, and event logs; toolbar, dialogs, and menus to control queues and printing; context sensitive help to easily access program features; and an online operations guide.

Circle 2 on the reader service card for more information, or see the demo version of RPM on the World-Wide Web at `http://www.brooksnet.com/`.

Authoring Development Tool

Highly rated in a recent computer-based training (CBT) report published by Patricia Seybold Group, ***Creative Course Writer (CCW) for OS/2*** from Creative Approaches, Inc. allows you to create powerful CBT for the exciting OS/2 environment with your favorite word processor (DOS-, OS/2-, or Windows-based). A recent enhancement to this product now speeds the creation of mainframe screen simulations in the OS/2 environment.



Desktop Observatory™

Create and manage OS/2™ desktops from a server or host. Advanced security features let you monitor application launches, restrict opening and editing of files, and record security triggers to a log file.

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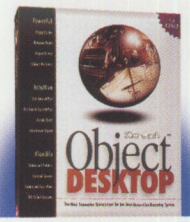
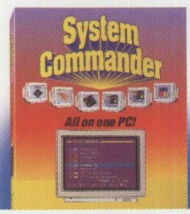
Performance improvements, PLUS utilities you'll use every day. Enhance your OS/2™ system without buying new hardware. Named one of 1995's Best Products by *OS/2 Magazine*.



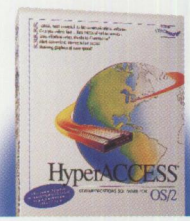
Object Desktop™

The next generation desktop environment. With features such as virtual desktops, viewing files and running programs from ZIP files, resource monitoring, Hypercache, Object Navigator and much more!



System Commander™

Run both Windows™ 95 & OS/2 Warp™ on one PC! With System Commander you can have any combination of x86 operating systems on your PC. "Highly recommended." John C. Dvorak *PC Magazine*



Hyper Access™

Get online fast with the hottest, most graphical 32-bit communications software around! Setup is effortless. Includes fast file transfers and terminal emulators. Now going online is easier than ever!

BackAgain/2™ Pro

The Ultimate Backup & Recovery for OS/2™ Warp. Includes "drag & drop," unattended operation, and full disaster recovery. Supports virtually all SCSI and ATAPI/IDE tape drives.

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Pay No Attention To The Operating System Behind The Curtain

You may have heard about a certain famous program that's a completely new, 32-bit "operating system." But one quick look behind the curtain shows it's merely an application running on DOS technology that dates back to the early '80s. If you want a stable 32-bit operating system with true multitasking designed from the ground up to run the next generation of 32-bit software, it's time to move up to OS/2 Warp. Run your DOS, Windows™ and OS/2 software on the OS that runs more PC software than any other. Choose from these featured programs or from the more than 2,000 other OS/2 Warp programs. Don't be led astray on the old yellow brick road – get OS/2 Warp.

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With full-motion video and audio, CCW supports all screen types by providing customizable "shells." Additional features include the following:

- Includes customizable global navigation buttons (forward, backward, menu, etc.)
- Provides full support for hypertext links and links to the IPF help facility
- Contains "master" application screen images in only one place
- Provides true conditional branching, allowing you to establish multiple student paths based upon student organization code, job, test results, etc., thus eliminating duplicate screens, simplifying maintenance, and saving disk space
- Captures actual OS/2 application screen components and supporting data for integration into the CBT (scroll bars, pushbuttons, spin buttons, radio buttons, check boxes, list boxes, etc.)

For more information, circle 3 on the reader service card or visit Patricia Seybold Group's Web page at `http://www.lotus.com/bpprog/25f2.htm`.

Real-Time Data Acquisition and Control

Microstar Laboratories, Inc. has announced a new ***OS/2 ACCEL*** driver that enables OS/2 users to develop and operate real-time data acquisition and control systems based upon Microstar Laboratories Data Acquisition Processor (DAP) boards for PCs. All of these DAP boards–from the entry-level DAP 800 up to the 486-based DAP 3200e–have their own on-board intelligence implemented as DAPL, a multitasking real-time operating system optimized for high performance data acquisition and control. DAPL runs applications free from any delays imposed by OS/2 or whatever software may be running.

In measuring or controlling a real-time process, computing power has to be available when it is needed. If it isn't, readings are lost and measurements are corrupted or a process goes out of control. On-board intelligence–DAPL–deals up front with the critical parts of any application: the parts that run in real time.

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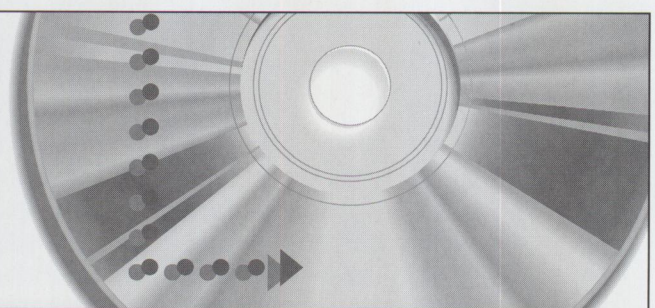

CD-ROM Mastering for OS/2 Warp

Unite CD•Maker™ lets you create your own custom CDs right from your desktop. Unite CD•Maker 2.0 includes these great features:

- Audio CD reading and writing
- Multi-session capability
- 32-bit APIs
- Long file name support
- Device drivers for many popular CD-recordables
- Beta OpenDoc™ interface upon request

Unite CD•Maker combines a multi-threaded design and drag-and-drop features for a powerful and easy-to-use CD mastering tool.

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email: 102404.3643@compuserve.com internet: http://www.cirunite.com

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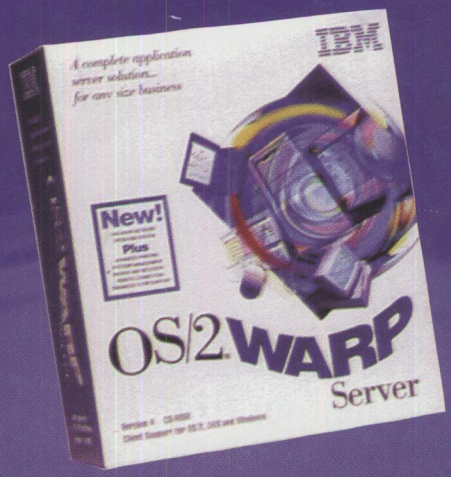
OS/2 Warp Server is a complete server software solution for businesses of all sizes! Benefits of OS/2 Warp Server include:

Concurrent user access to files, applications, printers and modems – from a single LAN server

A flexible, integrated installation process that lets you choose the services you need

A complete set of systems management tools that provide unattended software distribution, software/hardware auto discovery and alert management

Provides full, secure access to your LAN and all the resources on it from any location



Provides Internet services with enhanced TCP/IP support

Provides all the server/client software needed to install a 10-user network with First Step edition

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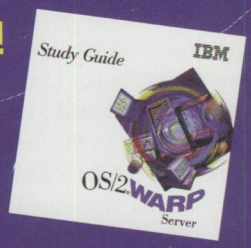
The Technical Self-Study CD provides you with all the materials that are discussed at the IBM 4 1/2 day Warp Server training workshop, which makes you eligible for certification as Warp Server Specialist. Hurry! CDs available only while supplies last.



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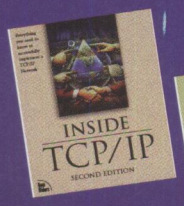

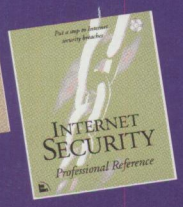

Inside TCP/IP

This tutorial will give administrators a resource for using TCP/IP networking and maintaining existing sites that are currently obtainable only through expensive workshops or word of mouth. The book covers connecting to NetWare; Microsoft's new Windows 95 platform; DHCP; the next generation of IPng; and name services, such as DNS and BIND.

Internet Security Professional Reference

This complete reference shows how Internet and network security is implemented and details ways to keep it from being violated. Inadequacies in current security products are pointed out and strategies to overcome them are explained. The book also includes a CD-ROM which enables you to build your own firewalls, SATANs and SAINTs.

Product Code	*Description*	*Price*
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Circle #26 on reader service card.

The Microstar Laboratories OS/2 ACCEL driver supports OS/2 2.0 and later and allows:

- Native OS/2 applications to control a DAP directly
- DAP-based DOS and Windows applications to run unchanged

The new driver supports multitasking and multithreaded applications. It includes 32-bit support for IBM C/C++ tools and for Borland C++ for OS/2.

A wide range of DOS and Windows software that can now run under OS/2 is available from Microstar Laboratories and from third parties. For more information, circle 4 on the reader service card.

Multimedia Mystery Software

Billed as "the most unique interactive multimedia product ever to be released," Sirius Publishing, Inc. recently released its new, stand-alone multimedia mystery, "***Treasure Quest***." A key element of the game is the unprecedented $1 million grand prize awarded to the first player to successfully solve the clues and unravel the mystery behind "Treasure Quest" in accordance with official contest rules.

Using broad-sweeping security measures at its disc duplication facilities and corporate headquarters to prevent breaches, Sirius Publishing wanted to eliminate the possibility that the reward might attract hackers to attempt to find a short cut to the solution.

The company emphasizes that the $1 million prize is only one of the many elements that make "Treasure Quest" unique. Combining new technology with old-fashioned human interactivity, "Treasure Quest" is laden with clues comprising rich, unique, and original graphics and video never before seen. It also includes an original sound track on an audio CD.

Players are challenged to solve the mystery with clues hidden throughout the CD-ROM. Some clues motivate players to search beyond their computer for answers. Others, both visual and verbal, will be contained within the disc itself. Its nonviolent action makes it the ideal family game.

"Treasure Quest" also contains free SiriusNet software and a Web browser that allows players to link to a special "Treasure Quest" Web site at `http://www.treasurequest.com`. Although players don't have to use the Internet to solve the mystery, players may want to share clues with other treasure hunters.

For more information, circle 5 on the reader service card.

Programmable Report Writer for OS/2

With HockWare, Inc.'s release of ***VisPro/Reports 2.0*** for OS/2 you can easily print invoices, form letters, personnel reports, financial reports, and more from any ODBC-enabled database. VisPro/Reports' ***VisPro Database Designer*** is the same full-featured entity/relationship diagramming tool found in ***VisPro/REXX Gold***, ***VisPro/C++***, and ***VisPro/C***. You can create database reports by dragging database tables from a database diagram and dropping them onto the VisPro/Reports editor. Drag-and-drop report creation instantly creates joins and drill-downs to easily present related data in different tables. You can visually design a new database or reverse-engineer an existing database diagram. The Database Designer supports DB2, Watcom SQL, and all ODBC-enabled databases. The VisPro/Reports preview window allows you to view report queries as the report is being designed. Reports can be viewed or exported to various file formats, including BMP, MET, and ASCII text.

Like all the VisPro products, VisPro/Reports is fully integrated with the OS/2 Workplace Shell. This includes the drag-and-drop features pioneered by HockWare in VisPro/REXX. VisPro/Reports also includes object settings notebooks, pop-up menus, and direct editing. A rich selection of objects, including field, bitmap image, business graphics, multiple line text, line, rectangle, rounded rectangle, and ellipse, let you create reports in a way never before possible with OS/2. VisPro/Reports includes numerous object attributes, including 16 million colors, OS/2 ATM fonts, line styles, line widths, fill patterns, drop shadows, and more.

For more information, circle 6 on the reader service card.

Applications for the Year 2000 and Beyond

Micro Focus has announced ***Micro Focus Challenge 2000 2.0***, a comprehensive, enterprise solution for addressing the year 2000 date-change challenge faced by most business organizations. The Micro Focus Challenge 2000 solution provides the tools necessary for assessing and implementing the unavoidable conversion and maintenance activities the millennium change is imposing upon IS shops.

Challenge 2000 2.0's new features provide increased performance and greater functionality. Specific enhancements include ***Micro Focus Revolve Year 2000 Add-On,*** which exploits Revolve's assessment, analysis, and modification features to provide a single, comprehensive offering for year 2000 analysis. The ***TransCentury Calendar Routines*** have been modified to provide new date functions and formats as well as new routines for calculating a person's age. Additionally, the inventory and organizer tool, ***MVS Application Express Offloader*** (AEO), has been enhanced to provide performance improvements of up to 400 percent, as well as remote execution from a workstation.

The genesis of the millennium date-change dilemma started with programmers' efforts to save expensive disk space by designing two-digit date fields, not anticipating that their programs would still be in use in the year 2000. Now, as that date quickly approaches, applications that base calculations on higher year values, such as the simple calculation of a person's age in the year 2000, will come up with the wrong answer. This type of error has the potential to affect thousands of applications, resulting in major billing disputes, investment miscalculations, and millions of unhappy customers. Companies with applications that use future dates, such as banking and insurance, have already begun to experience these problems.

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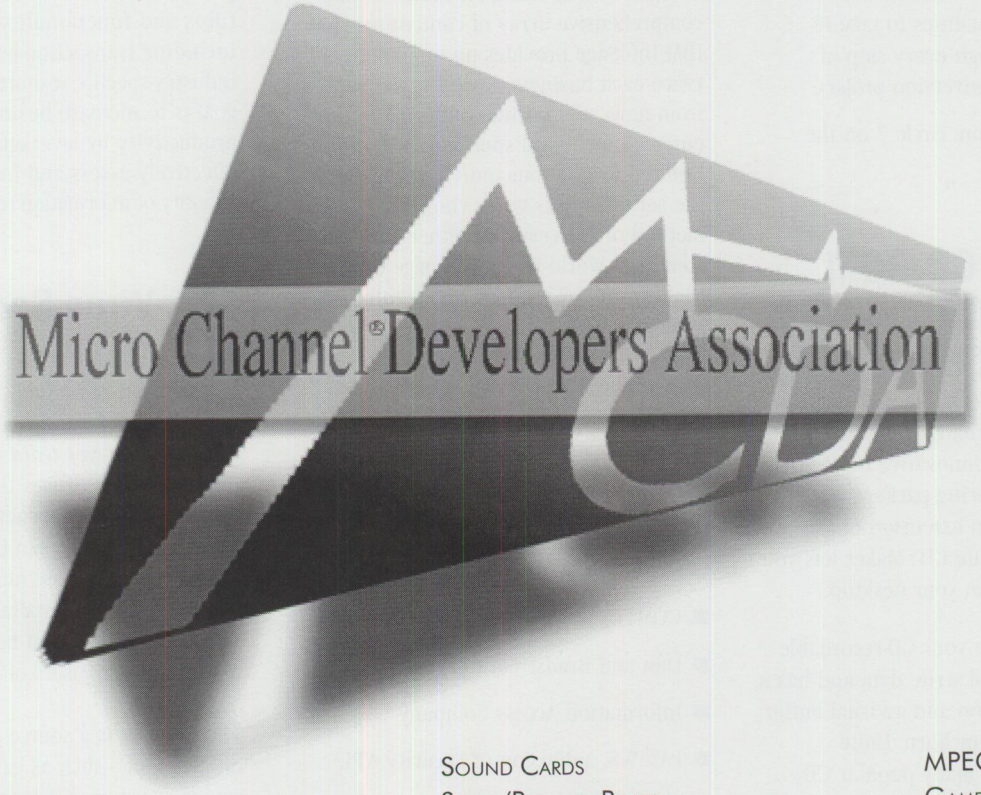

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Circle #27 on reader service card.

According to Gartner Group estimates, in 1996 as many as 20 percent of all business applications will fail because of invalid date computations, and up to 90 percent will fail by 1999 if corrective measures are not taken.

The complete Micro Focus Challenge 2000 solution incorporates a range of tools and development facilities to take IS organizations through every step of their millennium conversion project.

For more information, circle 7 on the reader service card.

OS/2 Warp CD-ROM and Audio CD Mastering Software

Cirrus Technology, Inc. has announced ***Unite CD•Maker 2.0***, an innovative CD-ROM and audio CD mastering package for the OS/2 platform. As an extension of the Workplace Shell, Unite CD•Maker lets you create CDs right from your desktop.

Unite CD•Maker lets your CD-recordable device both read and write data and has a simulated burn option and a visual buffer meter to monitor your burn. Unite CD•Maker supports many popular CD-recorder vendors such as Hewlett-Packard, Kodak, Philips, Pinnacle, Pioneer, Ricoh, Smart and Friendly, Sony, and Yamaha.

Unite CD•Maker's newest features include:

- Support for digital audio, XA form 1, mixed mode, ISO 9660 level 1 and 2, multi-session, and enhanced CD formats
- 32-bit application programming interfaces (APIs)
- Ability to copy from existing CDs

For more information, circle 8 on the reader service card.

Online News and Information Service

IBM has introduced an online news and information delivery service that will play an integral part in its network-centric computing strategy. ***IBM infoSage*** at `http://www.infosage.ibm.com` filters thousands of information sources to pinpoint and deliver industry-specific news and information that business professionals need to stay competitive.

Using leading-edge topic profiling technologies and drawing resources from a comprehensive array of content providers, IBM infoSage provides up to 30 stories twice each business day on topics ranging from news and business information to entertainment and sports. Information is tailored to suit your individual needs, and the service offers you a choice in the method of delivery–via either your personalized World-Wide Web page on the IBM infoSage Web site or your Internet e-mail.

IBM has established relationships with important content providers to provide rich information resources–ranging from news wires and newsletters to magazines and journals–for the infoSage service. The content providers who will initially provide content for the service include:

- COMTEX
- Dun and Bradstreet Corporation
- Information Access Company
- PAWWS, a division of Security APL
- The Reference Press
- Reuters NewMedia Inc.
- Standard & Poor's
- Weather Services Corp.

How IBM infoSage Works

Through the use of a powerful topic profile editor, subscribers to IBM infoSage specify and personalize the topics of interest to them–choosing from more than 2,300 industry-specific categories.

IBM infoSage also allows you to create your own topic, making it possible to select from an infinite number of subjects. The service then uses filtering technologies to identify the stories that are most relevant based upon your profile. Twice each business day, up to 30 stories are delivered via either your personal Web page or Internet-connected e-mail and soon, Lotus Notes. The full text of each story is available at the click of a button through the Web or upon request through e-mail.

IBM infoSage also features a unique "alert service," which provides quick delivery of breaking news stories that are of special interest to you. The alert feature sends special full-text "alerts" via e-mail anytime–day or night–whenever the news is received.

IBM infoSage will continue to add features and functionality over time–including transaction-based services and industry-specific resources. The service's goal is to increase business professionals' productivity by leveraging technology to effectively assess and integrate the vast quantity of information resources available.

Anti-Virus Security Software

SecureNet Technologies, Inc. has launched version 2.0 of its ***V-Net Gold*** software that protects PCs from viruses that can be received via the Internet or floppy disks. Your in-house staff can implement V-Net Gold to an unlimited number of PCs via a simple, one-time installation on the network server. It cannot be bypassed or undermined by users of individual PCs.

The Internet is a source of viruses carried on programs–such as games, screen savers, word processing, or any executable file–downloaded into a user's PC. V-Net Gold 2.0 protects against these viruses by authorizing disks and programs and automatically cleaning "boot" viruses without user intervention. It's compatible with any virus scanner and can be used with multiple scanners. Thunderbyte Inc.'s ***TBScan*** software is bundled into each copy.

For more information, circle 9 on the reader service card.

LAN Reporting Tool

Lieberman and Associates has announced ***"LAN Intensive Care Database and Reporting Tools,"*** a new product for IBM Warp Server that extracts all account and resource information from LAN Server and exports it into industry-standard databases for easy relational analysis.

Using the extracted information, you can track such items as assignments, definitions, logon failures, resource usage, access permissions, and error logs. Everything in your LAN is now available in standard database formats.

This package was created to provide critically needed information to keep you informed about what has changed in your LANs from day to day.

For more information, circle 10 on the reader service card.

Support for APA Print Files

SPOOLVIEW, DataTrade's C.O.L.D. system or optical storage and retrieval system for computer generated reports now supports indexing, viewing, and printing of native all points addressable (APA) print files, including IBM's advanced function print (AFP) files. SPOOLVIEW's ability to directly process APA files eliminates the need for expensive preprinted forms and the long and laborious process of scanning documents into an imaging system. Plus, optical storage space requirements for these reports are at least 50 percent less than that of images.

SPOOLVIEW is a multi-platform client/server application that collects reports from all IBM host systems (ES/9000, AS/400, and RISC System/6000) and PCs via file transfer or tape input. The reports are then automatically indexed and transferred to IBM 3995 optical media. You can view, print, fax, and export data via LAN-based PCs running OS/2, Windows, or DOS character-based user interfaces or via 5250, 3270, and ASCII terminals.

The APA codes create the form along with the text and pass it to high speed laser printers. Modules within SPOOLVIEW's server engine have the ability to find and index information and recognize fonts and graphics used in the forms generation. The APA reports can then be stored in their native formats on magnetic, optical, or CD-ROM media. When you request report pages, the system retrieves the pages to the SPOOLVIEW server where they are decoded and sent to the client PC. The client PC decompresses and displays the pages, all within a matter of seconds. You can print or fax any of the returned output.

For more information, circle 11 on the reader service card.

Lotus Notes Extension for JBA Guidelines

Software applications and development tools supplier, JBA International, has introduced a ***Lotus Notes*** extension for its application development tool ***JBA Guidelines***. The new offering provides considerably improved document access and manipulation functionality, particularly for applications on multiple client and host platforms.

JBA Guidelines is a complete software development environment for generating GUI-based workgroup to enterprisewide client/server applications. It uses a high level language called JOT that lets you code event-driven applications that utilize the flexibility and graphical nature of personal computers while providing easy and direct access to server technologies.

Previously, Lotus Notes users often needed programming support to access data on different platforms because of the nature of the Lotus API. Using JOT in Guidelines, you can set up your own GUI-based applications, across platforms, without having to program in C++. The Guidelines Notes extension allows databases and their component records and fields to be created, deleted, interrogated, written to, and processed in a number of ways. Guidelines modules may be called up to conduct operations on any combination of databases, notes, and items that can be defined by the Notes macro language and/or custom filters written in Guidelines. It uses standard, documented Lotus APIs while the same source code creates stand-alone `.EXE` files in OS/2 and Windows environments.

JBA, a full Lotus Business Partner, is working alongside Lotus to extend and enhance Guidelines functionality in response to the increasing use of Notes.

For more information, circle 12 on the reader service card.

Programmer Productivity Tools

Micro Focus has developed ***Micro Focus COBOL Workbench 4.0*** for OS/2, Windows, Windows NT, and Windows 95. Workbench is a comprehensive, integrated suite of programmer productivity tools designed to facilitate developing and maintaining high-quality, industrial-strength enterprise applications. Workbench now delivers a true 32-bit programming environment, providing a 32-bit compiler that supports both traditional mainframe COBOL dialects as well as object-oriented COBOL. Additionally, Micro Focus has announced new 32-bit versions of several Workbench tools including ***Micro Focus CICS Option 4.0***, ***Micro Focus Transaction System 4.0***, and ***Micro Focus Operating System Extensions (OSX) 4.0***.

A wide range of Workbench tools is now enabled to fully exploit the power of 32-bit operating systems, providing a powerful environment for developing and maintaining mainframe or workstation-based applications. Key benefits of the 32-bit environment include improved memory management, increased performance, and multitasking capabilities.

The 32-bit environment lets you maintain applications that previously would have been too large for a workstation because of the number of programs within the application, the size of data or linkage sections, or pointer manipulation problems. You will now realize significant performance improvements, particularly with computation or call-intensive applications. Additionally, it is easier to access other languages from COBOL, such as C for interoperability with GUI environments and third-party tools or PL/1 for enhanced mainframe emulation.

For more information, circle 7 on the reader service card.

Visual Application Development

TechBridge Technology Corp. is now shipping ***Visual TriO for Smalltalk 2.1***, a visual 4GL application development tool,

available on OS/2 and Windows, as an add-on to ParcPlace-Digitalk's ***Visual Smalltalk***.

GUI 4GL visual development power tools, characterized by smart GUI builders with data awareness and built-in query intelligence, have been popularized by tools such as Powersoft's ***PowerBuilder***. Before Visual TriO for Smalltalk, development of a Smalltalk application was a two-stage process: parts creation and then a separate applications assembly from the parts. However, by following the simpler GUI 4GL model of application development, Visual TriO for Smalltalk eliminates complexity and shortens the Smalltalk learning curve.

The technology is packaged as a Smalltalk framework of more than 500 programming-smart classes, presented in a desktop metaphor as a comprehensive, integrated tool suite.

For more information, circle 14 on the reader service card.

Oracle Developer's Guide

Help has been scarce for database developers who wish to write powerful Oracle applications and design fast, effective Oracle systems for their companies. Now, there is a guide that irons out Oracle7's complexities and teaches developers everything they need to use this full-featured database management system. Published by Oracle Press, ***Oracle Developer's Guide*** by David McClanahan is a must-have for developers who want to program in Oracle7.

Oracle Developer's Guide puts Oracle7 into perspective with useful, complete information. When it comes to learning how to build effective Oracle7 applications and develop fast, powerful, and secure systems, this is the first and only guide to bring it all together for the database developer.

Author McClanahan, a recognized expert in database design and analysis, demonstrates how to write peak-performance database applications and supply the code that developers require for numerous specific tasks. Written primarily for those with a C background and some understanding of structured query language (SQL), this rich resource is ideal for Oracle newcomers and whizzes alike.

Oracle Developer's Guide: ISBN 0-07-882087-1. For more information, circle 15 on the reader service card.

LAN Times Guide to Multimedia Networking

LAN Times Guide to Multimedia Networking from Osborne/McGraw-Hill helps administrators and anyone who works with multimedia technology build, maintain, and maximize the potential of networks that use multimedia.

The authors discuss the basic concepts and advanced issues involved in the sometimes daunting task of creating multimedia presentations and distributing them over internal or public networks. Step by step, they cover file formats, compression techniques, and transmission over the Internet, ISDN, LANs, and X4.00. Storage issues, interoperability, ATM, and security are addressed for the network manager, as well as current and future trends, hardware, software, and cabling.

LAN Times Guide to Multimedia: ISBN 0-07-882114-2. For additional information about Osborne/McGraw-Hill publishing, circle 16 on the reader service card.

C++ Nuts & Bolts: For Experienced Programmers

C++ Nuts and Bolts: For Experienced Programmers from Osborne/McGraw-Hill is the third title in their new Nuts & Bolts series. Offering experienced programmers the information they need without restating basic concepts they already know, this series enables developers to get up to speed rapidly on new software.

Written by renowned C++ expert Herbert Schildt, *C++ Nuts & Bolts* is packed with valuable programming know-how. Schildt offers clear explanations and extensive code examples to help developers master concepts quickly and easily. In addition, special "Fast Track Tips" and "Nuts & Bolts" boxes show programmers how to apply what they're learning.

Schildt begins with a thorough discussion of C++ programming essentials, including variables, operators, and expressions; control statements; functions; pointers and arrays; and structures, unions, and enumerations. He then moves on to provide in-depth coverage of C++'s object-oriented features.

With *C++ Nuts & Bolts*, developers with a background in any language will be able to quickly convert previous programming experience into C++ expertise!

C++ Nuts & Bolts: For Experienced Programmers: ISBN 0-07-882140-1. For additional information about Osborne/McGraw-Hill publishing, circle 16 on the reader service card.

Scanning the Professional Way

The first in Osborne/McGraw-Hill's Digital Pro Series, ***Scanning the Professional Way,*** covers complex issues of scanning images for print. Intermediate to advanced creators of print publishing materials, including graphic designers, advertising agency personnel, photographers, corporate marketing communications professionals, print production workers, educators, and service bureau employees will find *Scanning the Professional Way* is tightly focused and contains straightforward, no-nonsense information on scanning images successfully and painlessly.

Authors Sybil and Emil Ihrig draw on their vast professional expertise in publishing, design, and digital prepress to help readers become proficient in:

- Choosing the best scanning device
- Evaluating source images
- Calibrating and managing color
- Scanning and color reproduction for print, multimedia, and video output
- Professionally adjusting color, tone, and sharpness

- Determining optimum image size and resolution
- Selecting the most appropriate file format

Scanning the Professional Way: ISBN 0-07-882145-2. For additional information about Osborne/McGraw-Hill publishing, circle 16 on the reader service card.

Digital Images: A Practical Guide

Digital Images: A Practical Guide covers everything readers need to know to begin working with digital images. Once solely the realm of graphics professionals, creating, manipulating, and enhancing computer images can now be done by anyone with a computer and the right software. But where do you start?

Authors Adele Droblas Greenberg and Seth Greenberg cover this complex process by discussing the following and more:

- How digital images are used today
- Computer art basics–including the difference between bitmap and vector programs
- Creating your own digital images
- Scanning and video capture
- Getting started with 3-D and multimedia

Additional features include an interview with the creators of the best-selling computer game, Myst; a foreword by Kai Krause, creator of Kai's Power Tools; and "Tips of the Trade"–special tricks and techniques shared by digital imaging experts. *Digital Images* shows how anyone can immediately start generating attention-grabbing computer art.

Digital Images: A Practical Guide: ISBN 0-07-882113-4. For additional information on Osborne/McGraw-Hill publishing, circle 16 on the reader service card.

Get Rid of the "Sneaker Net"

The life of every network administrator is still filled with "sneaker net" activities–running from office to office, building to building, trying to support your users. The problem is simple–lack of automation. Without tools that automate systems management and reduce the human time element, systems management will remain a labor intensive and time consuming task.

To create an effective systems management tool, CleverSoft analyzed the day-to-day activities of network administrators. A substantial portion of their time is spent running around installing new software and updates. Thanks to many fourth generation languages, developers can now crank out new applications faster than ever before, so updates are frequent.

Then there's the troubleshooting. "My machine is locked up." "Why doesn't this application do anything when I click here?" Sound familiar? Today's method of problem resolution too frequently involves putting on your sneakers and making a trip to the unhappy user. You've painfully learned that once you solve a problem for one user, you usually have to make a configuration change for all your other users. So you tighten up your shoe laces and set out on another "sneaker net" excursion to every machine.

At last there is a tool that can really help you manage your OS/2 and Windows PCs; a tool that doesn't require weeks of learning at a systems management boot camp; a tool that works the way you work in a task-oriented fashion–a tool called ***CleverManage.***

Here are some of the highlights of this new tool from CleverSoft:

Software distribution–Install software or distribute updates to designated machines on the network. Initiate distribution interactively, at scheduled times, or when users connect to the network.

Application metering–Ensure software license compliance by monitoring and optionally limiting the number of copies of a given software package that can be used at one time.

Asset/inventory management–Keep track of what software is installed on every machine. Create inventory reports. Spot unauthorized applications.

Remote system configuration changes–Make changes to `CONFIG.SYS`, `WIN.INI`, or other configuration files on every machine in the network with a single click of a button. Instantly compare configuration changes.

Resource monitoring and event logging–Monitor and log important system events occurring on every machine. Produce a chronological report of the events that led up to a problem.

Automate problem correction–Create management rules that automatically take corrective actions when problems develop. Automatically restart failed applications, launch corrective application, or reboot machines.

Administrator notification–Alert administrators of impending problems via alphanumeric paging, e-mail, sound, windows, and SNMP messages (traps).

For more information, circle 17 on the reader service card.

Avarice Preview: Software Development as an Audience Participation Sport

By Joel Canon

Personal Systems ***asked Joel Canon to review Avarice Preview from Stardock Systems. If you're like the editor, you won't finish reading this review before you'll want to rush out and buy a copy. This game is sure to be another big hit from Stardock.***

So, you've got that brand-spanking-new Pentium PC unwrapped, Warped, and now you're looking for something cool to show off your new toy. Got a few hours to kill? Well, give Stardock Systems (or Indelible Blue) a call for a copy of Avarice Preview.

Avarice Preview is a new game from the same guys that brought you Star Emperor, Galactic Civilizations 2, and Object Desktop. It's not the full game, though, and it's not yet complete. But Avarice Preview gives you a chance to play a limited version of what will no doubt be another best-seller like Galactic Civilizations.

Avarice is billed as a "virtual reality" game, but that term doesn't do justice to the beauty and complexity wrapped up on Avarice's CD-ROM. Let's take a closer look at what makes Avarice Preview such a neat diversion. We'll start by looking at the game itself and then go into some of the technology that makes it happen. And finally, we'll take a look at what's planned for the final version.

The Plot

Avarice is a role-playing game that allows you to assume the character of Gareth O'Hara. Gareth has received a letter from his fabulously wealthy uncle, Kindel, inviting him to the O'Hara mansion in Hawaii. There are only two problems: First, Gareth never heard of his uncle before receiving the letter, but the offer of an "opportunity of a lifetime" tempts him to visit. Second, when Gareth arrives at the mansion, he finds that his uncle has disappeared, leaving only a blood-stained hat behind. The game begins as Gareth enters the O'Hara mansion to unravel the clues to Uncle Kindel's fate.

Playing the Game

When you play Avarice, you see a virtual world (well, a virtual mansion) through Gareth's eyes. You view a scene within the mansion that covers the upper three-fourths of the screen. The bottom of the screen displays several informational items, including a log of your activities and a display of Gareth's personal inventory. The log keeps a text version of your activities and, optionally, any results of your interactions with objects in the mansion. The results of your interactions include both sounds and visual clues.

As you use your mouse to move about the O'Hara mansion, animated cursors give clues as to where you are allowed to move. For instance, if the cursor becomes a large arrow pointing "ahead" on the screen, you can click the mouse to move forward–down a hall or into a room, for example. If the cursor points "backward" (actually it points down on the screen), you can move backward without turning around. For other moves, an animated cursor consisting of a circle with a flashing line at an angle indicates the direction, or legal moves, you can make.

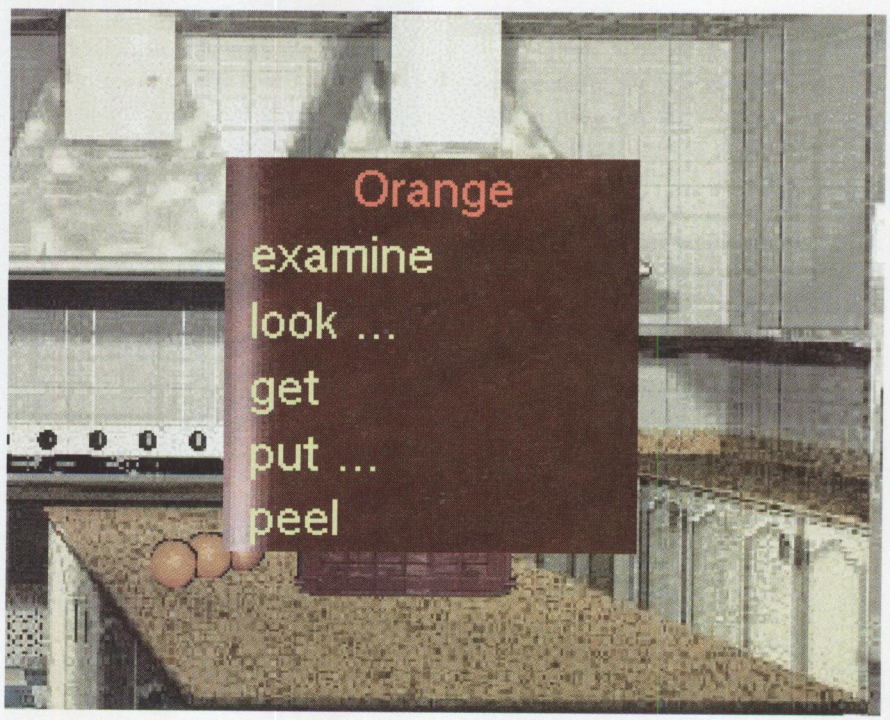

Figure 1. Sample Menu Choices for an Orange

Other cursors indicate the types of actions that can be performed on an object. One becomes a pair of eyeballs when the mouse pointer is over an object that could use some further inspection. For example, when the cursor moves over a fireplace, eyeballs indicate that you can look into the chimney. Another cursor shows a crosshair pattern when you can work with an object in the room. For example, a crosshair cursor appears when the mouse pointer is within a doorway that you may enter.

There are many objects lying around the mansion, and the curious player can use them in many ways. Any object that can be used works like any OS/2 object. A click of mouse button 2 (the politically correct way of describing my right-hand mouse button) shows a list of things that you can do to that object. (See Figure 1.) For example, clicking on a buffet shows that you can either "approach" it or "look . . ." at it. The ellipses following the second choice indicate that secondary actions are possible. For an object that shows "look . . ." on its pop-up menu, you may be able to look *on* the object, *inside* the object, or *under* the object. And objects can contain other things. The buffet's drawers can be explored, for example. And the bricks on the fireplace . . . well, you'll just have to see for yourself.

You can also *examine* objects to see a close-up of the object in place of the current scene's view. You can examine the contents of a note, for example. And since some notes arrive wadded up into a ball, you have to "unwad" them. You can pick up objects to add them to Gareth's inventory. You never know when you'll need that can opener!

The potential for this game is obvious, and Stardock gives us hints of what it can really do. Among the "teasers" in Avarice are the various pieces of fruit lying around for Gareth to peel and eat. It's not obvious what the oranges do for the virtual player's status or to advance the game, but it makes for a nice break in the hunt for clues.

During the game, you move Gareth throughout different parts of the O'Hara mansion. Several areas are obviously accessible and easy to enter. Other rooms require you to collect certain objects or information before you can enter.

Sometimes you must use information (clues in some form or another) to manipulate objects that allow entry into other areas. For example, to enter through certain doors, you need a key. And, kindly Uncle Kindel did not leave his keys lying around for just anyone to pick up!

While it's certain that Stardock will change much of this for the final game—for example, they've promised that the mansion will be *much* bigger—don't look to this review for too many clues. There's no cheat guide for Avarice, and we're not going to create one here.

Now that we've taken a spin around the O'Hara mansion, let's briefly look at what makes the game tick.

Avarice's lush graphics are a non-fattening feast for the eyes.

Avarice is Warped

Avarice is a native, 32-bit, multithreaded OS/2 game. It uses the heck out of OS/2 Warp to interact with you and your computer. For example, as you're thinking about your next move, you may notice disk activity. Avarice is busy caching more beautiful graphics in anticipation of your next move. The sound runs on a separate thread so that—unlike games like Myst—you can do something while the sound keeps running in the background. This sounds like a nit (or simple Warp fanatic techno-bragging), but it isn't. One of the charms of a game like Myst or Avarice is its ability to draw you into another world, one that exists only in your head. This world exists only in your imagination and is constructed from your involvement with the game. Nothing will burst your bubble faster than waiting for the game to catch up with your CD-ROM or hearing the music stop during a scene change. If your car ran like that, every time you shifted gears, your radio would stop!

Performance is always a trade off in computer games. Greater detail or high-quality graphics almost always mean an equivalent decrease in performance. Through some clever programming, Stardock has neatly sidestepped that issue. In the first update (see details below on how to get updates), Stardock added a multithreading function that decodes the high-resolution graphics. When you change scenes, Avarice will quickly paint the screen with a low-resolution version of the current view. Then, if you pause to look at the scene, it continues to generate the high-resolution version of the scene, which appears after a brief delay. You can configure the duration of the delay from "right away" to 10 seconds.

Avarice is Beautiful

The graphics for Avarice are absolutely gorgeous. Nothing can really quite prepare you for the atmosphere, artistry, and attention to detail this game provides. When you enter the O'Hara mansion, you enter a main hallway lined with interesting paintings. (Actually there are a *lot* of them in the mansion.) In front of each painting is a green marble pedestal. The pedestals and the polished marble floor gleam (see Figure 2). And as you begin to explore the mansion, you'll find the dining hall adorned with exquisite green wallpaper, complete with fleur-de-lis, as shown in Figure 3. Wooden items have real wood-grain patterns. And everything is textured—whether it's the smooth, shiny marble, wooden doors, or the stucco walls in the atrium.

If necessary, Avarice could serve as more than a game. It's conceivable that Stardock could add a few more rooms, more paintings and a tour guide, then sell it as a virtual art gallery. In fact, it already has a virtual library (but we wouldn't want to spoil the game by telling you where it is!).

One thing is certain about the Avarice Preview: You won't get hung up on the video problems that plague the graphics of much of today's commercial software. Many games (and CD-based reference material) depend upon your computer running at a specific video resolution and color depth. Myst, like many Windows games, runs at a resolution of only 640 by 480 at 256 colors, regardless of the machine's actual capabilities. Avarice can handle just about any common SVGA resolution and can even run in gray scale for extra speed on lower-end hardware. But at 1024 by 768, the graphics are truly

Figure 2. The Main Hallway

Figure 3. The Dining Hall

gorgeous and will justify spending the extra money for a 17-inch monitor.

Avarice supports a wide variety of resolutions and color depths. If your system can't show 65 million colors or you don't have a 17-inch monitor, that's fine. You'll still like Avarice. But if you've made the investment in high-end graphics or a larger monitor, Avarice will be your reward. Friends and relations will look over your shoulder with comments like "ooh" and "aah." Avarice's lush graphics are a non-fattening feast for the eyes.

Should You Buy Avarice Now?

Avarice Preview is *not* the full Avarice game–it is a "prequel" to the full game, which Stardock bills as "Avarice: The Complete Saga." In other words, it is a limited-function version of the complete game and even includes a coupon that's good for $30 off the final version.

Stardock has also promised that before the final version's release, they will issue some updates to the game that will add function and/or complexity. (As of mid-February 1996, Stardock issued the first update and one small patch.) Updates will be available electronically through several sources:

- The Stardock home page–`http://www.stardock.com`
- The Stardock BBS–(313) 453-1845
- CompuServe–`GO STARDOCK`

What's Coming in the Final Version?

Brad Wardell, Stardock president, has been very active in cyberspace to keep us informed on some of the features that will be added to the full version:

- *An updated version of the O'Hara mansion*–"The only thing the final version will have in common with the Preview is that part of the house will be the same," Wardell says.
- *NPCs or non-player characters*–For Avarice Preview, you are alone in the house. For the final game, you'll have some friends to deal with. Or maybe they're not really friends . . .
- *DART (IBM's high-speed audio interface for OS/2 games).*
- *Much smaller memory requirements.*
- *Better performance.*
- *More complex and challenging puzzles and clues.*

No release date for the final version has been announced. Instead of committing to a date, Wardell has indicated that they'll release the final version "when we're happy with it."

Summary

Avarice follows in the footsteps of the original Adventure game and its PC-based successors like Zork. It takes a cue from the graphics and sounds of Myst. And it uses OS/2's power to make it one of the most beautiful interactive games to hit your screen. Not bad for a "prequel!"

If you like mystery games and have access to any of the electronic sources for Avarice updates, then the Avarice Preview is for you. I've beta-tested several Stardock software titles, including Object Desktop. Stardock has done a good job of soliciting feedback from users of their software. There is no doubt this game will only get better. I expect Avarice: The Complete Saga to be Stardock's follow-up hit to Galactic Civilizations 2.

For more information on Stardock Systems, circle 19 on the reader service card.

Joel Canon is a software sales specialist for IBM in Winston-Salem, N.C. His job includes software sales to large corporate customers. Canon likes to beta-test software and has the hardware bills to prove it!

Personal Systems

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PartitionMagic 2.0 — Now Even More Magical

By Steven P. Schneer

Personal Systems ***asked Steve Schneer to take a look at the latest version of PartitionMagic and tell you about the product's new functions and features.***

PowerQuest Corp.'s PartitionMagic 2.0 proves you can make a good product even better. The winner of *Byte Magazine's* Best of COMDEX/Fall '95 award, PartitionMagic 2.0 has been enhanced to include some nice features and now runs on the Windows and Windows 95 platforms in addition to DOS and OS/2. Since my review of version 1.0 in *Personal Systems'* September/October 1995 issue, PartitionMagic has become a mainstream product that solves the problem of fixed partitioning.

Product Overview

PartitionMagic makes resizing partitions on a hard drive easy and quick. In the past, changing a partition layout or size required that you fully back up your hard drive, reformat the hard drive, then restore your data and applications. Now, PartitionMagic lets you resize a hard drive without destroying data and without worry as long as you have a reliable backup solution.

Significant improvements in PartitionMagic's new version include a new interface and a significantly expanded, informative, and helpful user guide, plus the ability to resize the cluster of a FAT file system partition to more efficiently use the space, modify the root directory size for Windows 95 long file name support, and hide one or more partitions for safety when testing new software.

Improved Interface

The first improvements you'll notice in version 2.0 are its updated main screen (Figure 1) and enhanced interface. The addition of context menus to almost all objects on the main screen is a nice touch. Version 2.0 also lets you create, delete, and format partitions from within PartitionMagic. This means that one application can replace two or three command line or stand-alone programs for most partition maintenance and modification.

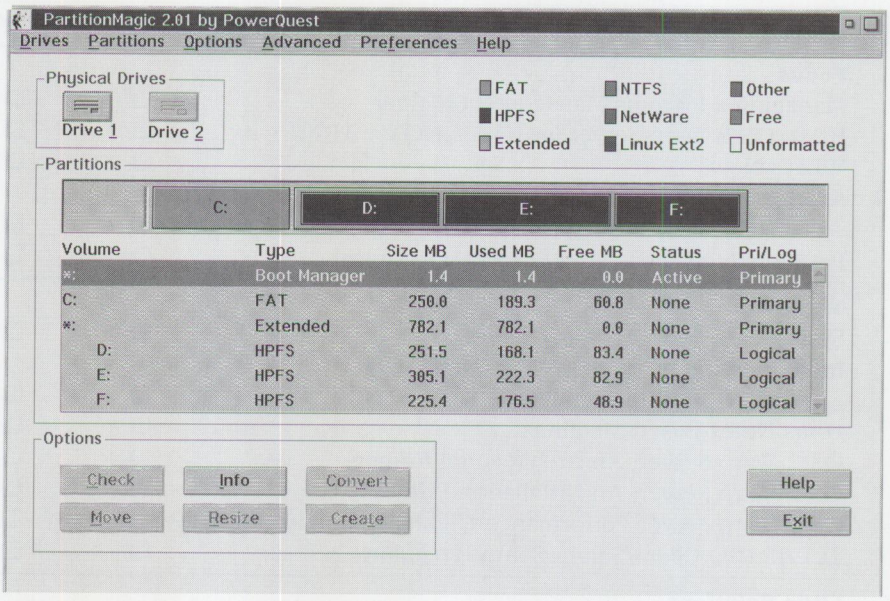


Figure 1. PartitionMagic's Main Screen

Further enhancements were made to the Check (Figure 2) and Information (Figures 3a and 3b) functions to provide you with more thorough and useful information.

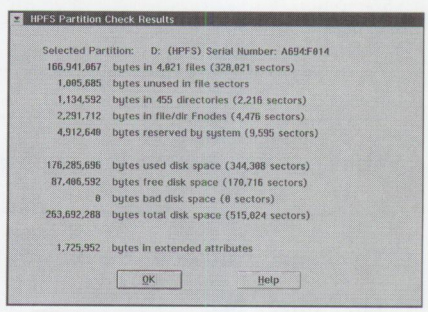


Figure 2. HPFS Partition Check Results

Resizing Clusters for Fun and Profit

When DOS formats a FAT partition, the maximum number of clusters is 65,525. Therefore, to accommodate the larger drives that are becoming standard on all PCs, the cluster size has to increase if a single partition is used. This, however, increases the space wasted when saving a small file, since the minimum allocation unit for any file is one cluster. If a FAT

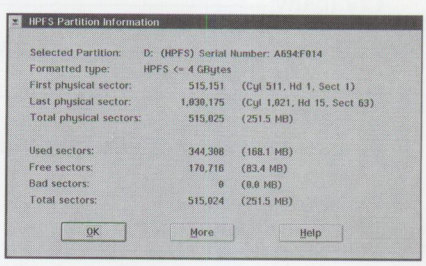


Figure 3a. HPFS Partition Information, Page 1

Backups and Restores

The PartitionMagic manual frequently stresses the importance of doing a backup prior to modifying any hard drive; however, the importance of actually *testing* the restore process can't be over-emphasized. Too often, a user makes a backup but never attempts a restore before a disaster occurs. By then it is ***too late*** to correct the procedure. If the procedure doesn't work, you can lose valuable data and time.

Always take the time to test your entire backup and restore solution before you're under deadline or in a crisis situation. Once you've tested it, or even as you test it, document the procedure. Then, *when* (not *if*) the need to restore arises, the restore process will be a familiar routine and should go smoothly.

partition is sized greater than 512 MB, then the simple `WORDPROC.BAT` file used to start your word processor consumes one 16,384-byte cluster. If the partition size is greater than 1,024 MB, that same 10- or 20-byte file consumes a 32,768-byte cluster. With many small files, this can add up to hundreds of megabytes of wasted space on a large, single partition hard drive.

PartitionMagic 2.0 addresses this by letting you split one large partition into several smaller ones. It lets you resize the clusters in those smaller partitions without reformatting (Figure 4).

Hiding Partitions

A new feature that can be helpful in certain situations is the ability to "hide" a partition. If you are developing a product and want to be able to install it independently of an existing version of your development code, you can "hide" all partitions, install and test the product, then "un-hide" and correct or modify the product as indicated by your testing. This feature can save a small developer the cost of a dedicated test machine.

Another potential use is in an evaluation lab within an organization that needs to test new software without risking changes or damage to the tester's existing workstation setup. Since many products now put files in system directories as well as other places (not always well documented), you could have a "test" partition that is used for this purpose only. By hiding your normal work partitions, you protect them from modification by the new program. A standard backup of the test partition allows you to restore it without fear of stray files being left around when you remove the program being evaluated.

Improved Documentation

The PartitionMagic 2.0 user guide is improved. Two major shortcomings in the 1.0 guide have been completely corrected with this release: It now includes many examples and screen shots, and it thoroughly documents error messages. The user guide not only thoroughly explains *how* to make changes, but also explains *why* you should make the changes. The guide's improvements are welcome.

Overall Value

PowerQuest has taken PartitionMagic and improved it with several new features and enhancements that add utility without significant "code bloat." The new version still comes on only two diskettes and can still be run from a command line if necessary. In addition, it provides a single, informative interface for several utilities that users have previously hesitated to use because of the damage they can do. By making these functions easier to use, PowerQuest has made a great utility even better.

Licensing and Pricing

Personal License allows you to use PartitionMagic on up to two specific PCs.

- Upgrades for 1.0 users of the Personal License are $29.95.
- Personal License for Windows 95 and DOS is $49.95 and handles FAT partitions only.

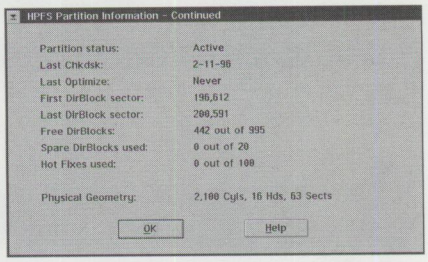


Figure 3b. HPFS Partition Information, Page 2

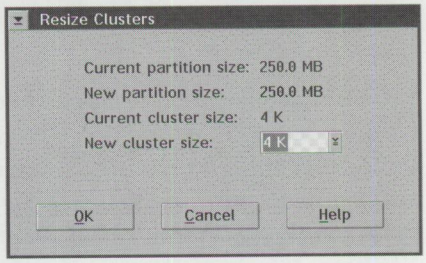


Figure 4. Resizing Clusters

- Personal License for OS/2 and DOS is $69.95 and handles both FAT and HPFS partitions, plus allows conversion from FAT to HPFS.

Professional License for DOS, Windows 95, and OS/2 is $495.95 and allows use on an unlimited number of PCs, one at a time.

Enterprise License allows remote configuration of multiple machines simultaneously throughout an enterprise. Contact PowerQuest directly for pricing on the Enterprise License arrangement.

For more information on PowerQuest Corp., circle 20 on the reader service

Steven P. Schneer is a certified OS/2 engineer. He has been an application developer, systems analyst, and database analyst. He has worked with mainframe computers since the punch card days and with personal computers since the Apple II+.

SystemView in OS/2 Warp Server

SystemView provides a robust set of functions to help administrators manage their PC workstations and servers. Its manager can manage OS/2 and Windows clients. It can communicate with other platforms and products, such as SystemView for AIX, as well as interoperate with PC SystemView products that cover additional platforms such as NetWare, Windows NT, and Windows 95. SystemView is included in OS/2 Warp Server and is also sold separately as SystemView for OS/2. This article covers SystemView's major capabilities.

Most companies today use local area networks (LANs) to share resources such as applications and hardware. These LANs enable client workstations to access resources previously reserved for only a limited number of systems.

To share resources efficiently, you, as a systems administrator, must know the location of everything on the network. As LANs evolve and become more complex, tracking and maintaining their shared resources becomes difficult.

Alice Turlington
IBM Corporation
Roanoke, Texas

Imagine, for example, having to determine the current status of LAN resources—all of the workstations, printers, monitors, and software currently available. This is an arduous task, especially in companies that have hundreds of workstations located in one or more buildings.

Systems Management

Systems management on the Intel platform addresses the problem of maintaining a LAN and its connected resources. It is a set of processes that informs a network's users and administrators about the available resources. Systems management addresses these issues:

- Locating all LAN resources
- Installing new software on clients
- Locating, tracking, and fixing problems efficiently
- Backing up everything necessary to recover from a severe error condition
- Securing systems and their data

SystemView Overview

IBM's systems management tool is SystemView, a set of applications that gives administrators and end users the power to manage the LAN, making network maintenance simple.

SystemView provides you with functions that:

- Monitor and manage OS/2 and Windows client systems
- Track hardware and software resources
- Provide software to managed systems

SystemView also provides the end user with functions that perform systems management tasks on the user's local system.

To better understand the SystemView approach, consider an example of a "typical" LAN workgroup environment. Such an environment consists of one central administration and control point for all workstations in the network. These workstations can also administer and control their own resources. The OS/2 or Novell NetWare LAN usually includes five to 300 workstations running DOS/Windows 3.1 or OS/2 and communicating through NetBIOS, TCP/IP, or IPX.

According to this model, tasks are functionally divided into two categories: administrative responsibilities and end-user responsibilities.

Administrator Responsibilities

As administrator, you should:

- Plan and manage the initial installation of LAN resources and remote systems
- Upgrade software resources on the LAN as needed
- Monitor the LAN for performance and operational problems
- Monitor software license compliance
- Monitor resource usage and plan for future capacity requirements
- Add, remove, and modify user characteristics
- Report, track, and resolve problems

Through an easy-to-use graphical user interface, SystemView offers several features to help you fulfill your responsibilities.

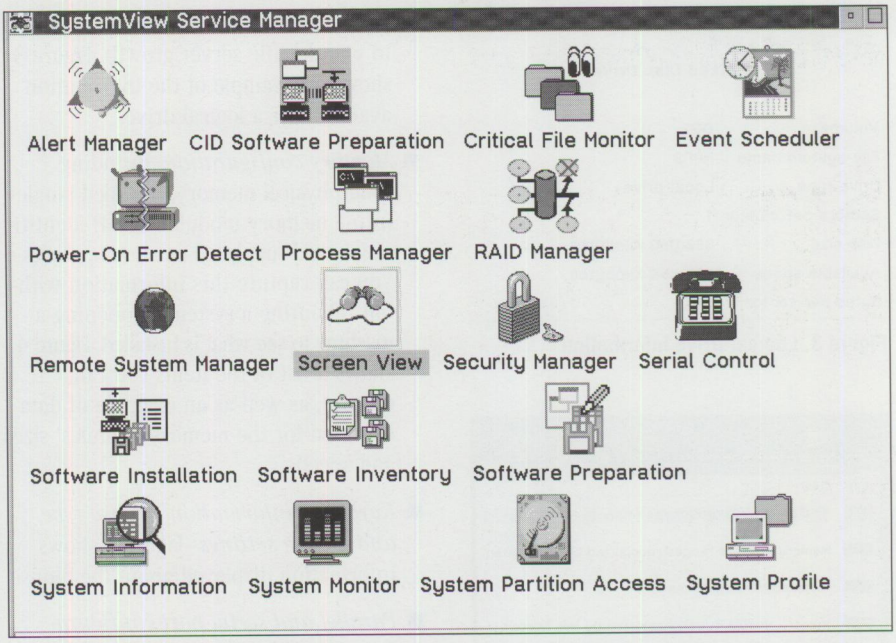


Figure 1. SystemView for OS/2 Folder

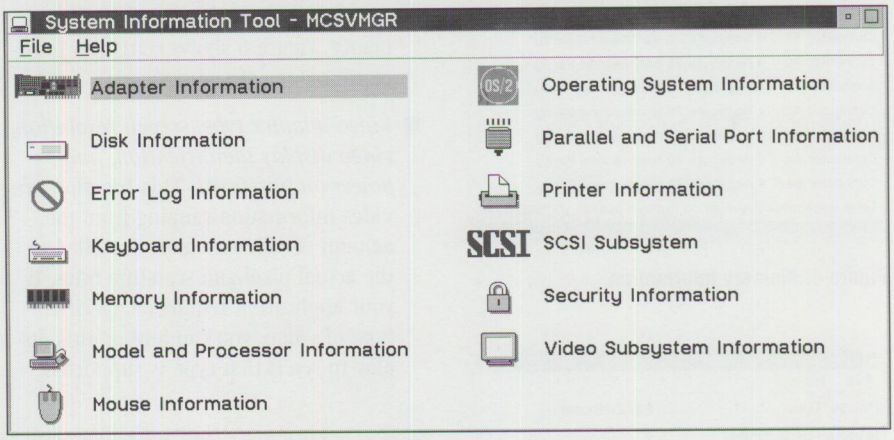


Figure 2. System Information Tool

Figure 1 shows the many icons contained in the SystemView for OS/2 folder.

In our model LAN environment, if a manager needs data about how many machines are connected to the LAN and what kinds of hardware and software are installed, you might spend several days going to each office and machine to get this data. Worse, often you must physically open the machine to see what is installed.

SystemView lets you electronically track both hardware and software. It captures this data by issuing commands to the machines on the network, therefore obviating the need to physically inventory each machine.

Hardware Inventory

SystemView tracks this information through the System Information Tool, which sets up a database of hardware information that you can print or write to a file. By simply clicking on the System Information icon, you can get a list of the resources on a particular system.

Figure 2 shows the System Information Tool window and the different areas from which you can capture information. *Note:* If Figure 2 and some of the subsequent windows look familiar to you, it is because this version of SystemView is based upon NetFinity 3.0.

During a hardware query, SystemView gathers data about Pentium processors (SystemView can detect the flawed

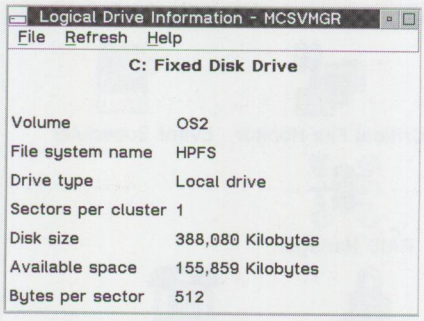


Figure 3. Logical Drive Information

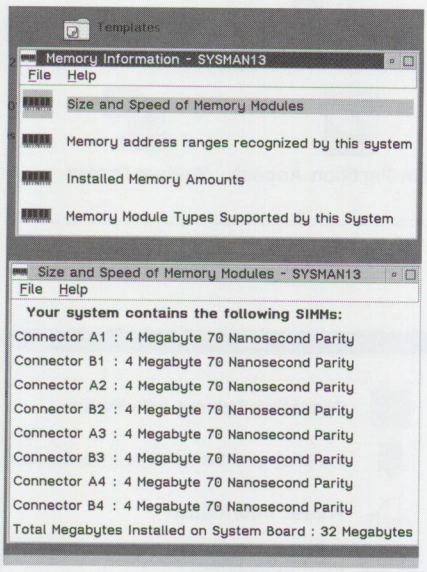


Figure 4. Memory Information

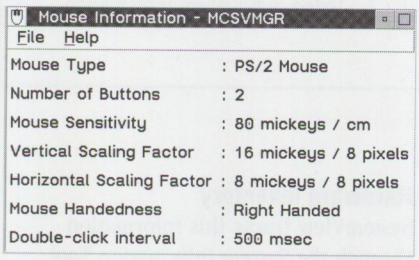


Figure 5. Mouse Information

Pentium processor), plus information about the model, model name, processor type and speed, and BIOS date.

The System Information tool also provides:

- *Disk information,* such as file system type, available space on disk drives, disk drive size, and partition layout–You can capture information for local drives as well as for remote drives. You'll find it especially helpful to know the size and available space for the remote drives on a file server, because you can use this information to plan for file server growth. Figure 3 shows an example of the information available for a logical drive.
- *Memory configuration,* including total physical memory, installed single inline memory module (SIMM) identification, and supported memory upgrades–You can capture this information without rebooting a system or opening a machine to see what is installed. Figure 4 shows a list of the items you can capture, as well as an example of data captured for the memory modules' sizes and speeds.
- *Keyboard information, mouse type, and mouse settings*–Figure 5 shows information displayed about the mouse.
- *Parallel and serial port configuration*–You can capture statistical information, such as the data transfer rate on these ports, to help you understand the system throughput and performance. Figure 6 shows statistical information about the port.
- *Video adapter type, screen resolution, video display identification, and power-on password*–This function provides information ranging from the amount of video memory installed to the actual pixel and scan-line rates. If your application requires a specific type of video, you can look at this display to see if that type is supported.

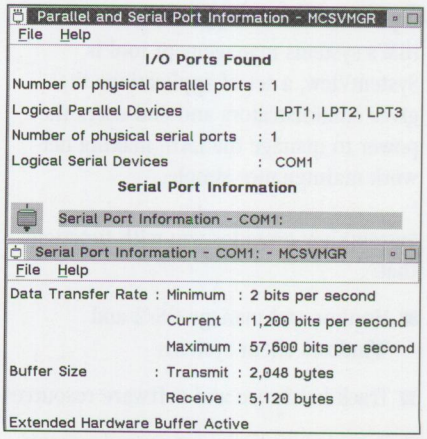


Figure 6. Parallel and Serial Port Information

Figure 7 shows an example of the video information.

- *Micro Channel adapter identity*–This function furnishes information about the adapters installed in a Micro Channel system. You no longer have to look at the back of a machine to try to figure out which adapters are in the system. Figure 8 is an example of the Micro Channel adapter information captured.
- *Extended Industry Standard Architecture (EISA) and Peripheral Component Interconnect (PCI) adapter identity*–This information is similar to that for Micro Channel adapters.

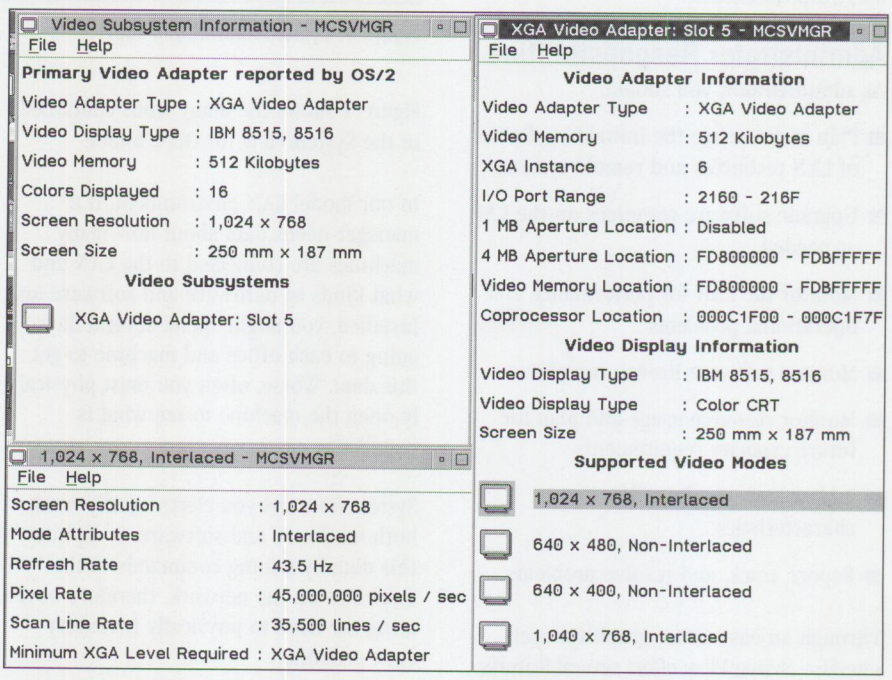


Figure 7. Video Information

- *Error log display and interpretation*–This facility gives you a consistent way to view the error log, so that you can find an error and display its related information using a single graphical user interface.
- *Printer configuration,* including data about installed printer drivers–You can use this single interface to capture information about multiple printers. Figure 9 shows an example of printer information.
- *Small computer systems interface (SCSI), enhanced small device interface (ESDI), and integrated drive electronics/Seagate Technologies 506 (IDE/ST506) adapter information*–Figure 10 is an example of SCSI adapter information. In Figure 10, the device is the disk drive, and its size is 388 MB.
- *Operating system information*, including version, DOS support, session limits, current task list, and `CONFIG.SYS` information–This data is extremely helpful during problem determination or software inventory; when an error occurs on a particular system, you often need to know the software's version number as well as the service level. Figure 11 illustrates the display of operating system information.

Software Inventory

SystemView uses the Software Inventory tool to gather and display information about the software installed on managed systems. You might want to search for a specific software product or compile a record of all software.

The Software Inventory tool checks the software installed on a workstation against a list of products in a dictionary file, which comes with SystemView. You can modify this dictionary file as needed or even create multiple dictionaries for a given software inventory.

The Software Inventory tool provides information in an easy-to-use table. The table includes product name, vendor name, version number, revision level, and location of the file. Figure 12 displays an example of software inventory data.

In addition to inventorying hardware and software, SystemView lets you gather information about managed workstations and specific users. SystemView uses the

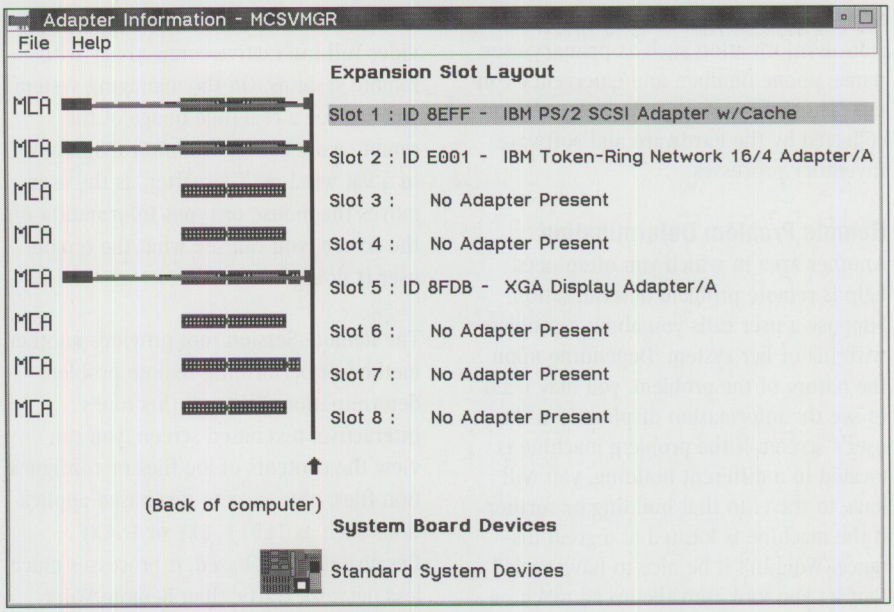


Figure 8. Micro Channel Adapter Information

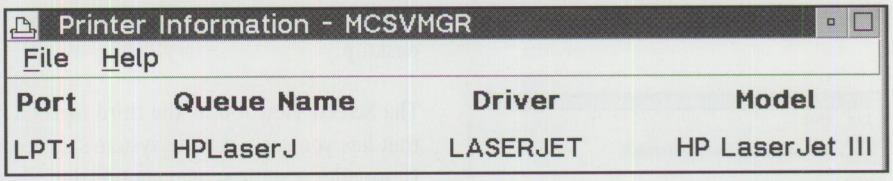


Figure 9. Printer Information

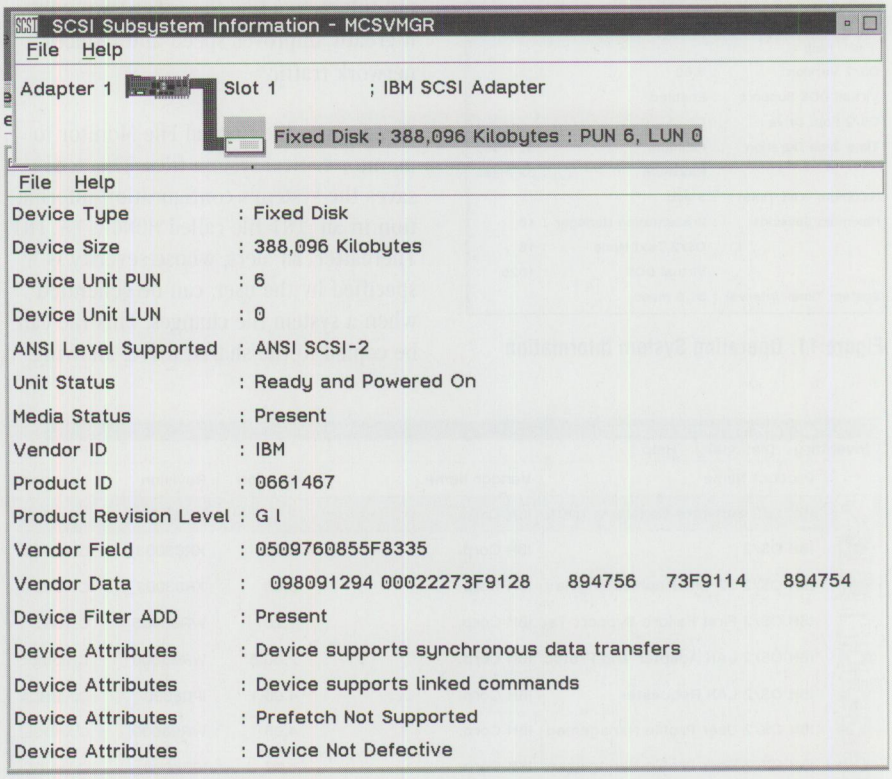


Figure 10. SCSI Subsystem Information

System Profile notebook to track workstation information such as primary user name, phone number, and emergency contact. This information complements that collected by the hardware and software inventory processes.

Remote Problem Determination

Another area in which you often need help is remote problem determination. Suppose a user calls you about a problem with his or her system. Depending upon the nature of the problem, you may need to see the information displayed on the user's screen. If the problem machine is located in a different building, you will have to travel to that building or further if the machine is located at a great distance. Wouldn't it be nice to have tools that let you look into the user's machine and see what is displayed on the user's screen without having to leave your office? You can do that with several tools in SystemView Service Manager.

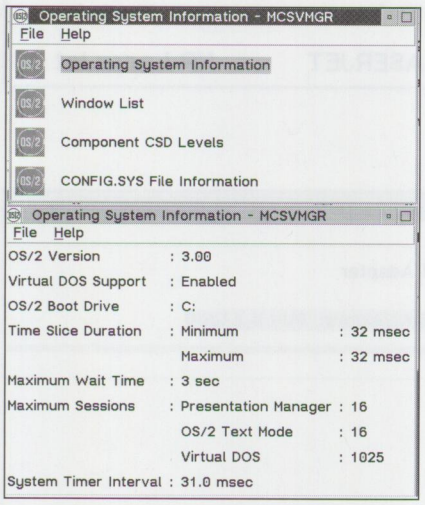


Figure 11. Operating System Information

The Remote Workstation Control tool provides full interactive connectivity with remote systems. On the managing system, you can see a real-time image of the remote workstation's monitor displayed in a PM window. Thereafter, as the user moves the mouse or types information on the screen, you can see what the remote user is doing.

The Remote Session tool provides another method of performing remote problem determination. Through this tool's interactive, text-based screen, you can view the contents of log files or configuration files, plus execute text-based applications such as `TEDIT.EXE` or `E.EXE`. Because it is text-based, it processes much less network traffic than Remote Workstation Control does; the Remote Session tool has to transfer only text images between the manager and remote workstations, rather than the entire graphical desktop.

The Screen View tool is the third method that lets you see a remote system's screen. It provides a static screen shot of the remote system and transfers that image to the managing system. Because it is not interactive like the other two tools, it greatly improves speed and reduces network traffic.

You can use the Critical File Monitor to monitor critical system files. This tool saves the system's configuration information in an `.INI` file called `MONCRITF.INI`. Thereafter, an alert, whose severity is specified by the user, can be generated when a system file changes. This file can be copied to the shared drive, allowing the Critical File Monitor to be configured when SystemView is installed.

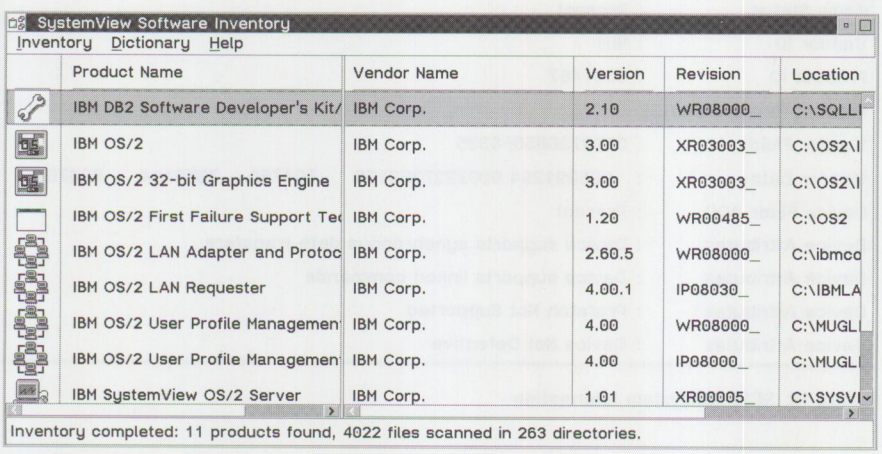


Figure 12. SystemView Software Inventory

Network Efficiency

SystemView provides you with tools that monitor usage information for devices such as CPU, memory, and direct access storage devices (DASD). This information is displayed with a graphical user interface and is updated dynamically while the system is running.

Anticipating that you may need to capture many different types of information at a time, SystemView allows you to display multiple graphs simultaneously. In Figure 13, six different types of data are captured and displayed simultaneously.

Alerts! Alerts! Alerts!

The previously described functions let you access each of the managed systems from your own machine and capture the information about those systems. However, it is time consuming to probe all systems, and you must consider the system resources required to display hundreds of windows. SystemView provides an alternative method by enabling a managed workstation to send an alert to the managing system when errors occur.

It also lets you establish the conditions that trigger the alerts and specify the system resources to monitor, as well as their threshold values.

For example, suppose you are monitoring a system's CPU utilization and you want to be notified when the CPU utilization reaches 80 percent. When this condition occurs, an alert is sent to the managing system and displayed in its alert log.

Additional conditions for which SystemView will generate an alert include:

- A power-on occurs at a managed system
- The predictive failure analysis (PFA) service receives an indication that a PFA-enabled hard disk is failing
- A specific managed system goes online or offline
- A user accesses a managed system using a specified userid and password
- A user uses public access to access a managed system
- A managed system denies access to a user

- A SystemView manager restarts a managed system
- A SystemView Manager's request to restart a managed system is denied
- A system monitor threshold is reached
- Someone creates, changes, or deletes critical files

You can include the following items in an alert:

- *Alert text*–the name of the alert and any textual commentary
- *Alert type*–failure, error, warning, information
- *Alert severity*–a value from 0 (least severe) to 7 (most severe)
- *Application ID*–the name of the application that sent the specified alert
- *Application alert type*–a numeric value assigned to an individual alert by the application that generated it

Figure 14 is an example of the SystemView alert log. The log includes an alert text area where the error condition is specified. Based upon the information provided, you may want to use some tools discussed earlier to perform problem determination.

You can specify any of a variety of automatic responses to LAN generated alerts. SystemView includes alert handler programs to:

- Log the alert to a file
- Display the alert in a pop-up window
- Forward the alert to another workstation
- Execute a command
- Send a simple network management protocol (SNMP) alert (available in OS/2 only)
- Send an SNMP reset alert
- Play a .WAV file
- Send a message to a digital pager by modem
- Send the alert information to an alphanumeric pager by modem
- Send the alert to another user using TCP/IP's SENDMAIL
- Send an alert to Lotus Notes or cc:Mail through vendor independent mail (VIM)
- Export the alert information to a database
- Generate a desktop management interface (DMI) indication and send it to the DMI service layer
- Print the alert
- Append the alert to a text file
- Add an error condition to the system
- Remove the error condition from the system
- Automatically respond to certain alerts
- Monitor enabled disk drives for failure
- Capture the current screen image of a managed system
- Manage error-correcting code (ECC) memory at managed systems

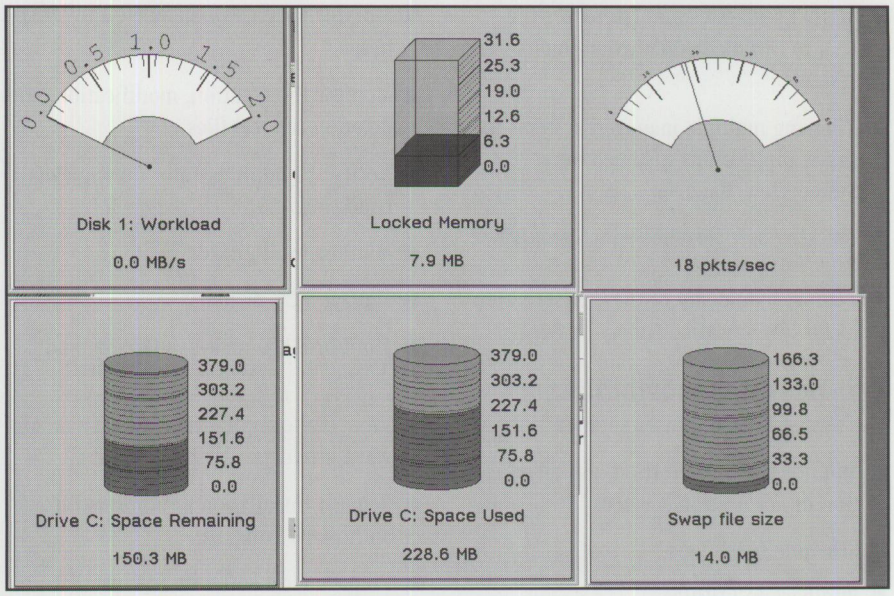


Figure 13. Monitoring Multiple Parameters

SystemView Power-On Error Detect Details - MCSVMGR

Date	Time	Originator
02-08-1996	06:30:54p	10005A8CCD87

Adapter(s):	Slot	Actual POS ID	Configured POS ID
IBM PS/2 SCSI Adapter w/Cache	1	8EFF	8EFF
IBM Token-Ring Network 16/4 Adapter/A	2	E001	E001
No Adapter Present	3	FFFF	FFFF
No Adapter Present	4	FFFF	FFFF

Figure 14. SystemView Alert Log

Software Distribution

SystemView provides several software distribution functions:

- Preparing software products for installation on managed systems
- Installing and removing system and application software on managed systems over the LAN

- Applying updates and fixes over the LAN to installed software on managed systems
- Allowing multiple managed systems to share applications installed on a SystemView Manager
- Tracking software licensing compliance

You can schedule any of these SystemView tasks for any specified time.

End-User Responsibilities

The SystemView end user should:

- Monitor the initialization and termination of application services
- Schedule batch jobs
- Run backup utilities

End users can perform many administrator functions but only for their own workstations. For example, end users can:

- Track local hardware and software resources
- Monitor local CPU, memory, and DASD usage
- Monitor the creation, modification, and deletion of local files
- Notify the administrator during alert conditions
- Monitor local disk drives
- Manage ECC memory
- Monitor RAID arrays, adapters, and drives
- View DMI-compliant hardware and software products
- Request installation of administrator-authorized software
- Prepare local software for installation on other workstations
- Run shared applications

SystemView Agent

SystemView Agent, a separate product, is installed on the client system along with the SystemView Client. It expands the manageability of the client system by making the client accessible to any SNMP manager. This is done using a mapper that converts the Desktop Management Task Force/Desktop Management Interface (DMTF/DMI) Management Information File (MIF) variables into MIB variables that can be queried by the SNMP manager.

Alice Turlington is a senior marketing support representative in the IBM Personal Systems Competency Center, Roanoke, Texas. She is currently the team leader for the PC Server pre-sales project. Previously, she spent five years as team leader of the OS/2 systems management team, providing systems management solutions for customers through design reviews, on-site planning, and installations. Alice joined IBM in 1989 after earning BS and MS degrees in Computer Science from the University of Texas at Dallas. Her Internet ID is aturlington@vnet.ibm.com.

Implementing PC SystemView (NetFinity) in Real-World Environments

For those of you familiar with NetFinity, PC SystemView is its current name. Announced in 1993, NetFinity has always been a member of the SystemView family, but to make this positioning more intuitive, its name was changed to PC SystemView 4.0. Like previous versions of NetFinity, PC SystemView is compatible with earlier releases.

This article discusses factors to consider when implementing PC SystemView in large- and small-scale environments. It also briefly discusses SystemView's architecture, features, and new functions, plus lists additional resources for PC SystemView and other SystemView products.

NetFinity was designed to provide efficient hardware management in a simple, easy-to-use product. With its immense success, NetFinity provided some additional systems management features, and it evolved into a focal point of the IBM systems management strategy.

NetFinity encompasses extensive hardware management, as well as some enterprise-level systems management, and provides easy, instant systems management capability in IBM PCs, whether server, desktop, or laptop systems. (NetFinity is shipped at no charge with all IBM PC Servers and with some desktop and laptop models.)

Christopher Gaskins and Patricia Davis
IBM Corporation
Research Triangle Park, North Carolina

PC SystemView

PC SystemView 4.0 is the core of the Intel-based SystemView product set, which provides a manager plus clients on Windows, Windows 95, OS/2, OS/2 Warp, NetWare, and now Windows NT. PC SystemView's breadth of platform coverage is a key advantage in mixed environments.

Advanced management features are available in SystemView for OS/2 and SystemView for AIX if you require additional function. This scalability lets you easily grow in systems management sophistication as your business grows. For instance, SystemView for OS/2 provides software distribution and full remote console takeover, in addition to the NetFinity 3.0 base product. And SystemView for OS/2 will continue to grow in advanced function to provide additional management features from the OS/2 managing station. SystemView for OS/2 comes with OS/2 Warp Server but can also be bought separately. (See the accompanying article, "SystemView for OS/2," in this issue of *Personal Systems*.)

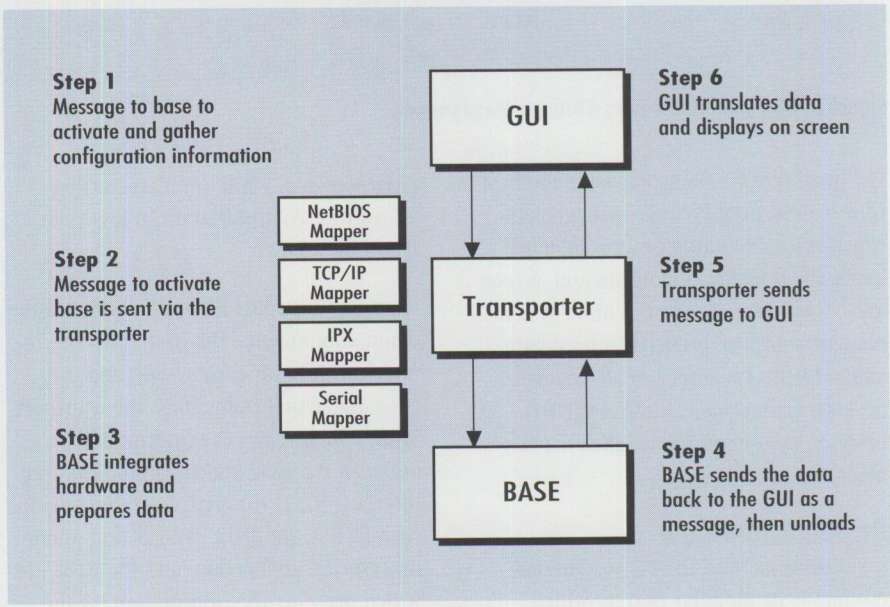


Figure 1. PC SystemView Local Architecture

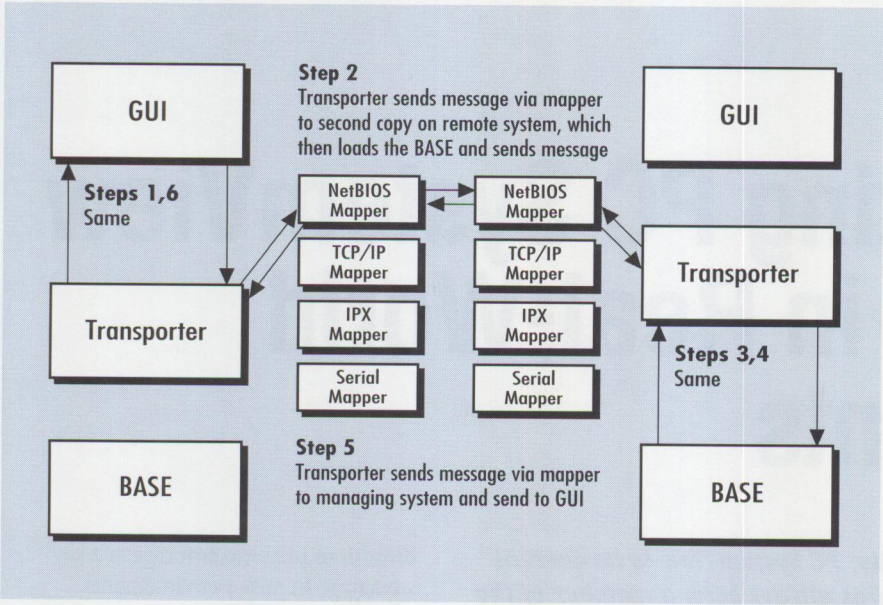


Figure 2. PC SystemView Remote Architecture

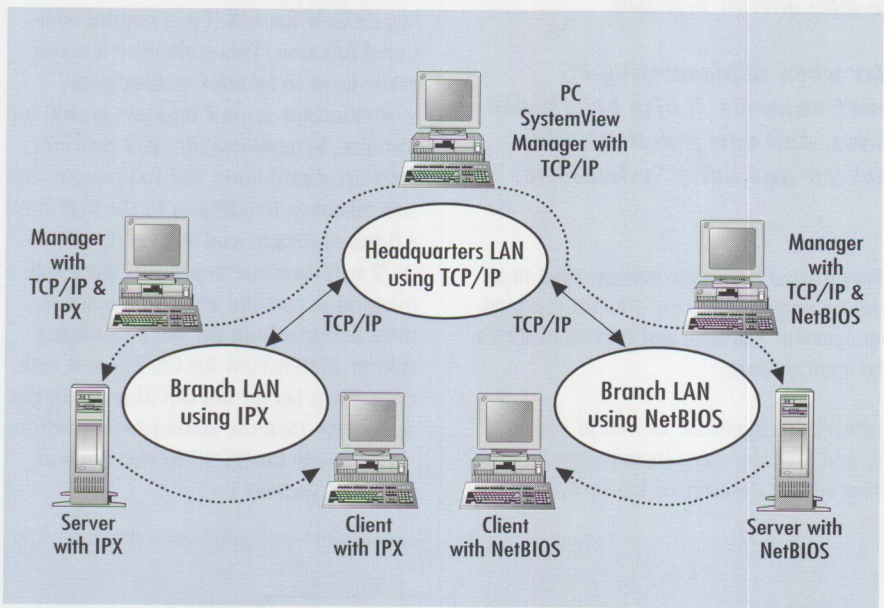


Figure 3. PC SystemView Pass-Through Management

PC SystemView 4.0 encompasses the best of some essential systems management capabilities, including process management, file transfer, remote session, screen view, RAID management, remote systems management, comprehensive hardware and software inventory of all systems, desktop management interface (DMI) browser, system monitors, alert management, and much more.

Product Overview

A key advantage of the PC SystemView product is its modular design, which enables easy customization for varied environments, while simultaneously affording easy installation in less than five minutes.

Figure 1 illustrates PC SystemView's three major components: the base function, which resides on each system and executes the actual commands; the transport layer, which relays the information between the base and the graphical user interface (GUI) through several protocols, such as IPX, NetBIOS, TCP/IP, and phone line (serial) connection; and the GUI, which presents the information on the screen.

Figure 2 illustrates how PC SystemView works remotely when a manager makes a client station call. The transport layer permits communication through multiple protocols, so that a PC SystemView manager can control multiple network nodes running different protocols. This control is accomplished either by installing (on the managing station) the multiple protocols used in the network or by using PC SystemView's peer-to-peer, pass-through management feature. Thus, a manager at station A can control station B simply by selecting it, just as though he or she resides at station B and uses the protocol at that station.

It is important to understand that PC SystemView is not server-centric and does not require any server hardware to run PC SystemView manager or services in a LAN environment. The PC SystemView services are what most people might generically call a client; however, we call them services because they provide actual end-user value, not just to a manager but to any PC user.

Figure 3 illustrates PC SystemView's pass-through management function and peer-to-peer access. A PC SystemView manager installed on a traveling ThinkPad can dial into a LAN through PC SystemView serial support and gain full control of another manager.

PC SystemView Architecture

In general, each PC SystemView service or function has a base and a separate GUI file. This design lets you customize your installation so that a service can be disabled by removing or renaming its base file. Its GUI can also be removed.

This design also enables you to install client stations without a GUI front-end. This option, termed *passive services*, is intended for a manager who wants full control of the client stations with no intervention from the end user. It also requires less disk space–now 10 MB. And, like NetFinity, PC SystemView still requires only about 340 KB of memory, all above the 1 MB extended memory boundary, to run in idle mode.

Conversely, installing the GUI services on the client lets you take advantage of all the PC SystemView services features, such as workstation monitoring, hardware and software inventory, security, and alert

actions, whether or not that station is connected to a LAN.

To aid in our discussion of how the manager and client communicate, we now briefly describe how PC SystemView discovers all PC SystemView managers and services in a network across the IPX, NetBIOS, and TCP/IP protocols. During the discovery, PC SystemView also discovers any SystemView for OS/2 managers and clients and, of course, any NetFinity stations using that particular protocol.

In the IPX protocol, the PC SystemView manager issues a `GetAllNetworks` request. All addresses and internal network IDs are returned. The manager sends a broadcast to each specific IPC socket on each server and network segment. For example, with 10 servers and five segments, 15 broadcasts are sent.

The `NETFBASE`, or base code, running on each client examines the discovery keyword conditions. If a match occurs, the system responds with its system name, type, and network address. Further exchanges between the manager and client at this point are performed directly.

Note: For communication between client and manager to take place, `NETFBASE` code must be running on the station to be managed by PC SystemView. This is the first area to check when troubleshooting. If discovery or communication between client and manager is not occurring, verify whether `NETFBASE` is running in the task list. (After PC SystemView is installed, `NETFBASE` should start automatically every time the system is started.)

PC SystemView uses two unique NetBIOS names during discovery: the network address name and the PC SystemView group name (which is non-textual). The PC SystemView manager broadcasts the datagram to the unique NetBIOS name. (NetBIOS cannot resolve the MAC layer, so it effectively issues a single-route broadcast.) The `NETFBASE` on the client examines the discovery keyword conditions, and if there is a match, the client responds with its system name, network address, and system type. After this, information exchange between client and manager is performed directly.

`\`	= PC SystemView CD root directory
`\OS2\MANAGER`	= OS/2 manager code
`\OS2\SERVICES`	= OS/2 services code
`\WINDOWS\MANAGER`	= Windows manager code
`\WINDOWS\SERVICES`	= Windows services code
`\NETWARE`	= NetWare services code

Figure 4. PC SystemView CD Root Directory

When using TCP/IP, the PC SystemView manager uses a local IP broadcast address, which must be enabled, to issue a broadcast to a TCP/IP socket. The IP broadcast is derived from the IP address and the subnet mask. For example, if the IP address is 9.80.128.1 and the subnet mask is 255.255.0.0, the local broadcast address becomes 9.80.255.255.

To discover other subnets in TCP/IP, simply create a text file named `TCPADDR.DSC` in the `\NETFIN` directory and enter the IP address and subnet mask. The `NETFBASE` on the client examines the discovery keyword conditions and responds (if there is a match) with the system name, type, and IP address. Further communication between manager and client is performed directly via the address routing protocol.

PC SystemView on the World-Wide Web

PC SystemView 4.0 has a new Web-ability feature in the PC SystemView manager. This feature is offered as an option during installation; if selected, an additional hypertext markup language (HTML) front end is installed on the managing station. This front end lets you access a PC SystemView manager through Web browsers (such as NetScape 1.12 or 2.0 and OS/2 WebExplorer) that support HTML version 2 and tables.

For instance, an AIX, Macintosh, or other system installed with a supported Web browser can fully access PC SystemView's systems management features from a TCP/IP network. This access assumes that you have proper security access and are within your company's firewall. Additionally, the services accessible to that manager are the "public" services, set by the security manager at that station, which require no password entry into that system. You need a password to access services not open to "public" access.

In a typical scenario, you might suddenly be contacted about a critical situation at a remote location–perhaps the PC SystemView alert manager beeped your pager with a severity 1 alert. You need a PC, Macintosh, or AIX system with a Web browser to access that machine–probably by first dialing into your company's intranet, then typing the URL for the PC SystemView manager installed with the Web-ability code. Pass-through management allows you to remotely access the systems as needed to fix the situation. Remote systems management doesn't get much easier!

Note: Remote-session service is not available in the current version of OS/2 WebExplorer 1.03 but is enabled on any browser with Java support, such as NetScape. Security on the Web is an important issue. PC SystemView 4.0 uses NetFinity's security to encrypt passwords and user IDs. In future releases, PC SystemView will use secure socket layer to provide full encryption on the network.

Planning for PC SystemView Installation

PC SystemView comprises two separate pieces: manager and services. Usually, there are more services (clients) than managers.

Installing either services or managers on a small number of systems is easy and straightforward, especially when done from a CD-ROM drive (either a local CD-ROM drive or a shared CD-ROM drive on the LAN). A directory of the PC SystemView CD (see Figure 4) shows a subdirectory for each operating environment that PC SystemView supports (`\OS2`, `\NETWARE`, and `\WINDOWS`). On the `\OS2` and `\WINDOWS` subdirectories are further subdirectories indicating services or manager code.

To install PC SystemView Manager for OS/2, simply execute the installation program in the `\OS2\MANAGER` subdirectory. Similarly, you can install the other components by executing the installation programs in their respective subdirectories.

If you install PC SystemView on a small number of systems (less than 25), then little planning is required. Install the product and customize each system's monitoring, thresholds, alerting, and security features. If you perform normal installations, then you must individually customize each machine; however, in a small environment, this is usually not a problem.

At the other end of the spectrum is implementing PC SystemView for a large environment, which could mean installing and administering PC SystemView for hundreds, thousands, or even tens of thousands of systems. Modifying each system is overwhelming and certainly not feasible. Consequently, to use PC SystemView in the enterprise environment, a considerable amount of planning must occur to make the installation simple as possible.

PC SystemView is designed to help with:

- Help desk support
- System resource monitoring and alerting
- Hardware and software asset management

Among the first installation planning considerations is to determine the proper ratio of PC SystemView managers to PC SystemView services. The ratio depends upon how you will use PC SystemView. Following are rough guidelines to determine this ratio. (Remember that each installation is unique, and many factors apply in determining the correct ratio.)

When using PC SystemView as a help desk support tool, determining the ratio of managers to services is simple–it boils down to how many help desk personnel will need to use the manager console. For example, if three employees in the help desk organization serve 500 end-user workstations, then the ratio of managers to services will probably be very low.

The process grows more complicated when PC SystemView is implemented for monitoring and alerting. In fact, it is probably the most difficult implementation to size properly. Why? Because PC SystemView's alert manager is so flexible that an infinite number of situations can be created where alerts are being generated. Let's look at two scenarios.

Scenario 1: You are using PC SystemView to monitor the resources of 50 OS/2 application and file servers. On these servers, the following resources will have thresholds configured to generate severity 1 alerts:

- When CPU utilization is 100 percent for five minutes
- When memory utilization is 50 MB for five minutes
- When free disk space drops below 10 MB
- When any RAID drive drops into a critical state
- When the UPS incoming voltage drops below 110 vac

When using PC SystemView as a help desk support tool, determining the ratio of managers to services is simple . . .

How many PC SystemView managers should be installed in this situation? You should install at least two, primarily so that two system administrators can be notified of the problem. Each server being monitored should be configured so that all severity 1 alerts are forwarded to the two PC SystemView managers. In this case, with a relatively low number of systems being monitored, one or two PC SystemView managers will suffice.

However, what happens in an environment where PC SystemView is going to be installed on 10,000 workstations?

Scenario 2: You are using PC SystemView to monitor 10,000 workstations, with the following thresholds configured to generate alerts:

- When free disk space drops below 10 MB
- When the `CONFIG.SYS` and `AUTOEXEC.BAT` files are changed
- When CPU utilization is 100 percent for 10 minutes

There is no way that one or two PC SystemView managers can effectively handle alerts generated from 10,000 workstations. Here, an implementation of hierarchical PC SystemView managers is beneficial. Local PC SystemView managers that "catch" alerts from about 200 to 250 systems each can, in turn, forward the most critical alerts to another PC SystemView manager or convert the alert to a simple network management protocol (SNMP) trap that can be sent to an enterprise management console, such as SystemView for AIX. Creating this hierarchy of PC SystemView managers ensures that no alerts escape because the system is too busy to "catch" them. The number of systems that a regional or mid-level manager is responsible for can vary; it depends upon the amount of alert traffic generated by each client and your particular policies.

Before you use PC SystemView to provide hardware and software asset management for all PCs on the LAN, you must answer a few questions:

- How often will the hardware/software inventory be collected?
- During which hours of the day or night is the inventory collected?
- How many systems will be inventoried?

Once again, the answers to these questions greatly change the manager-to-client ratio. Let's look at two more scenarios.

Scenario 3: You are asked to inventory 150 clients once a week, between 11:30 a.m. and 1:00 p.m. on Thursdays, then export the data to a Lotus Notes database.

Since PC SystemView collects data from each system consecutively, you must know the amount of time it takes to perform a full software and hardware inventory. To determine this, allow about two minutes per system to collect hardware and software data. This conservative number may be tuned for specific environments but is a good starting point for planning purposes.

With 150 clients to inventory, multiplied by two minutes per client, you need 300

NETDRVR.INI	= network protocol configuration and keywords
SECIN.INI	= incoming security IDs and passwords
SECOUT.INI	= outgoing security IDs and passwords
ALACTION.INI	= configured alert actions from alert manager
MONCRITF.INI	= files configured for monitoring via critical file monitor
MONTHR.INI	= thresholds configured via the system monitors
PROCMAN.INI	= programs to monitor from the process manager

Figure 5. PC SystemView .INI Files

minutes. However, the timeframe for collecting this data is tight–only a 90-minute window from 11:30 a.m. until 1:00 p.m. on Thursdays. So, to determine the required number of managers, divide the total minutes required (300) by the actual number of minutes available (90), which yields 3.3. Round up this number to find the answer, which is four managers.

We know now that four managers will be required for 150 clients; therefore, each manager will be responsible for about 38 clients. When the hardware and software inventory is collected, each manager will gather data from its 38 clients during the 90-minute window. (This scenario will work, because at two minutes per system, the inventory requires 76 minutes.) Each manager can insert the data directly into a Lotus Notes database on a centralized server.

Scenario 3 was straightforward, with few variables. Now, let's look at a more complex scenario for a much larger environment.

Scenario 4: Here you inventory 15,000 clients at least once a month, anytime between 10:00 a.m. and 4:00 p.m., Monday through Friday, and export the data to a DB2 database. The inventory does not have to be gathered from all clients on the same day.

While this example is more flexible, it adds more variables to the equation. There are 15,000 systems to be inventoried, so it will take 30,000 total minutes to collect the data (15,000 clients multiplied by two minutes per client).

Now you must calculate your window for collecting the inventories. The time period for collecting them is one month. The collections can be done during 360 minutes per day; there are (conservatively) 20 days per month. Therefore, 360 minutes per day multiplied by 20 days per month yields 7,200 available minutes per month for inventory collection.

Finally, to determine the required total number of managers, divide the total number of minutes (30,000) by the available minutes (7,200); this yields 4.1 managers, which you round up to five.

When implemented, five managers will query and collect data from 150 clients each day. Therefore, the total number of systems inventoried per day is 750. Earlier, we used 20 working days in a month, so 750 clients per day multiplied by 20 days per month equals 15,000 clients inventoried per month.

When configuring the five managers to collect the inventory, each manager will have 20 groups of 150 clients (that is, 150 different clients on each of 20 days). Each manager will collect data from a different group each day and insert it into a centralized DB2 database.

If the organization grows and more clients are added, simply add another manager to handle another 20 groups containing 150 clients each.

Installing PC SystemView on Large Numbers of Systems

As mentioned earlier, PC SystemView is a true peer-to-peer-based product. This structure offers many advantages, such as flexibility, network operating system independence, and the ability to work in small, medium, and large environments.

In large environments, however, you can roll out and customize PC SystemView more easily by cloning a single system's customization. Why is this preferable? Since PC SystemView services monitor themselves and only communicate with a PC SystemView manager when being managed or when forwarding alerts, each client must be properly configured for such things as thresholds on system resource monitors, critical file monitoring, security access, and alert actions.

If the normal PC SystemView installation is completed on 500 clients, and then customizations are made, the same actions would have to be taken manually for each of the 500 clients. It is much easier to install PC SystemView on one system most typical of your environment, customize it, then roll out these changes to all systems while installing PC SystemView.

Before rolling out PC SystemView, you may want to consider customizing the following items:

- Security access
- Thresholds for the system monitors (memory, CPU, disk)
- Critical files to be monitored
- Alert actions for alert notification
- System keywords for logical groupings

Once you have decided about these items, install PC SystemView on a client that is typical of the majority of all of the target clients. After the installation is complete, make customizations to the above items, which might include:

- Creating IDs and passwords for security
- Selecting which critical files will be monitored for changes
- Creating thresholds on all applicable system monitors
- Creating alert actions in the alert manager for forwarding alerts to PC SystemView manager systems
- Configuring the transport protocol to be used, as well as which keywords are installed for logical groupings

All of the changes made are held in PC SystemView's .INI files. Figure 5 lists the PC SystemView .INI files and their descriptions.

After you complete the customizations, you must perform a few more steps. First, copy the contents of the appropriate PC

```
option name
dll-entrypoint filecount commandcount
   option file
   option file
   ...
   command
   command
   ...
```

where:

`option name` = identifying comment, which must be unique

`dll-entrypoint` = identifying dll, which will usually be NULL

`filecount` = number of lines in this option/section to be treated as file identifiers. Parameters are:

- type = type of file: L = long unpacked file; P = packed file
- size = file size
- diskette = diskette number where the file resides
- filename = file name

`commandcount` = number of lines in this option/section to be treated as command codes. Parameters are:

- command code: CP = copy file; UP = unpack file; CCP = conditional copy file
- filenumber = the file number in the option file section

Note: CCP, or conditional copy, indicates that if the file is present on the source, copy it to the target.

Figure 6. A Section of the INSTALL.INI File

```
System Monitor Base        --> system monitor section
NULL 1 1                   --> no dll, 1 file, and 1 command
  P 274561 3 MonBase       --> file # 0, packed file, size=274561, disk # 3
  UP 0                     --> unpack file # 0 (monbase)
```

Figure 7. Default System Monitor Base Section

```
System Monitor Base        --> system monitor section
NULL 2 2                   --> no dll, 2 files, 2 commands
  P 274561 3 MonBase       --> file # 0, packed file, size 274561, disk # 3
  L 0 3 monthr.ini         --> file # 1, long file, size 0, disk #3
  UP 0                     --> unpack file # 0
  CCP 1                    --> conditional copy file # 1
```

Figure 8. Changes to INSTALL.INI for MONTHR.INI

SystemView Installation CD subdirectory onto a shared directory on a file server running LAN Server, NetWare, or Windows NT. If you are going to roll out multiple different agents, place each agent into a separate shared directory on the file server. Next, copy all of the `.INI` files from the customized client into the directories where you copied the PC SystemView files. The `.INI` files are common across all platforms that PC SystemView supports. Therefore, the `.INI` files customized on an OS/2 system will work on a Windows, Windows 95, Windows NT, or NetWare system.

As part of the basic installation, the `SECIN.INI`, `SECOUT.INI`, and `ALACTION.INI` files will be copied automatically to the target system during installation. For all other `.INI` files that are to be copied during installation, changes must be made to the `INSTALL.INI` file in the appropriate sections and their corresponding `.INI` files:

- System Monitor Base section, for `MONTHR.INI`
- NetFinity Client Base section, for `NETDRVR.INI`
- Process Manager Base section, for `PROCMAN.INI`
- Critical File Monitor GUI section, for `MONCRITF.INI`

Each relevant section in the `INSTALL.INI` file has the structure shown in Figure 6.

An example of the default System Monitor Base section in the `INSTALL.INI` file is shown in Figure 7.

To ensure that the `MONTHR.INI` file is copied to the target system, Figure 8 lists the changes you should make to the section in the `INSTALL.INI` file shown in Figure 6.

You must similarly edit the other affected sections. Once you have edited one or two sections, the process becomes easy to understand. (Refer to either the *PC SystemView User's Guide* or the *NetFinity User's Guide* for more details.)

Now the rollout can begin. On each workstation that is going to install the client, issue a `NET USE` command (when accessing a LAN Server machine) or `MAP` a drive letter (when accessing a NetWare machine) to the file server, and install from the shared directory.

If you require an automated approach, PC SystemView is CID-compliant, so you can invoke CID response files to make the installation much easier. Again, please refer to either the *PC SystemView User's Guide* or the *NetFinity User's Guide* for CID installation assistance.

How can managing so many workstations be integrated with AIX, UNIX, or MVS enterprise management consoles? As mentioned earlier, by using a Web browser, you can now fully manage any PC SystemView- or NetFinity-enabled client from any platform that supports a Web browser. Furthermore, PC SystemView/NetFinity can create SNMP traps that can be forwarded to the enterprise management console.

PC SystemView Partners in Management

The PC SystemView Partners in Management program (formerly the NetFinity Partners in Management program) allows key non-IBM hardware and software vendors to integrate and extend the PC SystemView product via the PC SystemView Software Developers Toolkit. Using this toolkit, partners write extensions or snap-in modules that extend or add function to PC SystemView.

This program is available only to companies that meet the requirements and have the synergy to significantly increase the value of PC SystemView.

Current members of the Partners in Management program are:

- American Power Conversion (APC)–`http://www.apcc.com`. APC has developed snap-in extensions to PC SystemView that let you actively monitor an APC uninterruptible power supply (UPS). When installed, six new system monitors appear, providing detailed information about the attached APC UPS. These extensions are shipped with every IBM PC Server on the ServerGuide CD-ROM set.
- APCON–`http://www.apcon.com`. APCON resells PC SystemView/NetFinity with their external small computer system interface (SCSI) switch box, called PowerSwitch. PowerSwitch allows two PC Servers to be cabled to one external direct access storage device (DASD) tower. PC SystemView/NetFinity performs the automatic switch in case of a server failure.
- BMC Software (formerly HawkNet, Inc.)–`http://www.bmc.com`. BMC has integrated their NetTune Pro product, which snaps in 40 NetWare server monitors. These new monitor extensions provide detailed data about the NetWare server attributes such as dirty cache buffers and LAN adapter traffic.
- Diagsoft, Inc.–`http://www.diagsoft.com`. Diagsoft is one of the world's largest suppliers of PC-based diagnostics. Diagsoft plans to develop a snap-in diagnostic module that integrates with PC SystemView to allow system and LAN administrators to run diagnostics from within PC SystemView.
- Lexmark International–`http://www.lexmark.com`. Lexmark has created a new snap-in service that allows PC SystemView to collect alerts that are generated from Lexmark LAN-attached printers. These alerts can range from paper jams to out-of-toner. These extensions will soon be shipped with Lexmark's MarkVision for OS/2.
- Motorola–`http://www.motorola.com`. Motorola is currently integrating PC SystemView with their client/server-based paging software, AirApparent. This integration will allow PC SystemView to use AirApparent as a numeric and alphanumeric paging device in more sophisticated environments.
- Vinca Corp.–`http://www.vinca.com`. Vinca is currently reselling PC SystemView/NetFinity with every Standby Server 32 for OS/2. Standby Server 32 is an OS/2 mirrored server product that takes advantage of PC SystemView's monitoring and alerting capabilities.

The partners listed above are the current members of the PC SystemView Partners in Management program. Other partners are currently being pursued to add functionality to PC SystemView. For more information about the PC SystemView Partners in Management program, contact Chris Gaskins at `cgaskins@vnet.ibm.com` or Denise Collins at `dcollins@vnet.ibm.com`.

More information about IBM SystemView and NetFinity can be found on the following World-Wide Web sites:

- `http://www.pcco.ibm.com`
- `http://www.software.ibm.com`

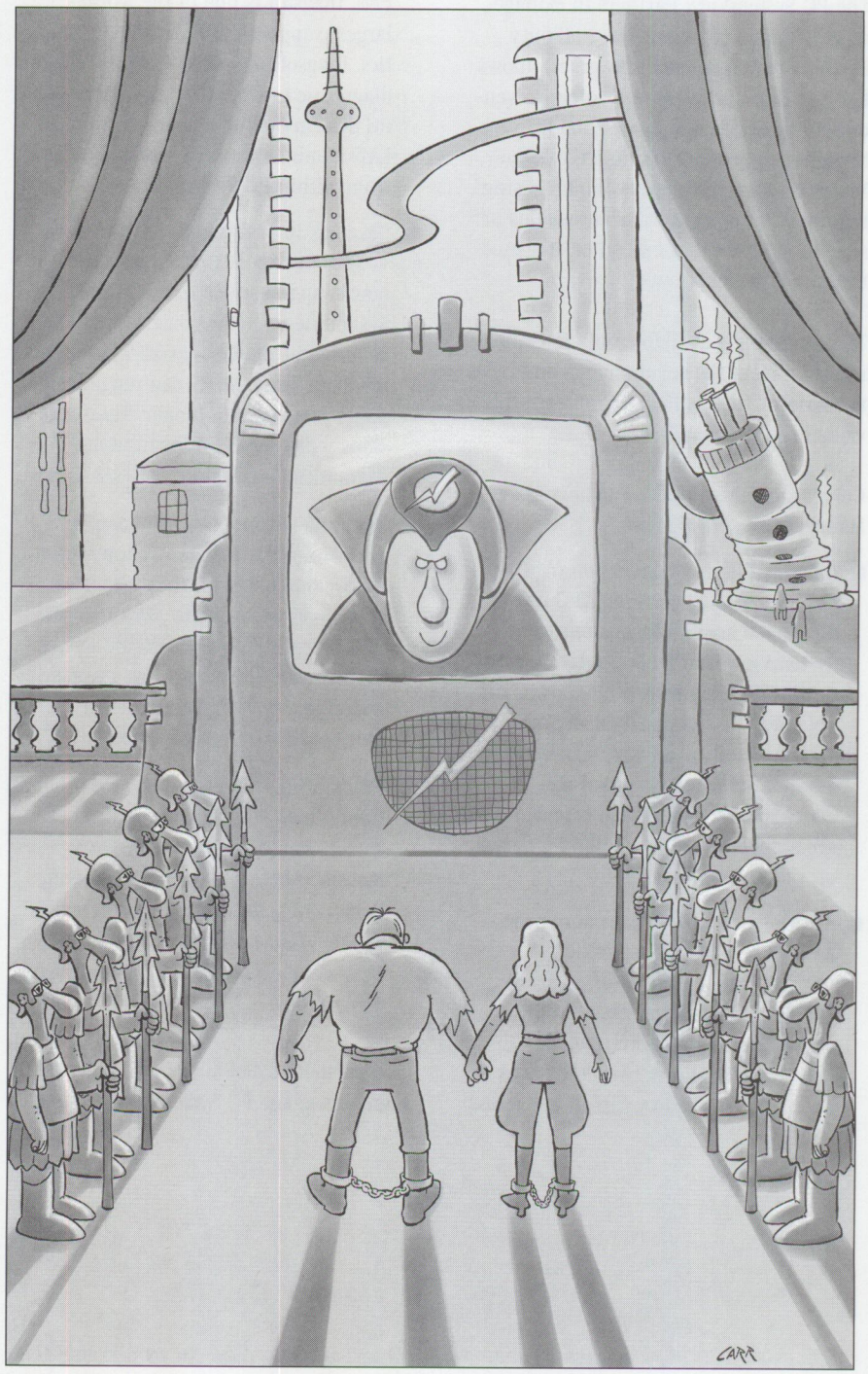
TALKlink users can use NETFIN CFORUM. Questions can be addressed to `netfin@vnet.ibm.com`.

Christopher Gaskins is a SystemView market manager in IBM's Systems Management Division in Research Triangle Park, NC. He manages the PC SystemView Partners in Management program and does technical marketing. He was previously on the NetFinity brand team and also spent four years providing worldwide level 2 support for PC Server products. Chris joined IBM in 1990. He has a BS degree in Computer Science from Berry College and is an avid bass fisherman. His Internet ID is `cgaskins@vnet.ibm.com`.

Patricia Davis is a SystemView market manager in IBM's Systems Management Division in Research Triangle Park, NC. She is responsible for defining product strategy and for marketing IBM's Intel-based systems management products. Her previous IBM jobs include U.S. product manager for NetFinity, product manager for Datag*LAN*ce Network Analyzer, site services analyst and coordinator in the IBM RTP Materials Engineering Laboratory, and a semiconductor development engineer. Patricia joined IBM in 1989 after earning a BS degree in Chemistry and an MS degree in Analytical Chemistry from the University of North Carolina, Chapel Hill. Her Internet ID is `davisp@vnet.ibm.com`.

Lotus Notes-Based Meetings

Lotus Notes is a powerful client/server application that effectively supports business processes. One of the most compelling uses of Notes is in support of meetings, including face-to-face, telecons, and videocons. This use requires a well-defined Notes application for meetings (meeting databases); upgraded conference rooms with network-attached PCs and projection panels; an easy means of creating meeting databases; and a paradigm shift in the way meetings are set up and run. This article describes this paradigm shift and how it improves information sharing and reduces the use of paper-based processes.



When the IBM Boca Raton, Florida site began its journey toward a client/server computing environment in mid-1993, a Lotus Notes database was set up to capture all tasks done by the development and support teams. Initially, these were simple tasks of one-week duration. Each task owner was responsible for keeping his or her tasks current in the database.

Steve Krantz
IBM Corporation
Boca Raton, Florida

At a set time each week, a two-hour meeting was conducted to review the tasks due during that period. Prior to the meeting, the moderator sorted the database by task, printed the tasks due, and created transparencies; the meeting was a traditional team status meeting.

This highly successful approach was followed through the spring of 1994.

By then, the client/server environment had matured, and such detailed, task-by-task reviews were no longer required.

At that time, the team was asked to provide summary information to management about the ongoing status of the computing environment. A CIO (for chief information officer) Notes database with a standard format (see Figure 1) was created to contain this information. A status document was then created for each major project, and the project owner was responsible for maintaining its accuracy.

Critical changes were made in the review meeting's operation. A notebook PC was brought into the conference room, then connected to the site network and to a projection panel. The moderator booted the PC, brought up Lotus Notes, brought up the CIO database, and ran the meeting online. New items, changed items, and new projects were entered directly into the database during the meeting.

This approach was very successful in running the large-scale, client/server migration and support project and, simultaneously, informing management of the project's current status. Anyone on site could access the CIO database to learn the status. All team members could create or change their project status documents. In addition, the team included measurements information in the database, as shown in Figure 2. No transparencies or hard copies were used in the meeting at any time.

In August 1994, a major, in-depth review of the client/server environment was held. It required that each team member prepare a chart presentation and deliver it to the assembled reviewers. Traditionally, such a meeting would have required hundreds of transparencies, hundreds of pages of copied materials, hours at the copy machine, distribution of meeting minutes, and so forth.

It was decided to run a Notes-based meeting instead.

All presenters were asked to attach or imbed soft copy versions of their visuals in the CIO database before the meeting, which was conducted entirely from the database. Because Lotus Notes supports multiple windows to access individual documents in a database, one window was used for the meeting's agenda, one window was used for the meeting minutes, and one window was used for the current presentation. When the presenter stepped up to speak, the current presentation window was enlarged and the visuals displayed.

The presenters used diverse formats, e.g., Freelance for OS/2, Ami Pro, and ASCII. This presented no problem, because the displaying PC was equipped in advance with viewer programs for each file format. This feature was previously developed as part of an Attachment Viewer SmartIcon created initially for our Notes Mail template. The Attachment Viewer accessed a lookup table (in a user-customizable reference Notes database) based upon file extension and invoked an associated REXX string that called the appropriate viewer program.

STATUS

Status	Level/Release	Comments/Dependencies
Current Status	Lotus Outgoing v1.02a	Outbound only. Currently in production.
Future Upgrade	Lotus Fax Server v1.0	Inbound and outbound. Currently being tested.

MAJOR ACTIVITIES

Activity	Ongoing Status	Target Date	Open/Closed Date
Define Inbound Strategy - Review Fax Works, FaxRouter/2, and Lotus Fax Server products	Complete The Lotus Fax Server (LFS) product will be piloted.	03/31/95	Open 01/31/95 Closed 04/04/95
Alpha Test	Complete	Start 05/22/95 End 06/02/95	Closed 06/02/95
Business Case	Complete	07/18/95	Closed 06/23/95
Beta Test	Active	Start 10/02/95 End 10/13/95	Open 08/16/95
Production Rollout	Dependent on PostScript printer rollout.	Start 4Q95 End 1Q96	

CURRENT PROJECT PROBLEMS/ISSUES/ACTIONS

Description	Status Update	Action Plans	Item Owner	Open/ Closed Date
Tool to view and print faxes from within Notes mail	Will use Lotus Image Viewer (LIV) accessed via NetDoor		John Kupsky	Closed 10/10/95
Production servers	Will use one 95/90		John Kupsky	Closed 10/10/95

Figure 1. CIO Database Project Status Form

The Notes-Based Meeting

A Notes-based meeting (NBM) is a one-time or ongoing meeting where all presentation visuals, agendas, minutes, and

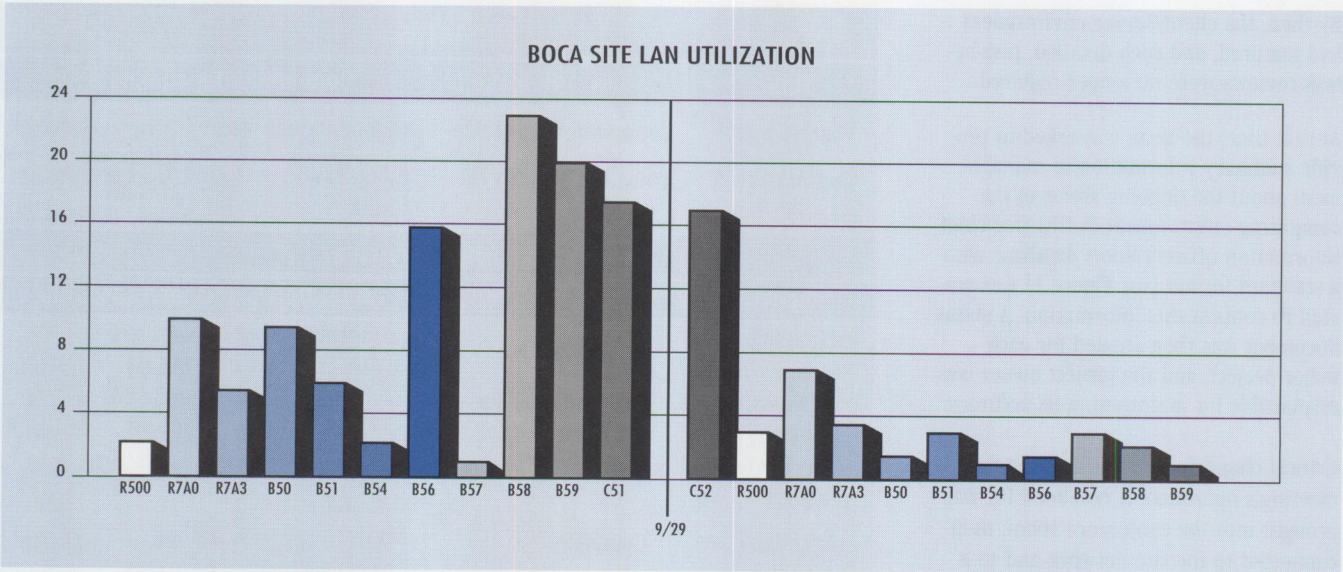


Figure 2. Sample Measurements from CIO Database

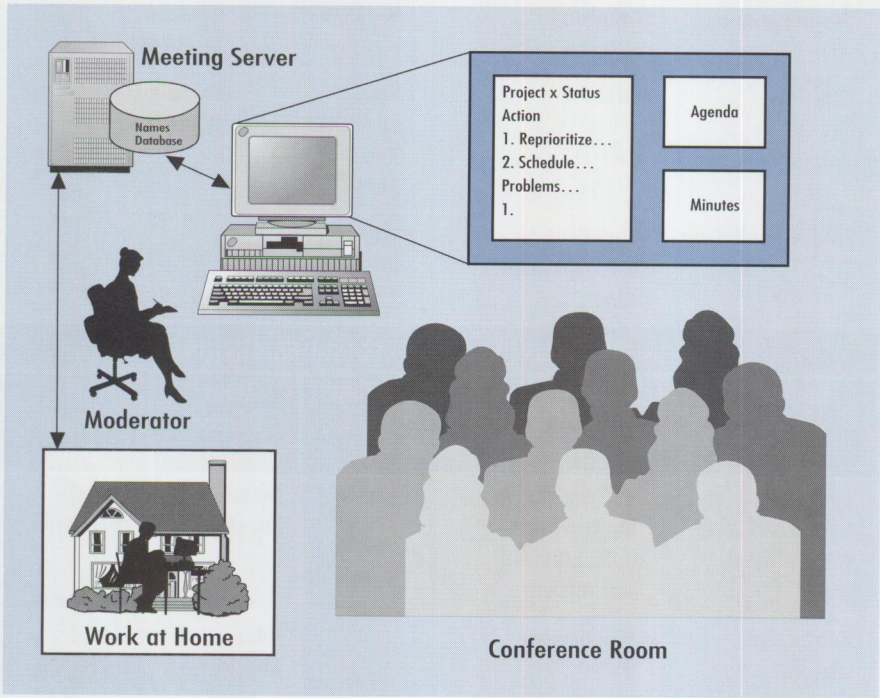


Figure 3. Notes-Based Meetings

action items are displayed and stored in a Notes database. To support NBMs, meeting rooms must be equipped with network-attached PCs configured with Lotus Notes and connected to a projection panel device.

Prior to the NBM:

- The meeting initiator establishes the meeting database on the meeting server, which can be any Notes database server. The attendee list is used as the access control list (ACL) for the database.
- The meeting initiator notifies each attendee and presenter of the meeting's location and the associated meeting database.
- The meeting initiator places the meeting agenda as a document in the meeting database.
- All presenters access the meeting database and either import or attach the file containing their visuals to a new database document. They ensure that each visual in the file can be effectively viewed when displayed.
- Prior to the meeting, the meeting initiator boots up the network-attached PC configured with Lotus Notes, accesses the meeting database, and ensures that it can be projected onto the display screen in the meeting room.

During the NBM:

- Each presenter accesses the document containing his or her visuals and steps through them using the PC.
- The meeting initiator keeps the meeting's minutes in a separate document in the meeting database. If the meeting room is equipped with more than one network port, this can be done with a separate, Notes-enabled PC while presentations continue.

After the NBM:

- The minutes document is finalized in the meeting database.
- Presenters and attendees can independently access all visuals, minutes, agenda, and any other documents in the meeting database.

Figure 3 illustrates the general concept of Notes-based meetings. Observe that Notes-based meetings easily support remote attendees as well.

Run Your Own Notes-Based Meetings

To adopt Notes-based meetings in your organization, you need to:

- Install Lotus Notes and educate all employees in its use. Lotus Notes Release 4.0 has now integrated an attachment viewing feature for easy display of visuals files.
- Make it easy for any employee to set up meeting databases. Your Notes administrator should be aware of this process. A suggested approach is to set up a special meetings server for this purpose. Don't forget to use the attendee list as the database's ACL.
- Equip each conference room with a PC installed with Notes, a projection panel, a projection screen, and one or more network ports. Don't forget to secure the system if it is placed in a public conference room.
- Finally, teach employees how to conduct Notes-based meetings without using transparencies or hard copies. Make sure they understand the need to attach or imbed, then test their visuals files prior to any NBM.

After face-to-face meetings are conquered, the next step is to address telecon operation. In general, telecon attendees simply need simultaneous access to the meeting database and audio telephone connectivity.

Two additional steps may be necessary to support this requirement. First, remote attendees may need to be certified to the meeting database in advance. This process step should be included at the meeting setup stage. Remote attendees must send their Notes IDs to the Notes administrator for certification.

Second, remote attendees with only a single telephone connection with which to communicate should plan to replicate the meeting database to their PCs before the meeting, so they can see the visuals in disconnected mode and use the telephone for voice connectivity.

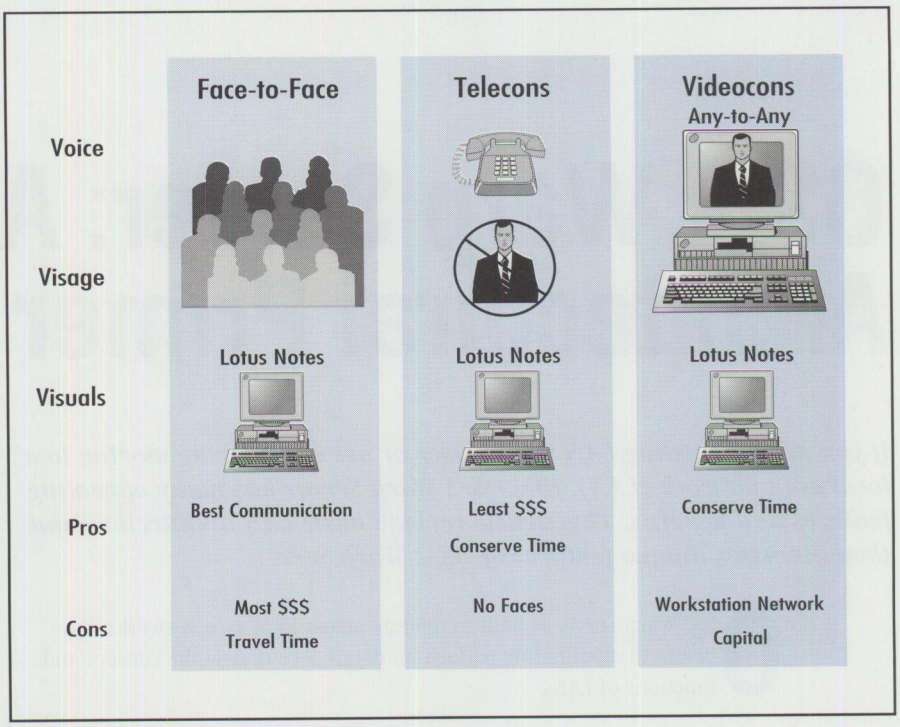


Figure 4. Meetings in the 1990s

Meetings of the Future

Peering into the future, we see that Lotus Notes is a critical ingredient in the operation of meetings. Stepping through Figure 4, we contrast the three primary meeting modes–face-to-face, telecons, and videocons–in regard to their three primary elements: voice, visage, and visuals.

Face-to-face meetings will continue to be the best method of communicating, but will also remain the costliest. Telecons lack "visage" or faces but are a low-cost, effective communication method. Finally, videocons, facilitated by emerging high-speed telecommunications, will emerge as an alternative to telecons where real-time images are important. These images may be talking heads or white-board images for brainstorming sessions. In all three cases, Notes meeting data-bases can be the visuals repositories of choice.

Steve Krantz is a senior technical staff member in Information Technology within the IBM Real Estate/Site Operations Division in Boca Raton, Florida. He is responsible for information technology architecture for his division. From 1993 through 1995, Steve was the project leader of IBM Boca Raton's migration to client/server computing; he has also held several management and technical positions during his 27 years with IBM. Steve is the author of *Real World Client/Server*, published in 1995 by Maximum Press, which provides a comprehensive guide to client/server computing migration based on the experience of the Boca Raton site migration as a case study. He has a BA degree from Queens College, an MS from Syracuse University, and a PhD from Nova Southeastern University. Steve's Internet ID is steve_krantz@bocaraton.ibm.com.

OS/2 Warp Server: An Architectural Primer

If you are an existing LAN Server user or are considering moving to a local area network (LAN), IBM OS/2 Warp Server has many appealing features and benefits. This article reviews basic LAN architecture and then discusses unique features of OS/2 Warp Server.

OS/2 Warp Server is built to operate across local area networks, but before discussing this package in detail, let's review the concept and functions of LANs.

A LAN connects machines so that they can share information. Users of LAN-connected machines can collaborate, as well as share printers, files, and modems.

The simplest LAN is known as a peer-to-peer LAN or simply peer LAN (see Figure 1). In a peer-to-peer LAN, each machine can share its files and printers (and some peer LANs can also share modems) with other machines on the LAN. Peer LANs are the simplest to set up and are the least expensive for small LANs of fewer than 10 users.

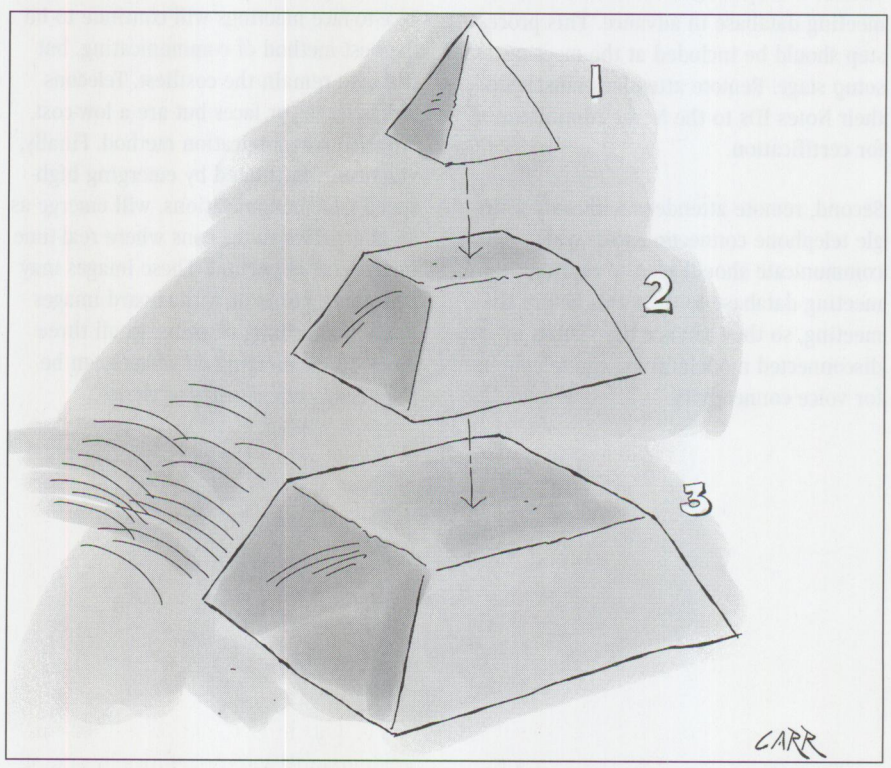
To make a workstation operate on a peer LAN, you must be running an operating system, such as IBM OS/2 Warp Connect, Microsoft Windows for Workgroups (WfWG), Windows 95, or NT Workstation, that supports peer-to-peer LAN operation. You can also add the peer capability to an existing DOS or Windows machine with software from Artisoft (LANtastic) or Novell (NetWare Lite).

Philip Lieberman
Lieberman and Associates
Beverly Hills, California

Security Issues for Peer-to-Peer LANs

Each machine in a peer LAN must implement some sort of security to control who can do what. There are two levels of security: share-level and user-level. Share-level security, the weakest security system (illustrated in Figure 2), does not care who you are, as long as you have the right password to access a resource. Once you have provided the password(s), everything within a resource (a directory or printer) is available to you. Share-level security is the only security available for stand-alone Windows for Workgroups and Windows 95 workstations. (*Note:* Windows 95 supports user-level security on directories if a NetWare or NT server is available to the Windows 95 workstation.)

User-level security (Figure 3) maintains a database of users and passwords, as well as extensive access control lists based upon users and user groups. User-level security is implemented in IBM OS/2 Warp Connect Peer Services as well as in NT Workstation (but only if NT File System [NTFS] is used). User-level security



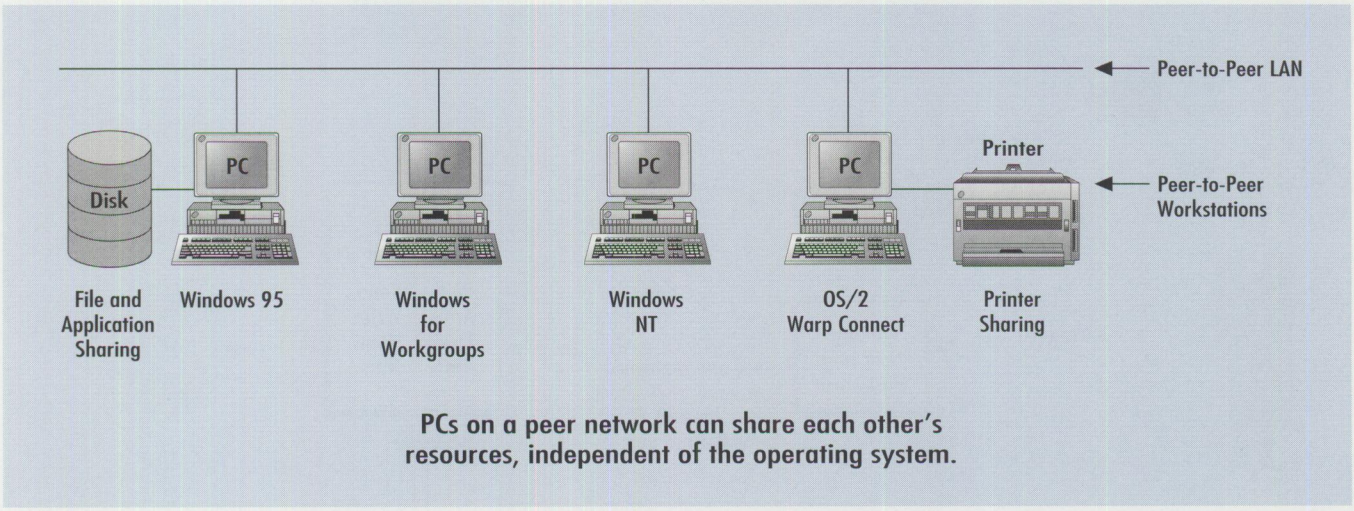


Figure 1. Peer-to-Peer LAN

is the industry-standard control system for industrial-strength LANs.

The problem with a peer LAN is the distributed nature of access control. A user needs an account and/or a password for each machine to which he or she wants to connect. In some peer LANs, such as Microsoft's Windows for Workgroups, the account name is not important for resource (file/printer) usage–only a common valid password is needed for access. (There may be two passwords: one for read-only and another for full access.)

If you change a peer machine password, you must coordinate the change with all users. If a new user is added to a peer LAN, each machine must be administered to allow access for this user. An alternative solution is to use a minimal security system, such as share-level access, and freely give out passwords.

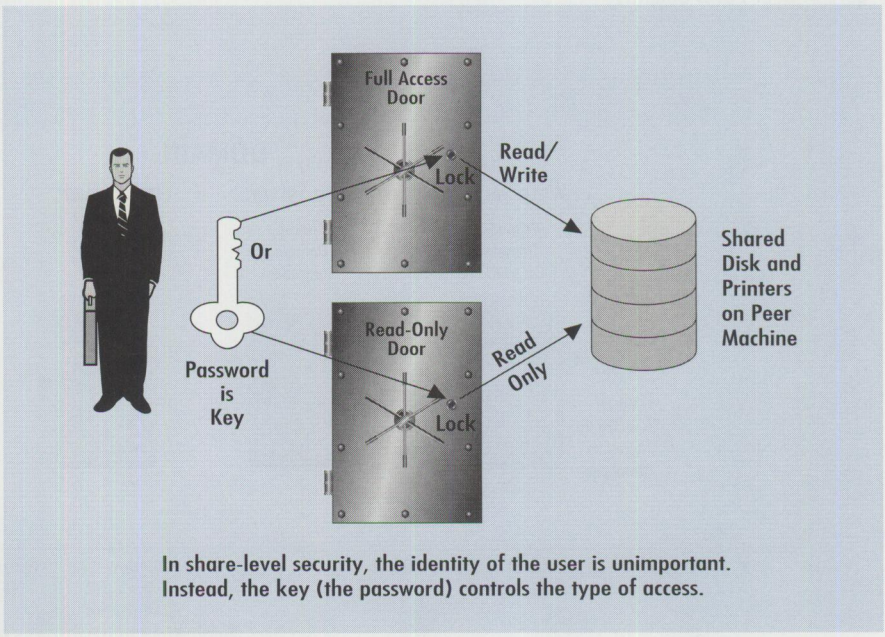


Figure 2. Share-Level Security

Why Use OS/2 Warp Server?

Instead of having each peer machine share its resources with the other machines in the LAN, OS/2 Warp Server enables you to centralize the LAN resources into a group of machines known as *servers*. The servers are grouped for administrative purposes into an entity known as a *domain* with one of the machines in the domain designated as the *primary domain controller*.

The purpose of the primary domain controller is to hold the master list of users, groups, and passwords for the LAN users in the entire domain. When a user wants to access any of the resources (e.g., servers) within the domain, he or she first logs on to the domain controller or to one of its backups, known as a *backup domain controller*. Once the domain controller verifies a user's ID and password, the user is given access to all of the servers in the domain, based upon the permissions you set up for that user. (*Note:* Any OS/2 workstation with the appropriate software can remotely administer the domain controller.) Figure 4 depicts the domain architecture within OS/2 Warp Server.

This architecture is *scaleable*–it enables the domain to add capabilities by adding more servers, as needed, to the domain. Practical experience with the OS/2 Warp Server architecture shows that a single administrator can handle hundreds, even thousands of users in a single domain using this architecture. Think about the confusion of handling this number of user accounts and passwords in a peer LAN!

What is OS/2 Warp Server?

OS/2 Warp Server is a family of integrated LAN software packages. It contains the OS/2 Warp operating system, LAN Server 5.0, plus a rich set of connectivity and powerful maintenance utilities. To address different user requirements, OS/2 Warp Server comes in two versions: *OS/2*

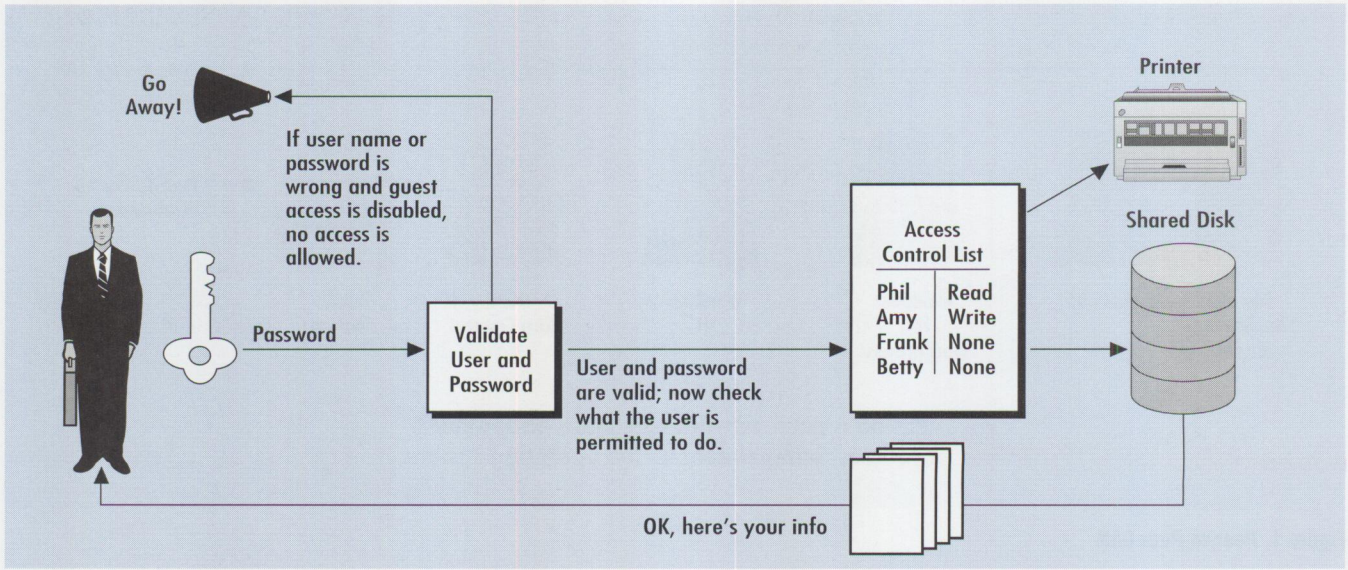


Figure 3. User-Level Security

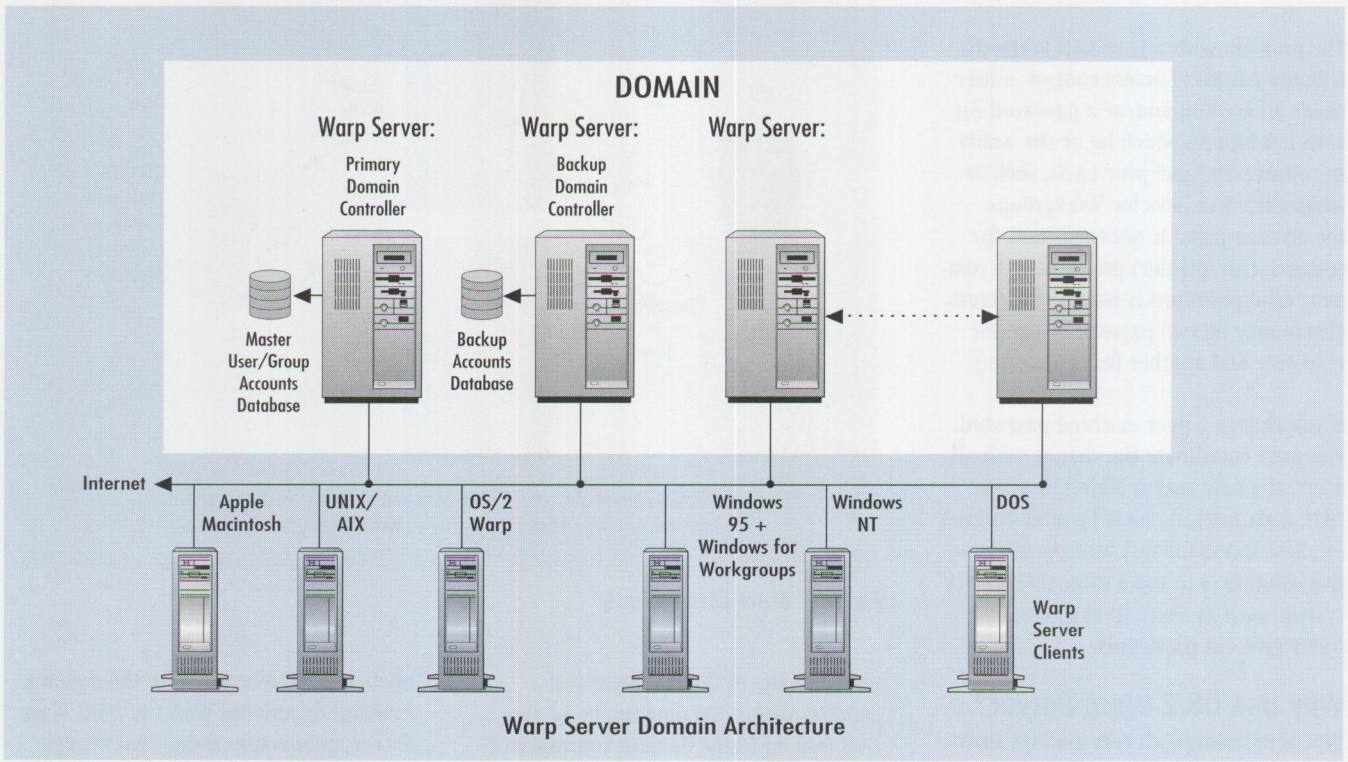


Figure 4. OS/2 Warp Server Domain Architecture

Warp Server (the entry version) and *OS/2 Warp Server Advanced.* There is also a bundle called *OS/2 Warp Server First Step*, which includes OS/2 Warp Server and 10 licensed client connections.

All versions of OS/2 Warp Server use the client licensing model called *use-based features*, where individual client connections are purchased from IBM.

OS/2 Warp Server Advanced includes all of the features of OS/2 Warp Server plus HPFS386 (an optimized Ring 0 file system with unlimited access control lists), fault tolerance (disk mirroring and duplexing), user disk limits, and Intel Pentium optimization. OS/2 Warp Server Advanced is designed to handle up to 1,000 concurrent users on a single, powerful server.

What makes this package different from previous versions of LAN Server is the seamless integration of its components. With a pair of kicker diskettes and a CD-ROM, you can install everything in one installation session. You can add, remove, or configure components through a single interface without the need for multiple diskettes, CDs, or different menus–no more searching through a box crammed with different diskettes, CDs,

and ServicePaks. The OS/2 Warp Server package is also maintained as a single entity for easy application of ServicePaks when they are needed.

Specific OS/2 Warp Server features include:

- File and print share services (shares disks and printers)
- NetWare file and print gateway services (transparent access to NetWare resources)
- Remote access services (dial-up access to LAN and mainframe)
- Systems management services (IBM SystemView)
- Backup and recovery services (standard and disaster recovery)
- Advanced print services (PostScript printer translation)
- Complete TCP/IP services (for both client and server components)
- Dynamic host configuration protocol (DHCP) support (automated TCP/IP configuration)
- Dynamic domain name services (DDNS) support (dynamic TCP/IP DNS support)
- Password coordination among different systems
- Artificial intelligence problem resolution database
- All the features of the OS/2 Warp 32-bit operating system
- Unlimited number of access controls (provided when using OS/2 Warp Server Advanced and the optional Distributed Security System [DSS])
- Unlimited number of groups*
- Access controls on all objects, including user-defined*
- Kerberos security system*
- Seamless integration to Distributed Computing Environment (DCE)*

*When using optional DSS components

File and Print Services

A server's core functions are to provide file and print sharing services to the network workstations. *File sharing* services provide both application and file sharing capabilities. The shared files and applications reside on one or more servers within a domain; in fact, they really reside on the hard disks of the server machines shared among LAN users. *Print sharing* services share printers attached to the servers within the domain.

In OS/2 Warp Server, file and print services are provided by the LAN Server 5.0 code (an upgrade of LAN Server 4.0) that has been integrated into the total OS/2 Warp Server package. This latest version provides the same easy drag-and-drop graphical administration capability first introduced with LAN Server 4.0. In fact, all of the administration programs work and appear exactly as they did in LAN Server 4.0 (see Figure 5).

If you have previously set up a LAN Server 4.0 domain, you'll be familiar with the type of information and configuration decisions the file and print services installation requires. The primary difference between installing OS/2 Warp Server and LAN Server 4.0 is that this information is requested through a new common installation program. You will find that OS/2 Warp Server defaults a lot of decisions for you.

To sum it up, file and print services are essentially LAN Server 5.0 under a different name. Isn't marketing wonderful?

Something New in LAN Server 5.0

Having understood that the file and print services function is really LAN Server 5.0, you might have the impression that the only change from LAN Server 4.0 is the installation program. If so, you might be surprised to learn that there are some important new features, including:

Compatibility with:

- Novell's and Microsoft's network operating systems
- Microsoft Windows for Workgroups, NT Workstation/NT Server, and LAN Manager clients

Support for:

- DEC PATHWORKS
- AIX and Apple Macintosh clients with add-on software
- NetBEUI, NetBIOS, TCP/IP, IPX/SPX, and SNA client protocols

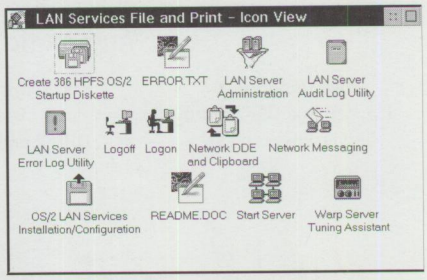


Figure 5. OS/2 Warp Server File and Print Services Administration Folder

Implementation of:

- Gateway services for NetWare resources using LAN Server and OS/2 Warp Server client software
- Peer services on servers
- Revised OS/2, DOS, and Windows 3.x requesters
- Windows 95 requesters
- Advanced printer support (APS) allowing PostScript jobs to print on non-PostScript and high-speed printers on the LAN

New Support for Windows Protocols

Compatibility with Microsoft's network operating systems (NOSs) was achieved primarily by supporting the protocols within the Windows for Workgroups operating system. (The WfWG network protocols are implemented in Windows 95 and Windows NT.) This support is provided by the new peer support within OS/2 Warp Server. The peer software used in OS/2 Warp Server is based upon the rock-solid peer software in OS/2 Warp Connect. The result is that existing WfWG, Windows 95, and NT systems can connect to OS/2 Warp Server with no changes in their client code. OS/2 Warp Server includes an enhanced requester for Windows 95 that adds LAN Server-unique features, such as public applications and aliases, to a Windows 95 workstation.

NetWare Goodies

OS/2 Warp Server introduces many different solutions for clients that need to connect to NetWare systems.

For clients that need to connect to a NetWare server but have only LAN Server or OS/2 Warp Server client software, OS/2 Warp Server provides the *NetWare*

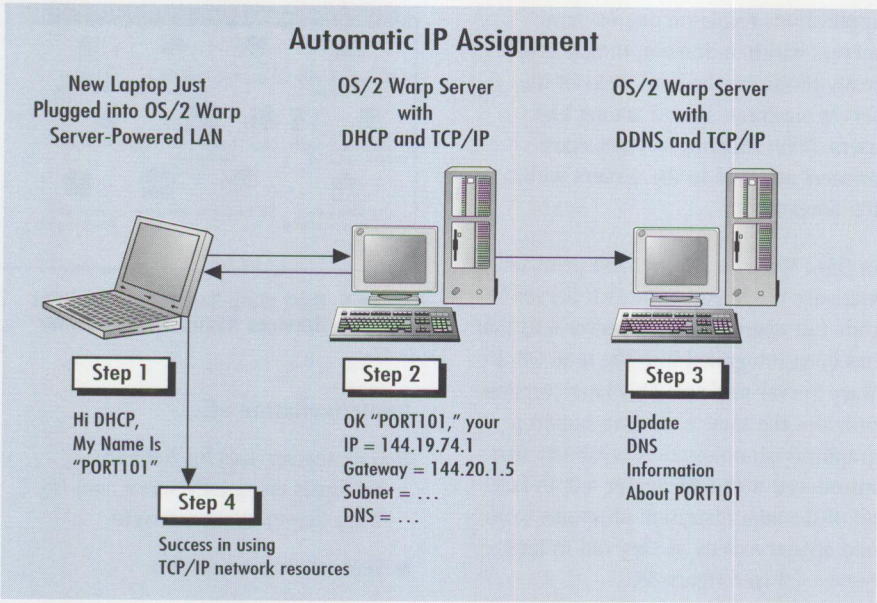


Figure 6. Automatic IP Assignment Using OS/2 Warp Server's DHCP and DDNS

Gateway Service, which runs on an OS/2 Warp Server machine and connects to existing NetWare Shares. The NetWare Shares are then presented to the OS/2 Warp Server clients as regular OS/2 Warp Server resources.

If you have ever tried to set up multiple protocols and client LAN packages under DOS or Windows 3.1, you can appreciate how much work and memory you can save with OS/2 Warp Server's NetWare Gateway Service. Memory conservation is particularly important on DOS workstations. (In case you are wondering, the NetWare gateway does support NetWare 3.12 and 4.02, including NDS).

Suppose you already have NetWare clients and want to use OS/2 Warp Server. No problem! OS/2 Warp Server can appear just like another NetWare server. It includes the ability to access OS/2 Warp Server resources and applications, as well as to retrieve home directory assignments (if logon is allowed).

OS/2 Warp Server also includes the native NetWare client for OS/2, which supports NetWare 4.02. This software can be loaded onto your OS/2 workstations to support your existing NetWare environment or to access OS/2 Warp Server.

To help you migrate and synchronize users and resources from NetWare, OS/2 Warp Server includes the NetWare Migration Utility, which supports the migration of NetWare 2.1x, 2.2x, 3.x, and 4.x (bindery emulation only) into OS/2 Warp Server. It provides a drag-and-drop interface to move directories, their permissions, and user accounts. Because NetWare's password structure is not compatible with OS/2 Warp Server, the migration utility provides strategies for automatically resetting the passwords of user accounts migrated to OS/2 Warp Server.

Getting Information on the Road

How many times have you gone on a trip and found that you forgot something from your office PC? Wouldn't it be easy to dial into your machine and retrieve that missing file, check your e-mail, and take care of those online jobs you do at the office?

In OS/2 Warp Server, two components make remote work easier: remote access services and file synchronization services.

Packaged in every copy of OS/2 Warp Connect is LAN Distance Client. This software package enables a remote connection to your office's network, provided you install the LAN Distance Server software product.

The LAN Distance Server package is integrated into OS/2 Warp Server and is another component that can be added at installation. This saves money, time, and hassles. The remote access services package is fully compatible with existing OS/2 Warp Server LAN Distance client software. OS/2 Warp Server also includes the remote access client software for Windows. Remote access services provides a complete bridging function that allows the transport of virtually all protocols (NetBIOS, TCP/IP, SNA, DLC, etc.). This remote-access product includes:

- Support for a wide variety of modems and multiport serial port hardware
- Encrypted logon transactions (very comprehensive)
- Optional dial-back support
- Extensive logging and error reporting
- Access restrictions by time of day
- Filtering

The mobile file synchronization runs on OS/2 clients to allow network-attached PCs to synchronize file versions between LAN-based and workstation-based files. For example, you might go into the office, connect to the LAN, download a bunch of documents, and then go on the road. While you are out, you make file changes, and others at your office are changing the same files. When you return and reconnect to the LAN, the file synchronization program tells you which files are newer on the network and which are newer on your workstation. You are offered the choice, file by file, of updating your machine's version or the LAN's version of the files in question. You still have to keep track of this stuff, but at least the software helps you figure out what is old and what is new.

TCP/IP Plus . . .

The underlying architecture of the Internet is TCP/IP. Even if you do not use the Internet, there is little question that TCP/IP has become the dominant protocol in the world of network computing. OS/2 Warp Server implements a comprehensive suite of the latest TCP/IP technology to make usage and support as easy as possible.

To ease workstation configuration, OS/2 Warp Server now provides dynamic host configuration protocol (DHCP), as well as dynamic domain name services (DDNS), as shown in Figure 6.

One of the biggest headaches in administering a TCP/IP installation is assigning IP addresses and TCP/IP settings for each

workstation. DHCP enables a workstation to simply provide its name (which is simple enough to assign) to the OS/2 Warp Server machine running the DHCP server. Then, like magic, back comes the machine's IP address, subnet mask, gateway address, and domain name server (DNS) address. All of the right settings are returned automatically from the DHCP service with no user or administrator muss or fuss.

Another time-consuming area of TCP/IP administration is looking up TCP/IP names and returning the corresponding IP address. The translation function is normally provided by a fixed file called *hosts* or via a DNS. The problem with the DNS is that you have to manually update the database with network changes. The new DDNS provides the same name-look-up function, but can dynamically and automatically update its database as new machines are added to the TCP/IP network via DHCP.

OS/2 Warp Server includes a comprehensive client and server suite of the most common TCP/IP utilities. The TCP/IP package includes the Web and Usenet utilities needed for Internet surfing and supports PPP and SLIP connections. The TCP/IP folder of applications is shown in Figure 7.

Want to Sleep at Night?

A lot of companies offer LAN software supposedly designed for enterprisewide installation. Certainly you can install just about any software wherever you wish, but how do you maintain ongoing control over thousands of computers?

OS/2 Warp Server implements many innovative, yet proven, software components to deal with the enormous job faced by corporate information services organizations. OS/2 Warp Server includes tools to aid in its support: IBM SystemView, electronic software distribution, license management, and backup and recovery services.

The systems management components are one of OS/2 Warp Server's strongest features. These components help you:

- Track hardware and software resources
- Monitor workstation and server operation
- Distribute software across the network
- Logically break up systems in groups for segmenting administration tasks
- Schedule operations into the future
- Back up and restore directories and files to a variety of media

Optional management and support components included with OS/2 Warp Server, but not installed by the integrated installation utility, include:

- Simple network management protocol (SNMP), so that OS/2 Warp Server servers can be managed by SNMP management systems
- Desktop management interface (DMI), which supports systems management using the DMI management systems
- AskPSP, a case-based reasoning system, which looks for possible solutions to problems you describe

State-of-the-Art Network Operating System

In today's world, it is essential that a network operating system integrate with existing networking solutions. OS/2 Warp Server is comprehensive in its ability to support the broad range of existing LAN clients and servers, while providing industrial-strength application and resource sharing. IBM OS/2 Warp Server is a single, easy-to-set-up LAN networking solution that scales beautifully from small businesses to the largest enterprises.

Acknowledgment

I would like to thank Khalil Emami of the IBM LAN Systems Customer Readiness group in Austin, Texas for his assistance in preparing this article.

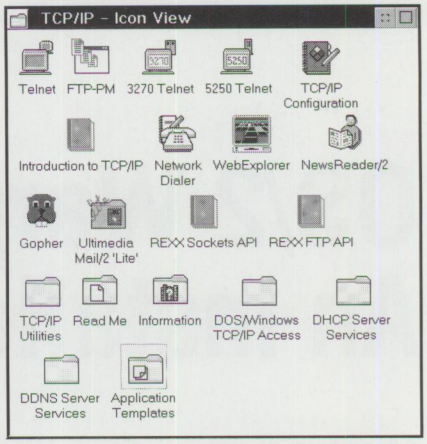


Figure 7. TCP/IP Application Suite Folder

Philip Lieberman is a well-known author, lecturer, and consultant. Phil is also the owner of Lieberman and Associates, which produces the LAN Intensive Care Utilities for IBM LAN Server and now for OS/2 Warp Server. His organization also provides end-user support, corporate software development, and all types of training services for OS/2 and OS/2 products. Phil can be reached at:

Lieberman and Associates
221 N. Robertson Blvd., Suite C
Beverly Hills, CA 90211
Phone: (800) 829-6263 or
(310) 550-8575
Fax: (310) 550-1152
BBS: (310) 550-5980
CompuServe: 76426,363
Internet: lanicu@ibm.net
World-Wide Web:
http://www.lanicu.com

OS/2 Warp Server: An Installation Primer

OS/2 Warp Server provides a massive number of services and capabilities that allow the construction of simple LANs as well as large, complex, enterprise LANs. This article describes a typical OS/2 Warp Server installation and gives tips and techniques for making your own installation a breeze.

Experienced LAN Server users have seen its installation and configuration evolve from text-mode interfaces to graphical user interfaces. Now, in OS/2 Warp Server, IBM has provided a single, consistent interface for installing the operating system as well as LAN software and accessories. Bid farewell to the master corporate box of diskettes and CDs needed to install a single server; they have been replaced by a couple of kicker diskettes and a pair of CDs. Also say good-bye to the different installation programs, now replaced by one installation program for the whole package.

Requirements: You Get What You Pay For

Where do you begin the installation of OS/2 Warp Server?

First, make sure you have the right amount of memory, disk space, processor power, and LAN adapter card(s). These requirements are listed in appendices A and B of the *OS/2 Warp Server "Up and Running!"* reference guide that comes with OS/2 Warp Server. Appendix A gives you worksheets for OS/2 Warp Server's server and client components. Appendix B lists the supported network adapters (there are a lot of them) and the modems that are compatible with the LAN Distance (remote access server) component, also known as the dial-up capability (this list is also very large).

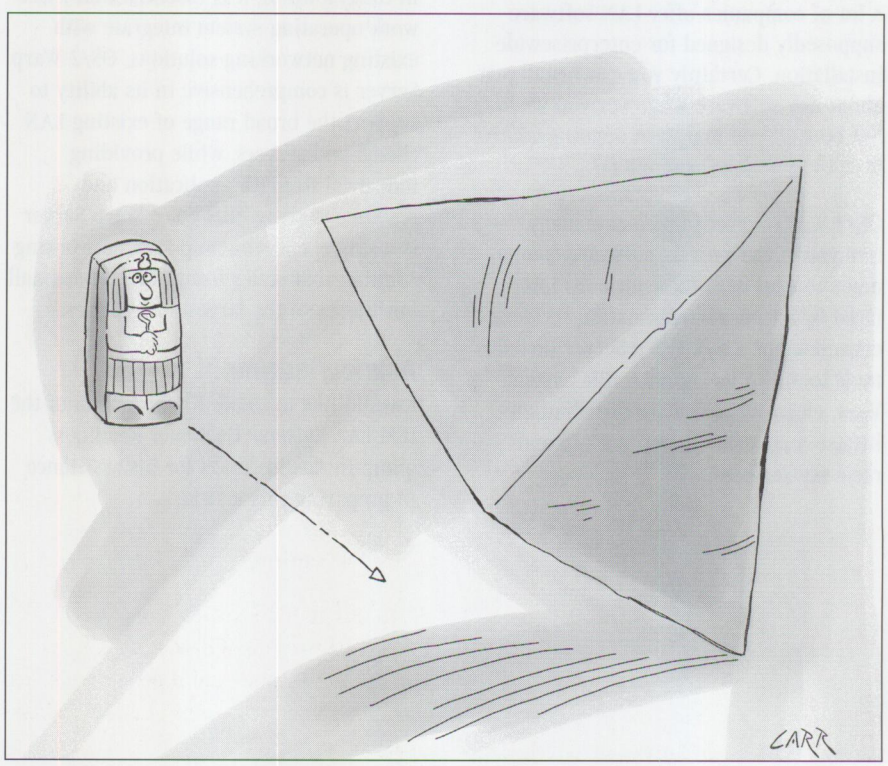
Philip Lieberman
Lieberman and Associates
Beverly Hills, California

If you are like me, you probably don't want to bother with filling out worksheets–you just want to install the software . . . now! For those who cannot wait, read Chapter 3, Planning Overview, in the *OS/2 Warp Server "Up and Running!"* book.

Oh, you don't want to read that, either? In that case, the requirements for running OS/2 Warp Server are given in Figure 1.

As you look through the requirements in Figure 1, it may appear that my recommendations are written in stone and any divergence will cause OS/2 Warp Server to behave badly. My recommendations merely consist of the different types of hardware I tried that seemed to improve overall performance.

When diverging from the minimum recommendations, I have found that the best



improvement comes from additional memory and a faster processor. If you do a lot of disk I/O, then a fast small computer system interface (SCSI) adapter combined with a fast SCSI disk drive provides the best performance. This is really obvious stuff–better hardware means a better server.

The good news is that OS/2 Warp contains support for just about all the hardware built in the past few years. By the way, OS/2 Warp Server works great on the wide variety of non-IBM disk controllers, video boards, CD-ROMs, and motherboards that I personally tested in our lab.

Now, on to the installation itself!

Kicker Diskettes

Within the OS/2 Warp Server package, you will find two diskettes and two CDs. Begin the installation by inserting the "Installation Diskette for CD-ROM" into the A: drive, and CD number 1 into your CD-ROM drive. Then reboot the machine. After about a minute, you are asked to insert the second diskette, "OS/2 Diskette 1 for CD-ROM" (yes, the names of the diskettes are goofy), then press the Enter key.

Component	Minimum	Author Recommendations
Processor	Intel 386	Intel Pentium or Pentium Pro
Speed	16 MHz	90 MHz or more
RAM	16 MB	32 MB or more
Disk Controller	Not specified	PCI Wide Fast SCSI-II or SCSI-III
Hard Disk	120 MB	320 MB (or more) Fast SCSI-II or better
Video	VGA	PCI Accelerated SVGA Video, 1024x768 minimum
Diskette	1.44 MB	1.44 MB
Mouse	IBM-compatible	Whatever you like that OS/2 Warp supports
CD-ROM	OS/2-compatible	4X SCSI CD-ROM or faster
LAN Adapter	See list for LAPS*	PCI LAN Adapter in LAPS list
Modem	9600 BPS	28.8 KBPS or better (for multiple modems, use external, processor-assisted, multiport serial card)

*LAN Adapter Protocol Support (LAPS) software provides device driver and protocol stack support. LAPS was the name used in LAN Server 2.0, 3.0, and 4.0; it is now called Multiple Protocol Transport Services (MPTS), but you will still see references to LAPS in MPTS. The list referred to is Appendix B, Supported Modems and Adapters, in the *OS/2 Warp Server "Up and Running!"* book.

Figure 1. OS/2 Warp Server System Requirements

Should You Accept the Installation Defaults?

All of the hardware scanning during installation is intended to simplify your decision making. Even with all of this automated hardware detection, however, you should still review the proposed installation choices for their "correctness."

For example, the installation automatically chooses names (based upon your name and company information) for your servers and domains that you might not like (I certainly didn't). You can blindly keep pressing the Enter key and get a workable installation, but reviewing and editing the options during installation can make the outcome of the installation more in line with your particular corporate LAN standards.

It takes between two and four minutes to read the two diskettes. During this period, the software scans your machine for a wide range of hardware. The initial hardware scanning is needed so that the base operating system, OS/2 Warp, can be properly installed. Later in the installation–usually after a couple of automatic reboots if disk formatting is requested–another scan is done to determine the type(s) of network adapter cards installed in your machine. (This is sometimes called a "sniffing" operation.)

Installation Decisions

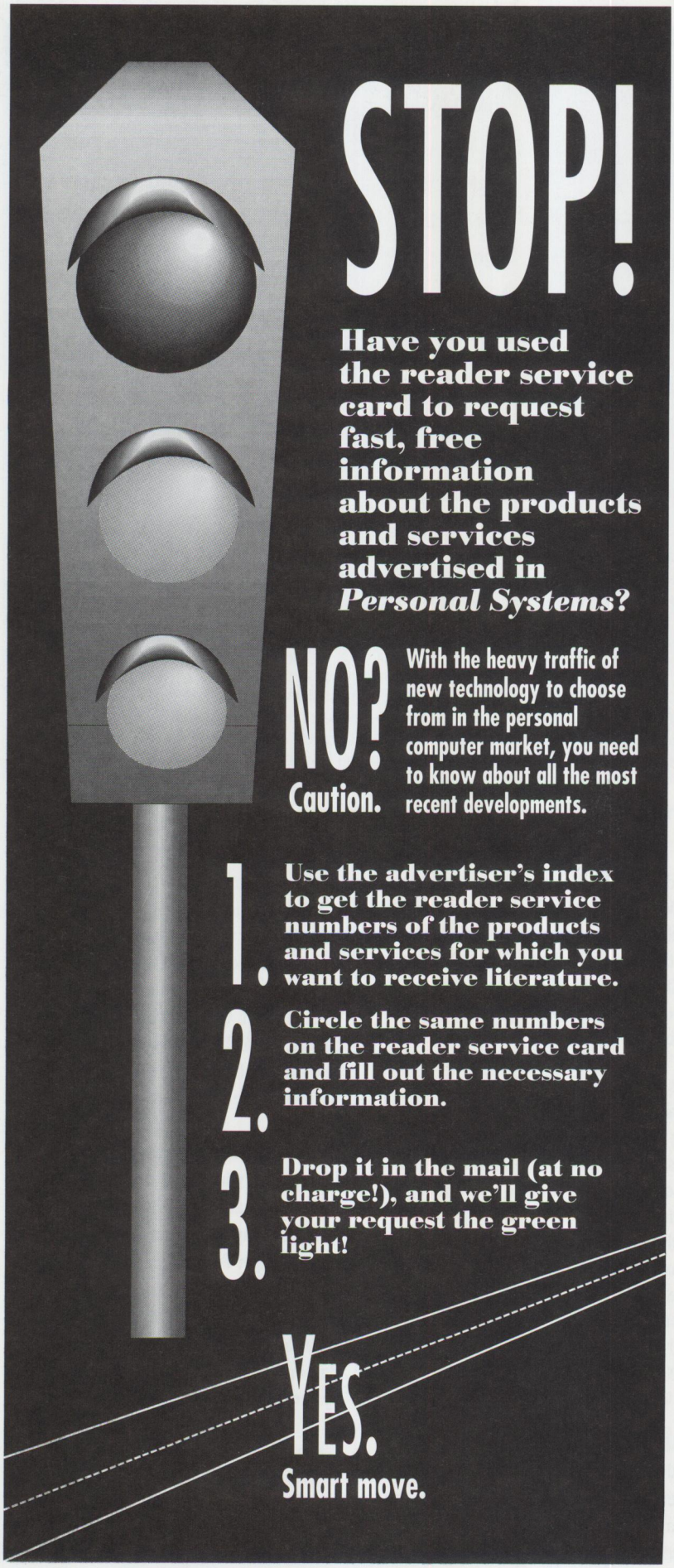
After the two initial diskettes have been completely read in and processed, you are given a choice of two installation options: easy or advanced.

In the *easy* installation, only the most common options are available for installation. I prefer the *advanced* installation, because it presents all available options and features during the installation process. (In fact, there is really nothing advanced in the advanced installation–it just sounds intimidating!) In this article, we'll take the advanced installation route.

One of your first options is to select the file system, which determines how the disk is formatted. OS/2 provides three different ways of formatting your disk for data storage: FAT, HPFS, and HPFS386.

FAT (File Allocation Table), the most primitive disk format, has been around since day one of the PC and is the default for systems that already have DOS/Windows.

A more efficient and powerful format is HPFS (High-Performance File System), which is a more common way to format the disk for OS/2 systems. HPFS is better than FAT because it is optimized for



Personal Systems

FREE Product Information Index

Reader Service Number	Company	Page #
30	BMC Software	Cover 4
2	Brooks Internet Software, Inc.	10
28	ChipChat Technology Group	55
8	Cirrus Technology, Inc.	12 & 16
17	CleverSoft	19
23	ColoradOS/2	7
3	Creative Approaches, Inc.	10
11	DataTrade	17
6	HockWare, Inc.	14
24	Indelible Blue	9
12	JBA International	17
10	Lieberman and Associates	16 & Cover 3
1	Lotus Development Corp.	10
27	Micro Channel Developers Assn.	15
7	Micro Focus	14 & 17
22	Microrim	3
4	Microstar Laboratories, Inc.	12
15	Oracle Press	18
16	Osborne/McGraw-Hill	18
21	Pinnacle Technology	1
20	PowerQuest Corp.	24
9	SecureNet Technologies, Inc.	16
5	Sirius Publishing, Inc.	14
26	Softmart	13
18	SofTouch Systems	Cover 2
29	Spitfire Software	12
19	Stardock Systems	20
14	TechBridge Technology Corp.	17
25	The 32-Bit Alliance	11

mission-critical operations where large volumes (greater than 500 megabytes) and a large number of files are used. HPFS has many advantages over FAT, such as more efficient data organization on the disk and some fault-tolerant capabilities. The bottom line is that, unless you need to boot to real DOS on the hard disk, you should probably be using HPFS.

The installation gives you the option of reformatting your drive. If you decide not to reformat your drive and you already have a desktop in place, the installation utility automatically migrates your existing OS/2 desktop, settings, and applications into OS/2 Warp Server.

If you are changing the file system type from FAT to HPFS or if you just want a clean start on the disk, you will want to reformat your drive. The upside of formatting is that you always get a clean start, but the downside is that you lose all of the programs and data on that disk–formatting is a one-way trip to oblivion for any existing data on your disk!

HPFS386 Upgrade in OS/2 Warp Server Advanced

If you already have HPFS on your machine and you are installing OS/2 Warp Server Advanced, the installation utility automatically upgrades your file system from HPFS to HPFS386.

After OS/2 Warp Server Advanced is installed, you will want to create a 386 HPFS recovery diskette. The 386 HPFS recovery diskette replaces the OS/2 Warp Install Diskette 1. This new diskette allows you to access HPFS386 disk partitions.

To create this diskette, insert the OS/2 Warp Server CD number 1 into the CD-ROM drive. Open the System Setup folder and double-click on the "Create 386 HPFS Diskette" icon. When prompted, insert a blank 1.44 MB diskette and press Enter to create the diskette. Save this diskette in a safe place.

Warning! You may feel that you won't need the 386 HPFS diskette, but you will get a rude surprise if you attempt to repair your hard disk with the original installation diskettes. When you boot from the original OS/2 Warp Server installation diskettes, there may appear to be little or nothing on your hard disk. Furthermore, you may find your ability to make changes on the HPFS386 volume extremely limited due to access controls on the disk(s). (You'll be in an equally bad situation if you attempt to use the OS/2 Warp Utility diskettes from another OS/2 Warp system.)

If you don't create a 386 HPFS recovery diskette and you ever need to boot from diskettes, your only recourse is to find another system running OS/2 Warp Server Advanced and create the 386 HPFS diskette on that system.

HPFS386 is an upgraded version of the venerable HPFS that ships with OS/2 Warp. Whereas HPFS limits entries in an access control list to 64, HPFS386 has no limit. HPFS386 also has structural implementation details that allow it to run closer to the operating system and thereby run faster (technically, HPFS386 runs at processor Ring 0 privilege for tighter integration with the LAN adapter, which also runs at Ring 0; the result is faster network responses to disk requests).

Who Are You?

The next part of the installation (shown in Figure 2) prompts you for your name and information regarding your work. This information is used to automatically create unique names for your OS/2 Warp Server machine. As mentioned earlier, while these names are created for your convenience, I strongly recommend that you verify them (you will see how to do this shortly). Check that the automatically created names conform to your corporate standards. For example, your server might need to be called "S1234xx" instead of the name OS/2 Warp Server gives it.

For future reference, if you decide to reinstall at some point (without reformatting) and neglect to fill in this information, OS/2 Warp Server will remember and use your most recent settings.

Hint! In OS/2 Warp Server's initial release, the information fields are very narrow (especially the company name field). Therefore, don't be too surprised if you have to abbreviate in some of the fields.

Base or Advanced OS/2 Warp Server?

Two versions of OS/2 Warp Server are available: the base version and OS/2 Warp Server Advanced.

The base version is suitable for servers with 100 or fewer users.

The Advanced version is designed for servers used by up to 1,000 users. The Advanced version accommodates more users by providing HPFS386 and fault-tolerance features that are not available in the base version.

There is also a First Step package consisting of the base OS/2 Warp Server and licenses for 10 OS/2 Warp Server clients.

What's on the Menu?

Now that you have told OS/2 Warp Server about yourself and your company, you are presented with a dialog box showing what is and isn't installed (see Figure 3). In Figure 3, you can see that I installed almost everything there is to install.

If you need to change any component settings within OS/2 Warp Server, make certain that you check the box to the left of the service that will require review or changes; you will be able to change settings after you close (confirm) this dialog box.

If you want to add or delete something, first check the service and then click on the "More . . ." button to the right of the service. By making changes in the dialog(s) that appear after you click on the "More . . ." button, you can control the installation or removal of components within services in OS/2 Warp Server.

After you complete your selection(s), click on the OK button to proceed. If you made mistakes and realize that you do not want the selections to take effect, just click on

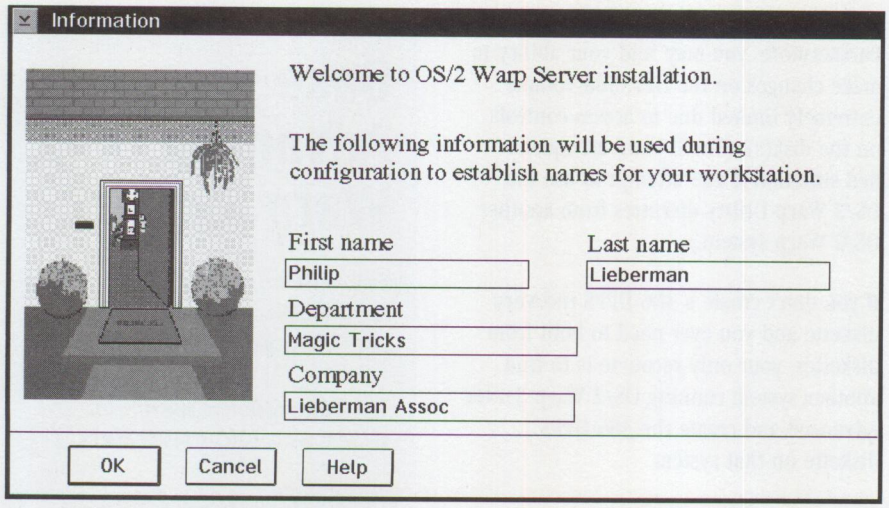


Figure 2. Tell Us About Yourself

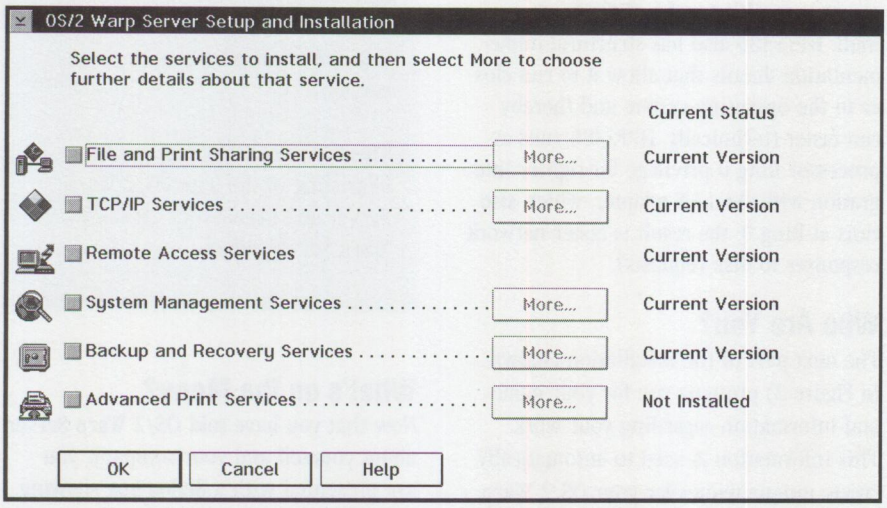


Figure 3. What Would You Like to Add to OS/2 Warp Server?

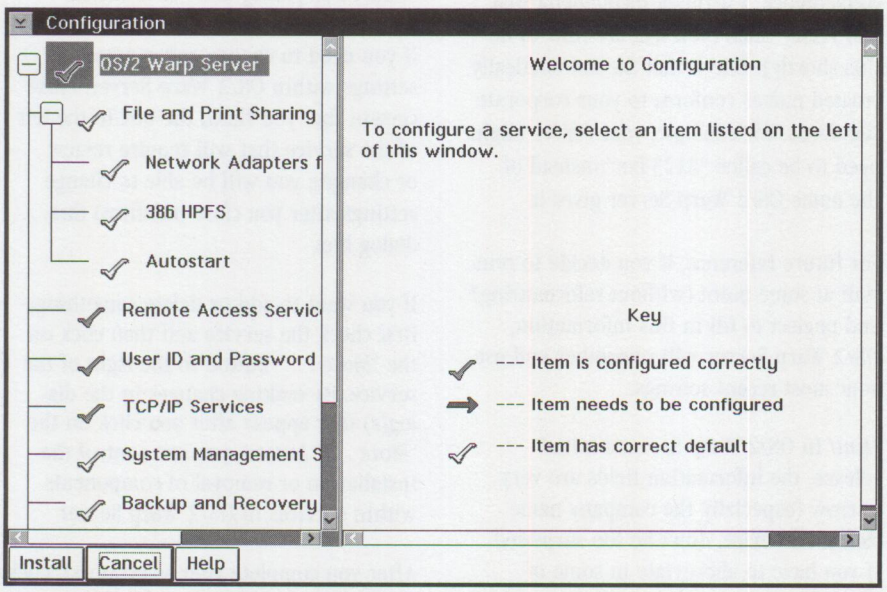


Figure 4. Configuring Services in OS/2 Warp Server

the "Cancel" button, and you will return to the previous panel (who were you again?).

You Say Tomato, I Say Potato

Once you have selected the services you want to add (or to modify, if this is not your first installation), the OS/2 Warp Server installation utility constructs a dialog similar to that shown in Figure 4. This dialog is divided into left and right panels. The panel on the left is an outline view of the services previously selected for change (add/delete/modify). The trick to configuring OS/2 Warp Server properly is to select each of the entries, then confirm that the panel on the right reflects your preferences.

This is the part of the installation where you must pay close attention. Notice that the outline view (the tree structure of available options on the left side of the window) contains two types of check marks—solid and empty—and a red arrow, as shown in the key on the right side of Figure 4. Each check mark and arrow that you choose in the left panel corresponds to a series of settings that will appear in the right panel.

The solid red arrow represents setting(s) that must be configured. A hollow check mark means that the installation program selected some sort of default setting for you. When you click on a hollow check mark, the right part of the panel changes to present the details of the setting. If you move to another check mark or arrow, the setting that you reviewed turns to a solid aquamarine check mark (as long as the settings are reasonable).

Use the default settings in the "advanced" installation at your own risk. They may not conform to your corporate naming standards; also, the installation program may not have identified all the hardware needed for OS/2 Warp Server operation.

If you use the "easy" installation path, you will be methodically presented with each default setting, shown in its own dialog window. Each dialog window requires either a confirmation or a change of the value(s) and then a confirmation (click on the OK button). "Easy" installation is designed for the new administrator, so that the most common installation configurations can be accomplished with the least trouble. The "advanced" configuration

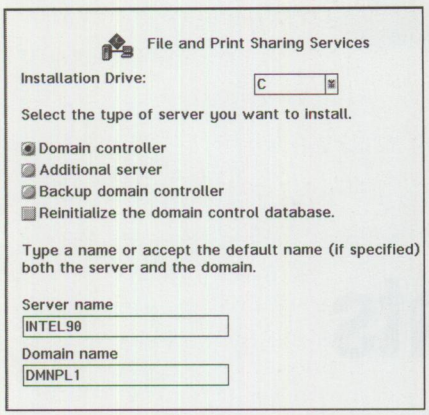


Figure 5. Domain Configuration Option

gives you complete flexibility and the ability to add and configure all of OS/2 Warp Server's features, although you must be more diligent in checking and configuring your particular installation.

Configuring the Domain

The most important setting is the "File and Print Sharing" check mark. When you select the "File and Print Sharing" check mark in the left panel, the right panel will appear similar to the one in Figure 5.

If this machine is the first in the domain, then you should select its role as domain controller. In all cases, you should make sure that you are happy with the domain name as well as the name of the server about to be installed.

It is important that all of the machines in the domain refer to the same domain name. Also, all of the servers on the network must have unique server names. Having two servers with the same name, even if they are in separate domains, will cause severe operating problems!

Before you add more servers or backup domain controllers, your primary domain controller must be fully functional and available to the other servers in the domain. One of the first things that happens when the servers are installed is that they synchronize with the primary domain controller; therefore, if there is no primary domain controller, installation will not occur properly on the member servers. By the way, you can have only a single primary domain controller per domain.

You may be wondering about the "Reinitialize the domain control database" option. If the machine on which you are installing was the domain controller, then you would normally want to migrate all of the domain information into OS/2 Warp Server. To enable migration of the domain information, you must turn off this check box. You also want to keep this check box clear if you are reinstalling the software on the domain controller (in case you accidentally erased some critical files). If this is the first domain controller in a new domain, or your account database is hopelessly corrupted, then you should check the box.

Once you have chosen the names of the servers and domains, as well as the role for each machine, you then go through the other check marks, verifying the adapter settings and other settings, depending upon what you selected for installation.

After you check all of the settings, click on the "Install" button. At this point, give yourself a pat on the back–that's all there is to the installation!–and go get a cup of coffee. In about 30 to 45 minutes, and after numerous automatic reboots, OS/2 Warp Server will be up and running, with no further work on your part.

Simplicity!

OS/2 Warp Server provides a single, consistent interface for the installation and configuration of OS/2 Warp, LAN Server, LAN Distance, IBM SystemView, TCP/IP, and more. In this article, you went through the process, from creating the kicker disks to configuring and installing OS/2 Warp Server. Pretty simple, isn't it?

Philip Lieberman is a well-known author, lecturer, and consultant. Phil is also the owner of Lieberman and Associates, which produces the LAN Intensive Care Utilities for IBM LAN Server and now for OS/2 Warp Server. His organization also provides end-user support, corporate software development, and all types of training services for OS/2 and OS/2 products. Phil can be reached at:

Lieberman and Associates
221 N. Robertson Blvd., Suite C
Beverly Hills, CA 90211
Phone: (800) 829-6263 or (310) 550-8575
Fax: (310) 550-1152
BBS: (310) 550-5980
CompuServe: 76426,363
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OS/2 Warp Server Performance Highlights and Tuning Tips

This article updates the performance capabilities of LAN Server 5.0, a key component of OS/2 Warp Server. It features the OS/2 Warp Server Tuning Assistant, a utility that assists a LAN administrator in configuring and tuning a system for optimum performance when several OS/2 Warp Server services (applications that come with OS/2 Warp Server) will coexist in that system.

Ken Whitfield
IBM Corporation
Austin, Texas

OS/2 Warp Server integrates several key IBM networking products into a single package. These products include file and print sharing services, systems management services, remote access services, backup and recovery services, advanced print services, and Internet networking connectivity. OS/2 Warp Server will extend OS/2's industry leading market share of application server installations with these additional functions.

The file and print sharing services, also known as LAN Server 5.0, are the cornerstone of OS/2 Warp Server; they provide the basic file and print sharing services needed in practically all network environments.

As a starting point in discussing LAN Server 5.0's performance capability, you might want to read the LanQuest Labs report, dated October 1994, in which LanQuest compared, evaluated, and reported its findings on LAN Server 4.0, Windows NT Server 3.5, and NetWare 4.02. LanQuest found that IBM LAN Server 4.0 was faster than the other two products in running a set of tests with industry-standard applications and scripts. (For a copy of this report, call [800] IBM-4FAX and request document 2014.)

IBM employed these same tests while developing and testing OS/2 Warp Server. The hardware that IBM used was not identical to the hardware used in the LanQuest Labs report, so LAN Server 4.0 was run on the new hardware to provide an accurate basis for comparison.

These new tests showed that LAN Server 5.0 was faster than LAN Server 4.0 by 14 percent at the 400 equivalent client load and by 13 percent at the 800 equivalent client load. This improvement is attributed to better integration with OS/2 and additional improvements in OS/2 Warp print performance.

DOS TCPBEUI Protocol Stack

In addition to LAN Server 5.0's improvement in file and print performance, a major improvement was made to the DOS LAN Services (DLS) client's TCP/IP performance. A completely new DOS TCPBEUI protocol stack is included with the DLS client shipped with OS/2 Warp Server. It is integrated in the installation procedure and is as easy to install as NetBEUI or LAN Support Program (LSP).

TCPBEUI is software that intercepts NetBEUI protocol functions and maps them into TCP/IP protocol functions. This enables LAN Server and its clients to use TCP/IP wide area connectivity, even though both server and client normally use the NetBEUI protocol to control data flow over the network. The disadvantage to this technique is the additional overhead and the resulting performance impact of mapping from NetBEUI protocol to TCP/IP protocol, and vice versa.

The TCPBEUI protocol stack shipped with the DLS client in LAN Server 5.0 is dramatically improved over the one in LAN Server 4.0. Whereas LAN Server 4.0 was able to support only 40 equivalent clients running the DLS 4.0 client TCPBEUI protocol stack, LAN Server 5.0 has been tested up to a load of 800 equivalent clients with no functional problems.

The performance of the new DLS client TCPBEUI protocol stack is extremely good. When running the file and print application tests used in LanQuest Labs' report, DLS clients running the new TCPBEUI protocol stack can run as much as four times faster than the DOS TCPBEUI protocol stack shipped with LAN Server 4.0. Under a moderately heavy server load, DOS TCPBEUI is approximately 25 percent slower than NetBEUI.

LAN Server must also be running the TCPBEUI protocol to communicate with DLS TCPBEUI clients. Although some additional CPU workload is placed upon LAN Server when compared with running the NetBEUI protocol, this workload is usually insignificant, because file and print servers normally under-utilize the CPU resource.

Because file and print servers are usually under-utilized, in most cases you won't be able to distinguish TCPBEUI performance from that of NetBEUI. This means that dual protocol stacks are not necessary to maintain good local performance along with wide area connectivity, so valuable memory can be saved in DOS machines.

Another significant addition to the DLS client for LAN Server 5.0 is a TCP/IP protect mode stack that runs under Windows 3.1 or Windows 95. Like TCPBEUI, it provides TCP/IP wide area connectivity, but with the additional benefit of requiring no conventional memory.

IBM OS/2 Warp Server Tuning Assistant

The OS/2 Warp Server Tuning Assistant is an extension of the LAN Server 4.0 Tuning Assistant. (See the article "LAN Server 4.0 Performance, Capacity Enhancements, and Tuning Tips" in *Personal Systems* magazine, May/June 1995, for a description of the LAN Server 4.0 Tuning Assistant.) In LAN Server 5.0, the Tuning Assistant is extended to allow system configuration and tuning when additional OS/2 Warp Server services will coexist with the LAN Server 5.0 file and print services. Note that the Tuning Assistant is installed and available only if the file and print services are installed.

The Tuning Assistant can assist you in two important tasks. It can allocate NetBIOS resources among the various installed services as well as among other installed OS/2 applications. It can also efficiently allocate system memory between the various services and other applications to provide good overall system performance.

The Tuning Assistant is executed without user input when the install process completes, and it automatically configures the system's NetBIOS resources and memory. When you install OS/2 Warp Server, the system is configured to provide good performance in most environments, but it may not be optimal for your particular needs.

Hint: Launching the Tuning Assistant enables you to define the requirements for services and applications running on the system, including NetBIOS and memory resources for applications not included in OS/2 Warp Server. Custom tuning your system this way provides the best system performance.

Additional information, such as the number of clients to be supported by certain services, provides even more detail to aid configuration and tuning. When Tuning Assistant knows this information, it can calculate new values for key parameters, then update the system's configuration files when you are satisfied with the results. The system always makes backup copies of all configuration file changes.

The changes that Tuning Assistant makes to system configuration files improve systemwide performance most of the time. To obtain the best results, however, you must be prepared to provide accurate memory and NetBIOS data for the various installed applications.

Solving NetBIOS Restrictions with Tuning Assistant

NetBIOS has existed since the earliest PC networking days. Its architecture did not anticipate some of the changes that occurred when networks expanded into enterprise and global geographical entities. For example, NetBIOS limits a system to only two network interface cards (NICs) with a maximum of 254 sessions per NIC. These limits were extended to four NICs and 1,016 sessions with the advent of busmaster NICs, which allow up to four NICs per system using LAN Server for file and print sharing.

This section discusses some additional NetBIOS restrictions and how they are handled in OS/2 Warp Server. A clarification of terminology will help in understanding the following material.

NetBIOS is an application programming interface (API), not a protocol. Along with this API, an underlying network protocol is required; implementations include NetBEUI, LAN Support Program (DXMJ0MOD), NetBIOS over TCP/IP, etc. Unless otherwise stated, NetBIOS in this article refers to both the API and the protocol. Reference is also made to the NetBEUI protocol to discuss specific data structure considerations.

Constraints of the NetBEUI Data Segment

One NetBIOS restriction that must be addressed is that the size of a certain set of parameter data structures cannot exceed 64 KB, since some of the NetBIOS code uses 64 KB memory segments. The NetBEUI 64 KB segment can cause problems if the combination of these parameters exceeds 64 KB, which results in a configuration where NetBIOS will not start until the values of some of the parameters are reduced. The NetBEUI data segment's content and default values in OS/2 Warp Server are shown in Figure 1.

Some of the NetBIOS code has been rewritten to eliminate some 64 KB segment restrictions. For example, during NetBIOS initialization, a message may appear saying that a 32-bit data segment is being used. The NetBEUI parameters `sessions` and `namecache` have been moved from 64 KB data segments to larger data segments.

Because several OS/2 Warp Server services use NetBIOS resources, you might expect that NetBIOS configuration could be problematic. The design approach for NetBIOS configuration was to set the critical NetBEUI parameters to their maximum values within the constraints of the 64 KB data segment size. The NetBIOS resources are allocated to the various services as shown in Figure 2.

Figure 2 mentions LAN Server Advanced. OS/2 Warp Server is also available as OS/2 Warp Server Advanced, which includes LAN Server Advanced. LAN Server Advanced's additional functions include:

- High-Performance File System (HPFS386)
- Improved file and print performance and capacity
- Fault tolerance via disk mirroring
- Per-user disk limit management capability

Readers experienced with NetBIOS might observe that the installation of LAN

NetBEUI Parameter	Value (bytes)	Data Size (bytes)	Total Size
Commands (NCBs)	254	64	16,256
Names	42	76	3,192
Packets	330	108	35,640
Selectors	15	10	150
Datagrampackets	10	124	1,240
Looppackets	8	148	1,184
Overhead			7,620
Total			65,282
Maximum Size			65,535

Figure 1. NetBEUI 64 KB Data Segment

Service	Sessions	Commands	Names
Remote Access	9	27	1
Systems Management (Software Distribution Client option)	5	51	7
Systems Management (Software Distribution Server option)	29	94	8
LAN Server	32	50	18
+ Network SignON Coordinator	8	8	2
LAN Server Advanced	100	220	18
+ Network SignON Coordinator	8	8	2

Figure 2. Default NetBIOS Resource Allocations

Server Advanced and either version of systems management services requires more NetBIOS commands than are available on a single NIC (254). This is where Tuning Assistant comes into play.

When you start the Tuning Assistant, it examines a configuration file, `WSCONFIG.CFG`, looking for the keyword `AllProducts`, then it parses that line to identify the services installed in the system where Tuning Assistant is being executed.

It then reduces the LAN Server Advanced NetBIOS resource requests in the `net1` line of the `IBMLAN.INI` file by an amount sufficient to allow the other installed services to obtain the resources specified in Figure 2.[1]

Because LAN Server's requester (LAN Requester) component is an OS/2 installable file system, it loads and initializes during system configuration. This initialization includes requesting the NetBIOS resources specified in the `IBMLAN.INI` `net1` line from the total available NetBIOS resources, which are defined in the `PROTOCOL.INI` file. Consequently, the total NetBIOS resources available for other NetBIOS applications can be restricted by the LAN Requester's resource specification.

Constraints of the NetBIOS Data Segment

A second data segment restriction specific to the NetBIOS API must be addressed if the system configures NetBIOS to use more than two NICs. This 64 KB data segment is used to keep information about commands, also referred to as network control blocks (NCBs). The formula in Figure 3 shows the condition to be satisfied to ensure that the total amount of data to be kept in the 64 KB NetBIOS data segment does not exceed its capacity of 65,535 bytes.

Tuning Assistant incorporates routines that check both the NetBEUI and NetBIOS 64 KB data segments. If the parameter settings for the NetBEUI data segment exceed 64 KB boundary, the parameter's `packets` and `names` will be reduced until the limit is no longer exceeded. `Packets` was chosen to be reduced because it is the biggest overall contributor, and the resulting performance impact is negligible. `Names` was chosen to be reduced because most NetBIOS applications use very little of this resource.

If the combination of NetBIOS NCBs, Requester NCBs, NetBIOS Bindings, and Requester Bindings causes the NetBIOS data segment to exceed the 64 KB boundary, Tuning Assistant increases the values of the `x2` parameters in the `net1, net2, ...` lines of the `IBMLAN.INI` file. Increasing the number of Requester Bindings, as shown in lines 4 and 5 of Figure 4, produces the same effect as increasing the value of `x2`—that is, it increases the Total Requester NCBs, which then reduces the amount of data to be contained in the NetBIOS 64 KB data segment (see the formula in Figure 3). Approximately 456 NCB data structures can be stored in this data segment when NetBIOS has bindings to four adapters; you may use this value for estimation purposes.

Configuring the 64 KB NetBIOS data segment can become quite complex, because there are many combinations of services that may be installed, possibly using different NICs as well as different ways of binding LAN Distance Connection Server to LAN Server. Tuning Assistant addresses these situations and configures NetBIOS resources for proper operation and good performance.

[1]During a re-installation of OS/2 Warp Server, the `SYSVIEW.CFG` file is examined to determine whether a software distribution client or server is installed.

If you have special configuration needs, a use-as-is utility tool, TUNENB.EXE, is available that lets you quickly experiment with different values of the parameters that affect both the NetBIOS and NetBEUI 64 KB data segments. To obtain TUNENB.EXE, download the self-extracting pkzip file TUNENBZP.EXE using anonymous FTP from ftp software.ibm.com in the directory /ps/products/lan/tools.

OS/2 Warp Server Memory Allocation

OS/2 Warp Server, in addition to including the base OS/2 Warp operating system, offers the ability to run many services, of which all or any combination may be installed and active on a system.

Since memory is a limited and expensive resource that can dramatically affect performance, you must understand the various services' memory requirements to properly size the system. Figure 5 shows the memory requirements for an operational system. The memory values are "working-set" numbers, meaning that the specified amount of memory was touched (used) during a defined time period. For each service, the memory values were measured when only that service was active and performing its typical functions. The memory requirements in Figure 5 should be considered minimum requirements, because the number of active clients was not large.

You should size your system memory requirements by adding the memory requirements for the base operating system plus each service that will be concurrently active. A generous allowance for file-system cache is important for good file and print sharing (LAN Server) performance. (See the document titled *IBM OS/2 Warp Server Up and Running: Planning Overview*, which accompanies the OS/2 Warp Server product, for more information about system memory sizing.)

Another important Tuning Assistant function allocates as much memory as possible to the file-system cache LAN Server is using.

Recall that when Tuning Assistant starts, it determines the amount of memory in the system, examines the configuration file (WSCONFIG.CFG) for the keyword AllProducts, and parses that line to identify the services installed on that system. Tuning Assistant conservatively assumes that all installed services will be active concurrently and sets aside the memory specified in Figure 5 for the identified services. Most of the remaining system memory is then assigned to the file-system cache.

Tuning Assistant changes the appropriate configuration files to set the cache size. This approach should provide enough memory for all installed services to run well (assuming that the system memory is properly sized), with LAN Server performance only minimally affected by a reduced file-system cache size. Tuning Assistant issues a warning message if the installed system memory is insufficient.

Caution: If you intend to run additional applications on your system, or will be providing services for a substantial number of clients, you must provide application memory information to Tuning Assistant to avoid too much memory being assigned to the file-system cache. You will know this has occurred if your system slows down when loading and executing applications as a result of memory being swapped out to disk. See the section titled "Using Tuning Assistant to Reserve Memory for Applications" later in this article.

(Total NetBIOS NCBs - Total Requester NCBs) * 95
+ (Total NetBIOS NCBs - Total Requester NCBs - 15) * 15
+ (NetBIOS Bindings) * 990
- (Requester Bindings) * 990
+ 11310

must be less than or equal to 65,535.

- *Total NetBIOS NCBs* is the value of NCBs in the PROTOCOL.INI file multiplied by the number of NetBIOS bindings to NICs (also called network adapter cards). See NetBIOS Bindings below for more detail.
- *Total Requester NCBs* is the sum of the x2 parameters on the net1, net2, ... lines in the IBMLAN.INI file.
- *NetBIOS Bindings* is the number of bindings of NetBIOS to NICs and is equal to the number of drivers specified in the Bindings = line in the NetBEUI section of the PROTOCOL.INI file. The LAN Distance PDFH_nif driver, the TCPBEUI_nif driver, and the IPXNB_nif driver count as bindings in this parameter.
- *Requester Bindings* is the number of LAN Requester bindings to NICs and is equal to the number of net1, net2, ... lines in the IBMLAN.INI file.

Figure 3. Formula to Ensure No Data Overflow

Total NetBIOS NCBs	Total Requester NCBs	NetBIOS Bindings to NICs	Requester Bindings to NICs	Total (Using Formula in Figure 3)
254 x 1 NIC	100 x 1 NIC	1	1	29,015
254 x 2 NICs	100 x 1 NIC	2	1	57,211
254 x 3 NICs	100 x 1 NIC	3	1	86,875 *
254 x 3 NICs	100 x 2 NICs	3	2	73,895 *
254 x 3 NICs	100 x 3 NICs	3	3	61,905
191 x 3 NICs	100 x 1 NIC	3	1	65,095

** Exceeds 64 KB limit and would prevent NetBIOS from initializing.*

Figure 4. Examples of 64 KB NetBIOS Data Segment Calculations

Operating System	Mem. Req. (in MB)
Base Operating System (OS/2 Warp)	4.0
Services	**Mem. Req. (in MB)**
Remote Access (LAN Distance Connection Server)	3.3
Systems Management (SystemView)	6.7
Backup and Recovery (Personally Safe and Sound)	1.9
Advanced Print (Print Services Facility)	1.8
File and Print Sharing (LAN Server 5.0)	6.1
File and Print Sharing – Advanced (LAN Server 5.0 Advanced)	7.1

Figure 5. IBM OS/2 Warp Server Memory Requirements

Customizing Your System Memory Allocation

It is likely that many OS/2 Warp Server installations will not run all the installed services concurrently. If this is your situation, you can improve your system's file and print sharing performance by increasing the size of the file-system cache. Tuning Assistant's flexibility helps you accomplish this.

Start Tuning Assistant and click on the new Services tab. There, you see check boxes for "LAN Distance Connection Server" and for "Administrator Console." Tuning Assistant places a check in these check boxes when it determines that these services are installed on the system. You can tell Tuning Assistant not to reserve memory for these services by removing the check in either or both check boxes as appropriate for your system.

To verify that memory is no longer reserved for this service(s), click on the Test Data tab and watch the APP RAM memory value change. The result is an increased file-system cache size and better file and print sharing performance.

The backup and recovery services and the advanced print services are not externalized in Tuning Assistant. If these services will not be concurrently active on the OS/2 Warp Server system, you can manually edit the file-system cache configuration files to increase the cache size by increasing the appropriate memory value(s) shown in Figure 5.

Reserving NetBIOS Resource for Applications

You can use Tuning Assistant to reserve NetBIOS resource and memory for other applications that you want to run on your OS/2 Warp Server system. Click on the "Tuning Assistant Services" tab, then click on the right arrow to turn pages to view the names of other applications that you may have installed. Most of these application selections existed in the previous Tuning Assistant version but are not integrated into Tuning Assistant as well as the OS/2 Warp Server services are integrated. For the most part, reserving NetBIOS resources is the only effect of clicking on these application check boxes.

Clicking on the "Lotus Notes on Server" check box causes Tuning Assistant to increase both `x1` and `x2` in the `net1` line in the `IBMLAN.INI` file by the amount specified in the "Maximum Concurrent Users" entry field. The total is evenly divided if there are multiple `net` lines (bindings to NICs). The default protocol for Lotus Notes is NetBIOS, which actually uses LAN Requester's resources instead of going directly to NetBIOS; consequently, LAN Requester's resources are increased to accommodate Lotus Notes.

It is possible that Lotus Notes is configured to use actual NetBIOS resources; Lotus Notes calls that protocol EENB. If that is your situation, you should use the "Other NetBIOS Applications" check box (described later in this article) instead of the "Lotus Notes on Server" check box.

The "LAN Server Ultimedia" check box added to this release of Tuning Assistant enables that product to be easily configured. Clicking on its check box affects only parameters in a LAN Server 5.0 Advanced file, `HPFS386.INI`.

The changes made to the `HPFS386.INI` file specify how many big buffers to allocate when the file system is started. You can use the "Maximum Concurrent Users" entry field to increase the value for the `fsprealloc` parameter in the `HFPS386.INI` file from its minimum of two big buffers at start time to the minimum plus the value entered in the "Maximum Concurrent Users" entry field.

If the "Dedicated Ultimedia Server" pushbutton is on, the 386 HPFS cache size is set to its minimum value to make all memory available for multimedia file transfer. *Caution:* If your system will be supporting normal file and print sharing functions, the "Ultimedia and File Server" pushbutton *must* be on to avoid severe performance degradation caused by the minimum file-system cache.

Note: For more information about the `fsprealloc` and `srvprealloc` parameters, use a text editor to view the comments in the `HPFS386.INI` file.

Clicking on the "LAN Network Manager on Server" check box or clicking on the "Communications Manager/2" check box causes parameter changes only in the `LANDD_nif` section of the `PROTOCOL.INI` file. This has no effect on Tuning Assistant's NetBIOS or memory allocation algorithms.

Clicking on the "DB2/2 on Server" check box causes Tuning Assistant to set aside 45 NCBs, plus the total number of sessions specified in the two entry fields for "Number of DOS and OS/2 Requesters," for the DB2/2 product to use. As a result, you will probably observe a decrease in the `x1` and `x2` parameters in the `net1, net2, ...` lines of the `IBMLAN.INI` file. This decrease is intended to reduce the NetBIOS resources claimed by LAN Requester at initialization, so that a sufficient amount will be available when DB2 is started. This scheme is based upon an older version of DB2 than is now available, and it may not be the best way to configure your system for DB2. The following section outlines another method that should yield better results.

From the "DB2 on Server" check box, one more right-arrow click brings up a panel with a check box labeled "Other NetBIOS applications." Under this check box are the entry fields: "Number of Commands," "Number of Sessions," and "Number of Names." I strongly recommend that these entry fields be used to identify to Tuning Assistant any NetBIOS requirements for products or applications that are not OS/2 Warp Server services. (Those requirements should be available in the products' or applications' specifications.) Tuning Assistant uses the values given for commands, sessions, and names in its calculations and makes adjustments accordingly.

Since sessions and NCBs (commands) are already set at their maximum value of 254, additional requirements must be satisfied by a reduction in the LAN Requester's NetBIOS resources, i.e., a decrease in the `x1` and `x2` parameters in the `net1` line of the `IBMLAN.INI` file. If more than 254 sessions or commands are needed to satisfy the new requirements and to maintain reasonable performance for LAN Server, Tuning Assistant displays a warning message that says additional adapters are recommended.

Most NetBIOS applications use very few of the names resources. If your product or application specification requires a lot of names, you should be aware of the following detail.

Earlier in this article, I described the NetBEUI 64 KB data-segment constraint. Figure 1 shows that `names` is one of the parameters that must be stored in this data segment. An increase in `names` must be accompanied by a decrease in one of the other parameters. Tuning Assistant uses an algorithm that takes the initial values of `packets` and `names` and alternately reduces one, then the other, until the 64 KB limit is satisfied. This means that you must specify a larger value for `names` than you actually need. Tuning Assistant's trial calculations provide an easy way to zero in on the right number.

Configuring NetBIOS resources for additional applications is more complicated when multiple NICs are used in the system. Tuning Assistant can determine how the OS/2 Warp Server services are configured to the NICs but has no provision to obtain this information about additional applications. Consequently, it configures the NICs as though the applications were using all of them.

Tuning Assistant must also ensure that the NetBIOS 64 KB data-segment constraint is satisfied. For this reason, you may see unexpected values for `x1` and `x2` in the `net1, net2, . . .` lines of the `IBMLAN.INI` file. To improve LAN Server 5.0 performance or capacity, you can modify the `net1, net2, . . .` lines in the `IBMLAN.INI` file, after Tuning Assistant has been run, with values that satisfy the formula given in Figure 3.

Using Tuning Assistant to Reserve Memory for Applications

Clicking on the Server major tab, then clicking twice on the right arrow brings up a panel that enables you to reserve memory in your system for applications not included in OS/2 Warp Server.

Click on the "Support user logged on to the server" check box. After determining (by consulting the specifications) how much application memory is needed, you can enter the amount of memory into the "Application Reserve Memory" entry field. Tuning Assistant adds this value into its calculations to determine how much of the system memory is available to assign to file-system cache. I strongly recommend that you use this entry field to identify to Tuning Assistant the memory requirements for the additional applications that will be running on an OS/2 Warp Server system. You should also use the "Application Reserve Memory" entry field when any of the OS/2 Warp Server services will be running in a multi-client configuration that requires more memory than that specified in Figure 5.

A final point about application memory specifications: Often, the numbers are given as a total-system size rather than working-set size. If this is your situation, the memory specification may be reduced by 4 MB, the size of the base operating system, to approximate the working set. The working-set number will give Tuning Assistant a more appropriate value for properly tuning and configuring the system.

Tips About Other Changes from LAN Server 4.0 to OS/2 Warp Server

The following sections contain information about enhanced features of LAN Server 4.0 contained in OS/2 Warp Server.

New 386 HPFS Default Cache Size

The calculation to determine the default value for the 386 HPFS cache (`cachesize`) has been changed. Previously, if less than 20 MB of memory was available after OS/2 Warp and LAN Server were loaded, then 20 percent of the available memory would be assigned to `cachesize`. But if more than 20 MB of memory was available, then 60 percent of that memory would be assigned to `cachesize`.

To provide a more consistent increase in `cachesize` with increases in system memory, the default `cachesize` is determined as shown in Figure 6.

Available memory is determined by the 386 HPFS file system software at initialization and is the total system memory minus OS/2 Warp memory requirements (about 4 MB) and LAN Server 5.0 Advanced memory requirements (about 7 MB).

Hint: This default 386 HPFS cachesize will be replaced at the completion of the installation process by the value that Tuning Assistant calculated for cachesize. To obtain the values given in Figure 6, you must remove the cachesize parameter from the `HPFS386.INI` file.

24-Bit DMA Questions Eliminated

The LAN Server 4.0 (Advanced only) installation procedures included two panels that asked the user to indicate if the system contained any network adapter cards (busmaster type) and disk adapter cards that supported 24-bit direct memory addressing (DMA). If you were unsure and accepted the default response, then performance would not be optimum in a system that had the required 24-bit DMA adapters. (*Note:* The likelihood of your system having either a busmaster-type network adapter or a disk adapter that does not support 24-bit DMA is very small.)

The IBM OS/2 Warp Server installation procedure does not ask these questions

Available Memory	386 HPFS Cachesize
0 MB - (4 MB minus one byte)	256 KB
4 MB - (6 MB minus one byte)	506 KB
7 MB - (8 MB minus one byte)	838 KB
9 MB - (10 MB minus one byte)	1,222 KB
11 MB - (12 MB minus one byte)	1,652 KB
15 MB - (16 MB minus one byte)	2,630 KB
19 MB - (20 MB minus one byte)	3,748 KB
23 MB - (24 MB minus one byte)	4,992 KB
27 MB - (28 MB minus one byte)	6,350 KB
31 MB - (32 MB minus one byte)	7,812 KB
32 MB - (96 MB minus one byte)	(available memory minus 24 MB)
96 MB + (available memory * 0.75)	

Figure 6. Default 386 HPFS Cachesize in LAN Server 5.0 Advanced

Parameters:

```
/D:Domain name          /M:xxx
/S:Server name          /A:x
/T:Server type          /U
/P:Package type
```

Example:

```
WSTUNE /D:DOMNAME /S:SRVNAME /T:DC /P:ADVANCED /M:32 /A:2 /U
```

- `Domain name` is used only to display a domain name on the first panel.
- `Server name` is used only to display a server name on the first panel.
- `Server type` is either `AS` for additional server or `DC` for domain controller.
- `Package type` is either `Entry` or `Advanced`.
- `/M:xxx` is the memory in MB.
- `/A:x` is the number of adapters being used by LAN Server (1 to 4 only).
- `/U` specifies to use user-supplied files. The possible user-supplied files are:
  - `CONFIG.SYS`–Cache settings (`x:\boot` drive)
  - `IBMLAN.INI`–LS settings (`x:\ibmlan` directory)
  - `PROTOCOL.INI`–MPTS settings (`x:\ibmcom` directory)
  - `HPFS386.INI`–HPFS386 settings (`x:\ibm386fs` directory)
  - `WCLLOCAL.INI`–LAN Distance settings (`x:\wal` directory)
  - `WSCONFIG.CFG`–OS/2 Warp Server install settings (`x:\os2\install` directory)
  - `SYSVIEW.CFG`–SystemView settings (`x:\os2\install` directory)

Figure 7. Tuning Assistant Parameters

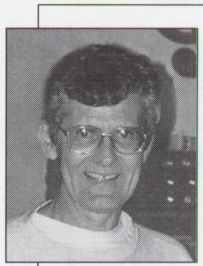
but instead automatically detects known network adapters of this type, and during the installation process posts an error message warning of the reduced performance. A disk adapter that does not support 24-bit DMA cannot be detected during the installation process but will be detected and reported when LAN Server 5.0 Advanced is started. Instructions for remedial actions are provided in the error message.

Updated Tuning Assistant Command-Line Options

Figure 7 lists parameters you can use when executing the Tuning Assistant program (`WSTUNE.EXE`) from the OS/2 command line in the `\IBMLAN` subdirectory.

If `/U` is used on a system with no LAN Server installed, then the `/T` parameter must also be used. This is because Tuning Assistant uses a net API call to determine server type, and if no server is installed, the API fails.

User-supplied files must be in the same directory as `WSTUNE.EXE`. If the "Apply" pushbutton is pressed, these files are changed and no backups are created.



Ken Whitfield is a senior programmer in LAN Systems Performance, IBM Personal Software Products division, Austin, Texas. He was the lead performance analyst for OS/2 Warp Server and for several LAN Server releases and has analyzed the performance of LAN products since 1987. Most of his IBM career, which began in 1964, has been in hardware development in Austin, including the Memory Typewriter, Office System 6, Displaywriter, and various IBM PC features. Ken has a BS degree in Electrical Engineering from the University of Tennessee. His Internet ID is whitfiel@austin.ibm.com.

TCP/IP CID Client/Server Setup Procedure

This article provides a step-by-step procedure for building a TCP/IP OS/2 remote installation code server using the LAN CID Utility (LCU) as the software distribution manager (SDM). NetBIOS is not being used! The procedure guides you through installing the TCP/IP CID code server; setting up OS/2 Warp, LAPS, and TCP/IP 2.0; and building the LAN Transport (LT) client boot diskettes. It also enables you to incorporate previous, current, and future OS/2 versions and its platform of applications (Communication Manager/2, LAN Server, etc.) into one structured directory tree on a single computer.

The procedure in this article does not use NetBIOS as the method of transport (as did previous articles), but rather it uses the TCP/IP protocol. Although, compared with TCP/IP, NetBIOS is easy to configure, it is not routable like TCP/IP unless you use the new NetBIOS emulation over TCP/IP protocol.

Figure 1 shows a flowchart of what I consider to be the two categories of remote installation under OS/2: CID and redirected. Note that configuration/installation/distribution (CID) is a specification, not a product.

Erik Mintz
IBM Corporation
Austin, Texas

A CID installation can be implemented in one of two ways using what are known as software distribution managers:

- LAN CID Utility (LCU), a set of REXX procedures
- NetView Distribution Manager/2, a Presentation Manager (PM) application

Figure 1 shows the executables used during an LCU installation via NetBIOS, NetWare, or TCP/IP. Notice that the `SRVREXX.EXE` file is always used to load the LCU REXX support and that the `CASAGENT.EXE` file is used only in a NetBIOS/SRVIFS environment.

This TCP/IP CID client/server setup procedure was tested using the following server hardware and software:

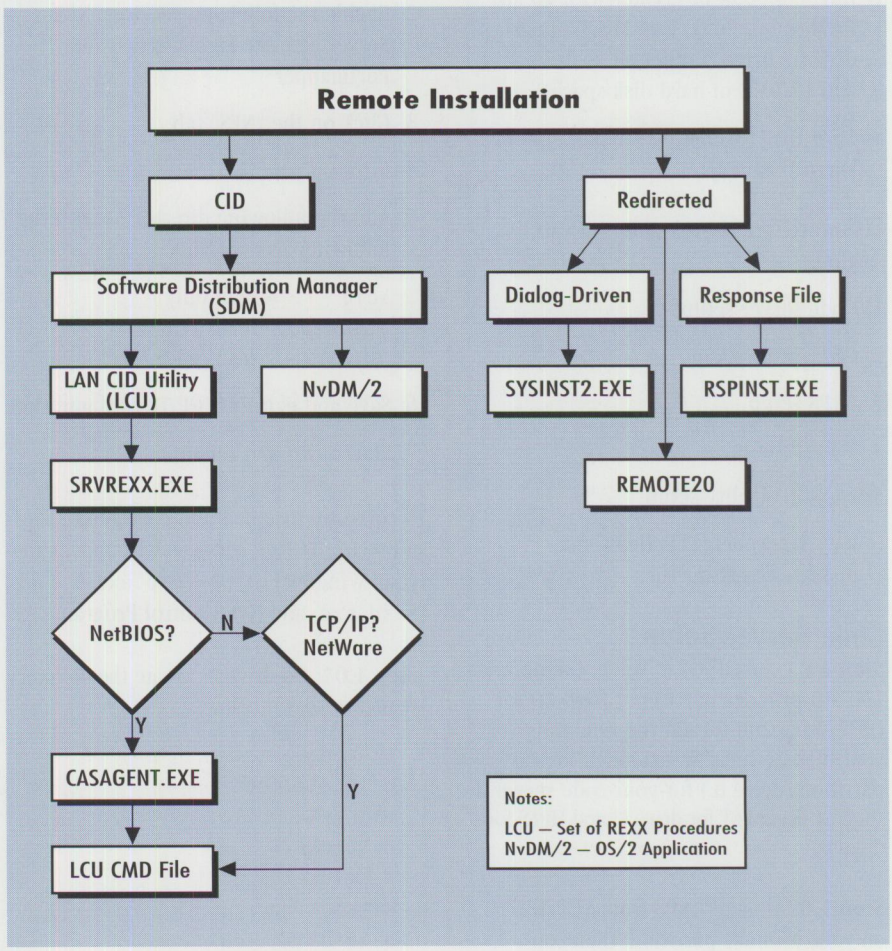


Figure 1. Remote Installation Flowchart

- Intel 80486 processor with 16 MB RAM, 1.44 MB 3.5-inch diskette drive configured as drive A:, and 200 MB of hard disk space
- Token-Ring network
- 16/4 IBM Token-Ring Adapter (ISA or Micro Channel)
- OS/2 Warp
- Multiple Protocol Transport Services (MPTS), CSD level WR08105 suggested
- LAN Adapter and Protocol Support (LAPS), CSD level WR07045 suggested
- TCP/IP for OS/2 2.0
- TCP/IP for OS/2, CSD level UN50382
- Network File System (NFS) CSD level UN52836
- Utilities from *The CID Guide* CD-ROM (GG24-4295)
- PKZIP2.EXE

This procedure was tested using the following client hardware:

- Intel 80386SX or greater with 10 MB RAM (minimum), 1.44 MB 3.5-inch diskette drive configured as drive A:, and 120 MB of hard disk space
- 16/4 IBM Token-Ring Adapter (ISA or Micro Channel)

The procedure is broken up into six sections:

1. Code server setup
2. OS/2 Warp setup
3. LAPS setup
4. TCP/IP setup
5. LAN CID Utility setup
6. LAN Transport (LT) client boot diskettes creation

Code Server Setup

Step 1.01: Install OS/2 Warp. Create a 100 MB primary partition (drive C:) for OS/2 Warp and format the remainder of your disk drive as an extended logical partition (drive D:) for your code server. I suggest using FAT for drive C: and HPFS for drive D:.

Step 1.02: Install LAPS from TCP/IP on your primary partition, then configure LAPS with the LAN adapter (IBM Token-Ring Network Adapter) and IBM TCP/IP protocol. After the installation is complete, shut down and reboot.

Step 1.03: Install LAPS (WR07045) on your primary partition, keeping the same adapter driver and protocol. After the installation is complete, shut down and reboot.

Step 1.04: Install TCP/IP for OS/2 on your primary partition. After the installation is complete, shut down and reboot.

Step 1.05: Install TCP/IP for OS/2 UN50382 on your primary partition. After the installation is complete, shut down and reboot.

Step 1.06: Install NFS on your primary partition, then shut down and reboot. After TCP/IP and NFS are installed, configured, and running, click on the TCP/IP configuration object and follow the steps below to create a c:\tcpip\etc\exports file:

1. Click on the "autostart" tab.
2. Enable the following services: NFS Server, Remote File Systems, and Portmapper.
3. Click on the "NFS" tab.
4. Click on page 2.
5. Add the following directories with the following access rights:

```
\cid        - read only
\cid\log    - read/write
\cid\rsp    - read only
```

6. Save and exit the TCP/IP configuration.
7. Shut down and reboot.

If correctly installed and configured, the following TCP/IP services will appear in your Window List: portmap.exe, nfsd.exe, and NFS Control Program.

Step 1.07: On drive D:, create the directory structure shown below:

```
d:\cid
d:\cid\client
d:\cid\compile
d:\cid\dll
d:\cid\exe
d:\cid\img
d:\cid\img\lcu
d:\cid\img\sample
d:\cid\img\sample\tcpip
d:\cid\img\tcpip
d:\cid\img\tcpip\bin
d:\cid\img\tcpip\dll
d:\cid\img\tcpip\etc
d:\cid\log
d:\cid\log\lcu
d:\cid\rsp
d:\cid\scratch
```

Step 1.08: Copy MPTS disk 3 (Utilities) to a working directory (d:\cid\scratch) on your code server, then unpack the files necessary for your code server:

1. Insert MPTS disk 1 into drive A: and type `copy a:\pkunzip2.exe d:\cid\scratch`
2. Insert MPTS disk 3 into drive A: and type `xcopy a: d:\cid\scratch /s`
3. Execute the instructions below:

```
cd d:\cid\scratch
pkunzip2 applets\mptsaplt.zip
  applets
pkunzip2 lcu\lcu.zip lcu
copy lcu d:\cid\img\lcu
copy applets\cas*.* d:\cid\
  compile
```

4. Copy PKZIP.EXE to d:\cid\scratch (client or user must obtain PKZIP.EXE—shown in hardware/software list earlier in this article)

Step 1.09: From the c:\tcpip directory (assuming you installed TCP/IP in that directory), perform the following steps to copy some files that are necessary to set up your code server:

1. From the code server's c:\tcpip\bin directory, copy the files below to d:\cid\img\tcpip\dll

```
arp.exe
cntrl.exe
ifconfig.exe
ifndis.sys
inet.sys
mount.exe
nfsctl.exe
nfs2000.exe
nfsbiod.exe
```

2. From the code server's c:\tcpip\dll directory, copy rpcdll.dll and tcpipdll.dll to d:\cid\img\tcpip\dll

Step 1.10: This step copies some utilities from *The CID Guide* CD-ROM to your code server. Place the CD-ROM in the drive and execute the commands below (where x: refers to the drive letter of your CD-ROM):

```
copy x:\tcpip\hosts
  d:\cid\img\tcpip\etc
xcopy x:\tcpip d:\cid\img\
  sample\tcpip /s
xcopy x:\utility
  d:\cid\img\sample /s
```

Step 1.11: Execute the following commands, which require *The CID Guide* CD-ROM:

1. Type `copy x:\tcpip\hosts c:\tcpip\etc`
2. Edit this file to add your hostname and the IP address of your NFS server. (You can delete the existing entries in this file.) Then execute the following commands:

```
copy c:\tcpip\etc\hosts
  d:\cid\img\tcpip\etc
copy c:\tcpip\etc\hosts
  d:\cid\img\sample\tcpip
```

Step 1.12: Create the file `c:\tcpip\etc\resolv` and place your domain name and nameserver information in this file (see the example). Then copy it to `d:\cid\img\tcpip\etc`.

Sample domain name:
`bocaraton.ibm.com`
Sample nameserver: `9.83.10.2`

Step 1.13: Edit `d:\cid\img\sample\tcpip\nfsrfi.cmd` with the following changes. Modify your mount statements to reflect the changes below:

1. Change lines 25 and 26 as shown below:

```
mount -u -g x: NFS Server
  Name:d:\cid
mount -u -g y: NFS Server
  Name:d:\cid\rsp
mount -u -g z: NFS Server
  Name:d:\cid\log
```

(where NFS Server Name is your server's hostname)

2. Change line 34 as shown below:

```
x:\client\os2v30\ %hostname%
  %hostname%
  z:\os2v30\%hostname%.log
```

Step 1.14: Edit `d:\cid\img\sample\tcpip\thintcp.cmd` with the following changes:

```
/*Add'l REXX functions to delete c:\tcpseed.cmd,      */
/*c:\crenvvar.exe, and the c:\tcpseed directory       */

call rxfuncadd 'sysloadfuncs', 'rexxutil', 'sysloadfuncs'
call sysloadfuncs
'del c:\crenvvar.exe'
'del c:\tcpseed.cmd'
call sysfiletree 'c:\tcpseed\*.*', 'file', 'SF'
do i=1 to file.0
  parse var file.i . . . . filename .
  'del' filename
  end
  call sysfiletree 'c:\tcpseed', 'file', 'D'
  do i=1 to file.0
    parse var file.i . . . . filename .
    'rd' filename
  end /* do */
```

Figure 2. Step 1.15

1. Change all references from `os2v211` to `os2v30` (this is a global change)
2. Add `x:\img\lcu` to the path statement on line 51 as shown below

```
 line=line||sc||CltDrv||'
\TCPIP\DLL;X:\DLL\os2v30;X:
\IMG\LCU;'||CltDrv||'
\IBMCOM\DLL;'
```

Step 1.15: Add the REXX statements in Figure 2 to the end of the file `d:\cid\img\sample\tcpip\tcdelete.cmd` *(be careful of syntax!)*.

OS/2 Warp Setup

Step 2.01: On drive `D:`, create the following directory structure:

```
d:\cid\client\os2v30
d:\cid\dll\os2v30
d:\cid\exe\os2v30
d:\cid\img\os2v30
d:\cid\log\os2v30
d:\cid\rsp\os2v30
```

Step 2.02: Use the following steps to unpack the files necessary to set up your code server for OS/2 Warp:

1. Insert disk 2 into drive `A:` and type

```
unpack2 a:\bundle
  d:\cid\exe\os2v30
  /n:setboot.exe
```

2. Insert disk 3 into drive `A:` and type

```
unpack2 a:\bundle
  d:\cid\exe\os2v30
  /n:xcopy.exe
```

3. Insert disk 4 into drive `A:` and type

```
unpack2 a:\rexx
  d:\cid\dll\os2v30
```

4. Insert disk 7 into drive `A:` and execute the following commands:

```
unpack2 a:\cid
  d:\cid\exe\os2v30
unpack2 a:\required
  d:\cid\exe\os2v30
  /n:rspinst.exe
unpack2 a:\required
  d:\cid\rsp\os2v30
  /n:sample.rsp
copy d:\cid\rsp\os2v30\
  sample.rsp
  d:\cid\rsp\os2v30\default.rsp
```

Step 2.03: Edit the response file `default.rsp` with the minimum changes needed for a CID installation. Edit `d:\cid\rsp\os2v30\default.rsp` and set the keyword `exitonerror=1`.

Step 2.04: Execute the command `copy d:\cid\rsp\os2v30\default.rsp d:\cid\rsp\os2v20\johndoe.rsp`.

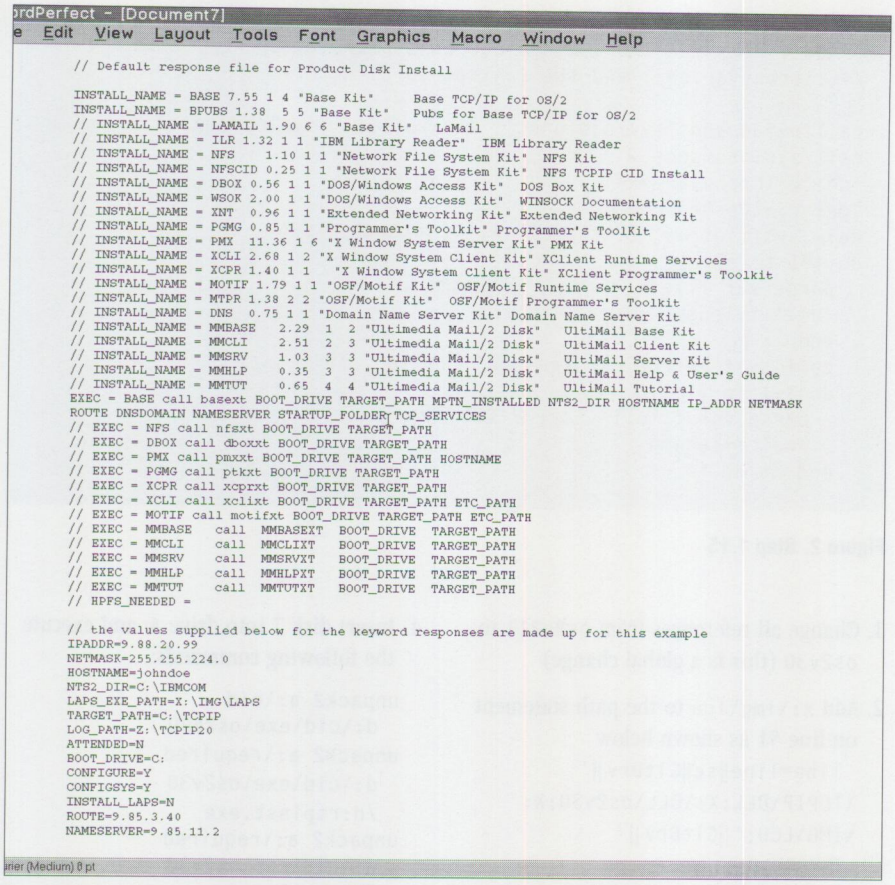
I have changed the following keywords in `d:\cid\rsp\os2v30\johndoe.rsp` so that the primary partition (drive `C:`) is formatted as FAT during the installation:

```
basefilesystem=2
formatpartition=1
```

Note: `JOHNDOE.RSP` is used as the example client response and LCU command file name throughout this procedure.

Step 2.05: Install the OS/2 images on your code server:

```
cd\cid\exe\os2v30
seimage /s:a:
  /t:d:\cid\img\os2v30
```



```
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      // Default response file for Product Disk Install

      INSTALL_NAME = BASE 7.55 1 4 "Base Kit"     Base TCP/IP for OS/2
      INSTALL_NAME = BPUBS 1.38  5 5 "Base Kit"   Pubs for Base TCP/IP for OS/2
      // INSTALL_NAME = LAMAIL 1.90 6 6 "Base Kit"   LaMail
      // INSTALL_NAME = ILR 1.32 1 1 "IBM Library Reader"  IBM Library Reader
      // INSTALL_NAME = NFS    1.10 1 1 "Network File System Kit"  NFS Kit
      // INSTALL_NAME = NFSCID 0.25 1 1 "Network File System Kit"  NFS TCPIP CID Install
      // INSTALL_NAME = DBOX 0.56 1 1 "DOS/Windows Access Kit"  DOS Box Kit
      // INSTALL_NAME = WSOK 2.00 1 1 "DOS/Windows Access Kit"  WINSOCK Documentation
      // INSTALL_NAME = XNT  0.96 1 1 "Extended Networking Kit" Extended Networking Kit
      // INSTALL_NAME = PGMG 0.85 1 1 "Programmer's Toolkit" Programmer's ToolKit
      // INSTALL_NAME = PMX  11.36 1 6 "X Window System Server Kit" PMX Kit
      // INSTALL_NAME = XCLI 2.68 1 2 "X Window System Client Kit" XClient Runtime Services
      // INSTALL_NAME = XCPR 1.40 1 1   "X Window System Client Kit" XClient Programmer's Toolkit
      // INSTALL_NAME = MOTIF 1.79 1 1 "OSF/Motif Kit"  OSF/Motif Runtime Services
      // INSTALL_NAME = MTPR 1.38 2 2 "OSF/Motif Kit"  OSF/Motif Programmer's Toolkit
      // INSTALL_NAME = DNS  0.75 1 1 "Domain Name Server Kit" Domain Name Server Kit
      // INSTALL_NAME = MMBASE   2.29  1  2 "Ultimedia Mail/2 Disk"   UltiMail Base Kit
      // INSTALL_NAME = MMCLI    2.51  2  3 "Ultimedia Mail/2 Disk"   UltiMail Client Kit
      // INSTALL_NAME = MMSRV    1.03  3  3 "Ultimedia Mail/2 Disk"   UltiMail Server Kit
      // INSTALL_NAME = MMHLP    0.35  3  3 "Ultimedia Mail/2 Disk"   UltiMail Help & User's Guide
      // INSTALL_NAME = MMTUT    0.65  4  4 "Ultimedia Mail/2 Disk"   UltiMail Tutorial
      EXEC = BASE call basext BOOT_DRIVE TARGET_PATH MPTN_INSTALLED NTS2_DIR HOSTNAME IP_ADDR NETMASK
      ROUTE DNSDOMAIN NAMESERVER STARTUP_FOLDER TCP_SERVICES
      // EXEC = NFS call nfsxt BOOT_DRIVE TARGET_PATH
      // EXEC = DBOX call dboxxt BOOT_DRIVE TARGET_PATH
      // EXEC = PMX call pmxxt BOOT_DRIVE TARGET_PATH HOSTNAME
      // EXEC = PGMG call ptkxt BOOT_DRIVE TARGET_PATH
      // EXEC = XCPR call xcprxt BOOT_DRIVE TARGET_PATH
      // EXEC = XCLI call xclixt BOOT_DRIVE TARGET_PATH ETC_PATH
      // EXEC = MOTIF call motifxt BOOT_DRIVE TARGET_PATH ETC_PATH
      // EXEC = MMBASE   call  MMBASEXT  BOOT_DRIVE  TARGET_PATH
      // EXEC = MMCLI    call  MMCLIXT   BOOT_DRIVE  TARGET_PATH
      // EXEC = MMSRV    call  MMSRVXT   BOOT_DRIVE  TARGET_PATH
      // EXEC = MMHLP    call  MMHLPXT   BOOT_DRIVE  TARGET_PATH
      // EXEC = MMTUT    call  MMTUTXT   BOOT_DRIVE  TARGET_PATH
      // HPFS_NEEDED =

      // the values supplied below for the keyword responses are made up for this example
      IPADDR=9.88.20.99
      NETMASK=255.255.224.0
      HOSTNAME=johndoe
      NTS2_DIR=C:\IBMCOM
      LAPS_EXE_PATH=X:\IMG\LAPS
      TARGET_PATH=C:\TCPIP
      LOG_PATH=Z:\TCPIP20
      ATTENDED=N
      BOOT_DRIVE=C:
      CONFIGURE=Y
      CONFIGSYS=Y
      INSTALL_LAPS=N
      ROUTE=9.85.3.40
      NAMESERVER=9.85.11.2

rier (Medium) 8 pt
```
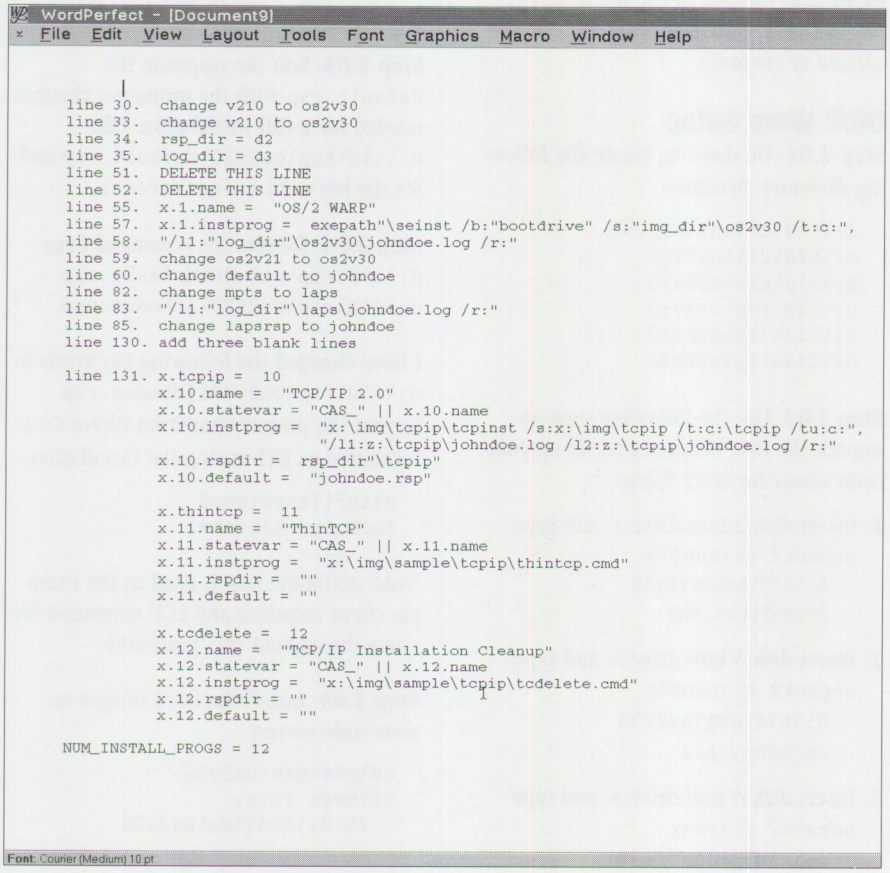

Figure 3. TCP/IP Response File Additions and Changes



```
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File  Edit  View  Layout  Tools  Font  Graphics  Macro  Window  Help

      line 30.  change v210 to os2v30
      line 33.  change v210 to os2v30
      line 34.  rsp_dir = d2
      line 35.  log_dir = d3
      line 51.  DELETE THIS LINE
      line 52.  DELETE THIS LINE
      line 55.  x.1.name =  "OS/2 WARP"
      line 57.  x.1.instprog =  exepath"\seinst /b:"bootdrive" /s:"img_dir"\os2v30 /t:c:",
      line 58.  "/l1:"log_dir"\os2v30\johndoe.log /r:"
      line 59.  change os2v21 to os2v30
      line 60.  change default to johndoe
      line 82.  change mpts to laps
      line 83.  "/l1:"log_dir"\laps\johndoe.log /r:"
      line 85.  change lapsrsp to johndoe
      line 130. add three blank lines

      line 131. x.tcpip =  10
                x.10.name =  "TCP/IP 2.0"
                x.10.statevar = "CAS_" || x.10.name
                x.10.instprog =  "x:\img\tcpip\tcpinst /s:x:\img\tcpip /t:c:\tcpip /tu:c:",
                                 "/l1:z:\tcpip\johndoe.log /l2:z:\tcpip\johndoe.log /r:"
                x.10.rspdir =  rsp_dir"\tcpip"
                x.10.default =  "johndoe.rsp"

                x.thintcp =  11
                x.11.name =  "ThinTCP"
                x.11.statevar = "CAS_" || x.11.name
                x.11.instprog =  "x:\img\sample\tcpip\thintcp.cmd"
                x.11.rspdir =  ""
                x.11.default = ""

                x.tcdelete =  12
                x.12.name =  "TCP/IP Installation Cleanup"
                x.12.statevar = "CAS_" || x.12.name
                x.12.instprog =  "x:\img\sample\tcpip\tcdelete.cmd"
                x.12.rspdir = ""
                x.12.default = ""

      NUM_INSTALL_PROGS = 12

Font: Courier (Medium) 10 pt
```

Figure 4. LCU Command File Additions and Changes, Part 1

LAPS Setup

Step 3.01: On drive D:, create the following directory structure:

```
d:\cid\img\laps
d:\cid\log\laps
d:\cid\rsp\laps
```

Step 3.02: Copy the LAPS (WR07045) diskette to your code server. Insert the LAPS disk 1 into drive A:, and type `a:\lapsdisk a: d:\cid\img\laps`.

Step 3.03: LAPS (WR07045) does not include the TCP/IP protocol. The LAPS diskette that comes with TCP/IP 2.0 has the TCP/IP protocol but contains an older version of the Token-Ring device drivers and protocol. In this step, you repack the TCP/IP protocol to include it in the LAPS (WR07045) `protocol.zip` file.

1. Execute the following commands:

```
md d:\cid\temp
md d:\cid\scratch\laps
md d:\cid\scratch\tcplaps
```

2. Insert the LAPS (WR07045) diskette into drive A: and type `copy a:\ibmcom\protocol\protocol.zip d:\cid\scratch\laps`

3. Insert the LAPS diskette from TCP/IP 2.0 into drive A: and execute the following commands:

```
copy a:\ibmcom\protocol\
  protocol.zip
  d:\cid\scratch\tcplaps
cd\cid\scratch
pkunzip2 tcplaps\protocol\
  protocol.zip d:\cid\temp
pkunzip2 laps\protocol\
  protocol.zip d:\cid\temp
  (choose Y to overwrite NET
  BIND.EXE)
pkzip2 -p -r protocol.zip *.*
copy protocol.zip
  d:\cid\img\laps\ibmcom\
  protocol
```

Step 3.04: Use the LAPSRSP utility to create a response file, based on your local machine's `protocol.ini` file, for a CID installation of MPTS. Execute these two commands:

```
cd\cid\img\laps
lapsrsp c:\ibmcom\protocol.ini
  d:\cid\rsp\laps\lapsrsp.rsp
  /t:c: /i:product
```

TCP/IP Setup

Step 4.01: On drive D:, create the following directory structure:

```
d:\cid\img\tcpip (should have
   already been created in step 1.05)
d:\cid\log\tcpip
d:\cid\rsp\tcpip
```

Step 4.02: Copy the TCP/IP 2.0 diskettes to your code server. Insert each TCP/IP diskette (excluding the LAPS and Library Reader diskettes) into drive A: and type the following command for each diskette:

```
xcopy a:\*.* d:\cid\img\tcpip
```

Step 4.03: Copy the default TCP/IP 2.0 response file to the TCP/IP response file directory:

```
copy d:\cid\img\tcpip\
   default.rsp
   d:\cid\rsp\tcpip
copy d:\cid\img\tcpip\
   default.rsp
   d:\cid\rsp\tcpip\johndoe.rsp
```

Step 4.04: Edit `d:\cid\rsp\tcpip\johndoe.rsp` to match the example shown in Figure 3. In this example, only the base kit and feature applications are installed. Keywords have been added for the TCP/IP values. These response file keywords are included in the TCP/IP references listed at the end of this article.

LAN CID Utility Setup

Step 5.01: This step describes how to compile your LCU command file. The following three commands are an example for building a default LCU command file:

```
cd\cid\compile
casprep casadv.fil
   d:\cid\client\default.cmd
copy d:\cid\client\default.cmd
   d:\cid\client\os2v30\
   johndoe.cmd
```

Step 5.02: Use an ASCII line editor and refer to Figures 4 and 5 to edit, by line number, the changes that must be made to the `d:\cid\client\os2v30\johndoe.cmd` file.

LAN Transport Client Boot Diskettes Creation

Step 6.01: Create your LAN Transport (LT) client boot diskettes.

1. Type `cd\cid\exe\os2v30`
2. Type `sedisk /s:d:\cid\img\os2v30 /t:a:` (you will be prompted for two formatted diskettes)
3. Label the first diskette "Install disk," and label the second diskette "disk 1"
4. Leave disk 1 in drive A:

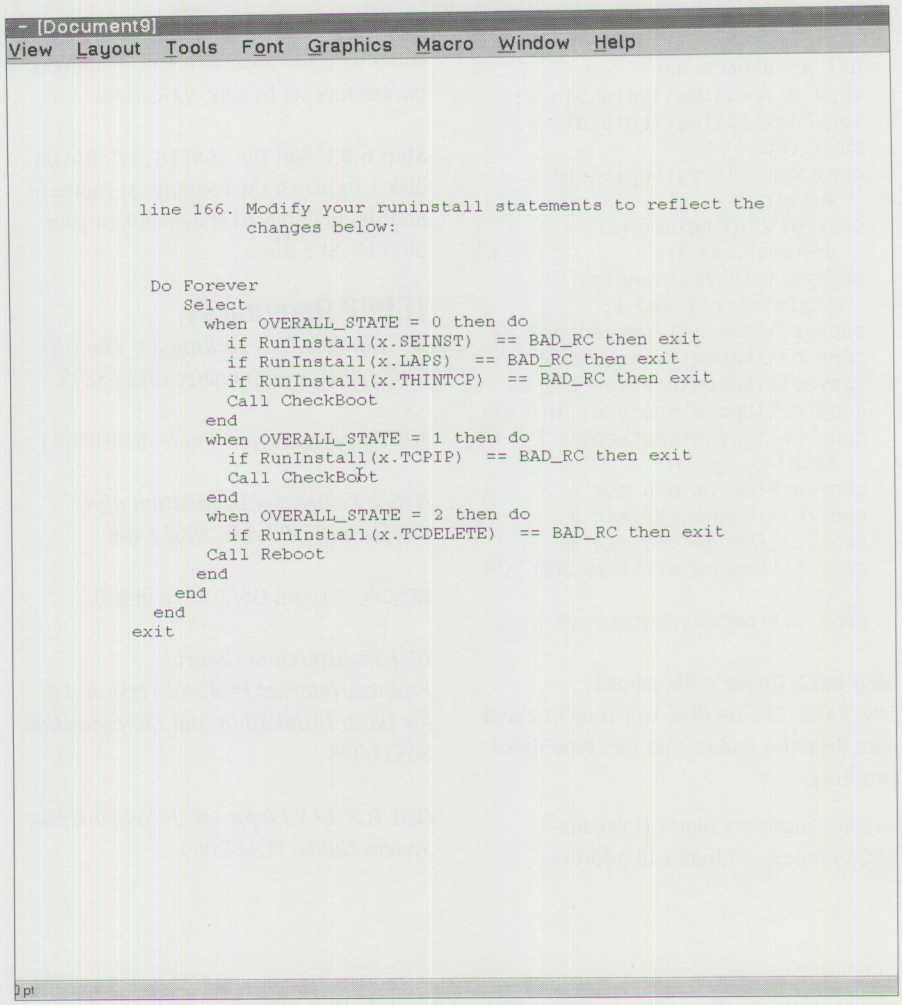

Figure 5. LCU Command File Additions and Changes, Part 2

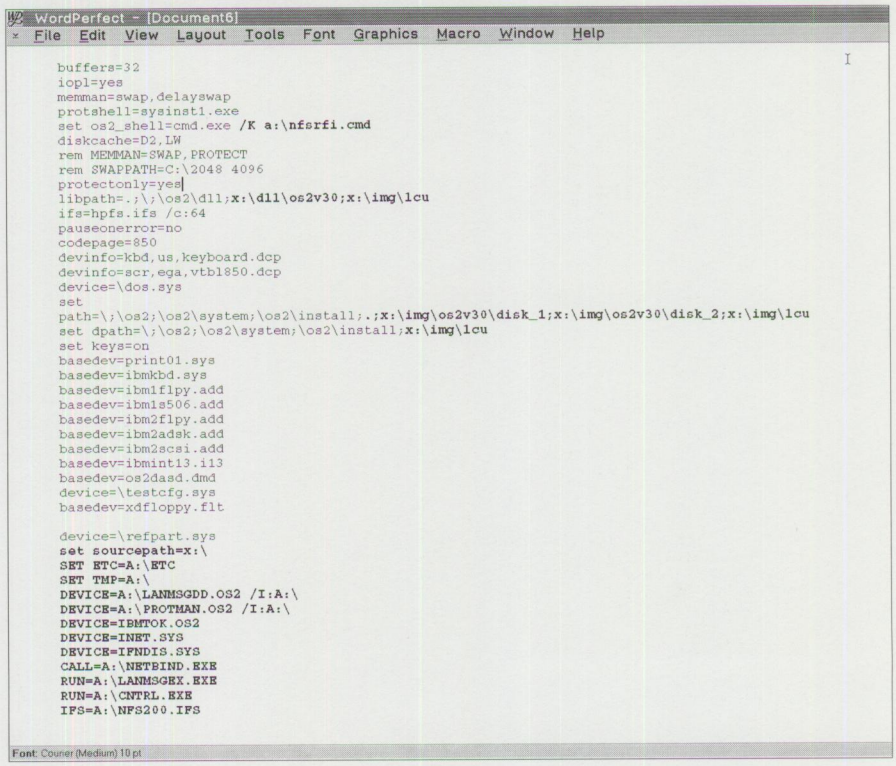

Figure 6. CONFIG.SYS on LAN Transport (LT) Client Boot Diskette

5. Type the following:

```
del a:\unpack.exe
copy d:\cid\img\tcpip\bin a:
copy d:\cid\img\tcpip\dll a:
md a:\etc
copy d:\cid\img\tcpip\etc
  a:\etc
copy d:\cid\img\sample\
  crenvvar.exe a:
copy d:\cid\img\sample\
  tcpip\nfsrfi.cmd a:
copy c:\ibmcom\lanmsgdd.os2 a:
copy c:\ibmcom\lanmsgex.exe a:
copy c:\ibmcom\protman.os2 a:
copy c:\ibmcom\protocol.ini a:
copy c:\ibmcom\protocol\
  netbind.exe a:
copy c:\ibmcom\pro.msg a:
copy c:\ibmcom\lt2.msg a:
copy c:\ibmcom\lt0.msg a:
copy c:\ibmcom\dll\lanmsgdl.dll
  a:
copy c:\ibmcom\ibmtok.os2 a:
```

Step 6.02: Create a file named `ENV_VARS.CMD` on disk 1 of your LT client boot diskettes and in that file, type these two lines:

```
set hostname = Client's Hostname
set address  = Client's IP Address
```

Note: The client LCU command file is executed with the hostname and IP address parameters set by `ENV_VARS.CMD`.

Step 6.03: Edit the `CONFIG.SYS` file on disk 1 to match the contents of Figure 6. Add the highlighted statements to your `CONFIG.SYS` file.

TCP/IP References

OS/2 Installation Techniques: The CID Guide, IBM order number GG24-5295

MPTS Configuration Guide, S10H-9693

NTS/2 Redirected Installation and Configuration Guide, S96F-8488

`README.CID` on OS/2 Warp disk 0

IBM Transmission Control Protocol/Internet Protocol Version 2.0 for OS/2: Installation and Configuration, SC31-6075

IBM TCP/IP V2.0 for OS/2: Network File System Guide, SC31-7069

Erik Mintz is a senior associate programmer in the OS/2 Service and Support group in Austin, Texas. Currently a CID analyst, he joined IBM in 1990 in environmental engineering and later worked in multimedia development. Erik has a BS in Hydrogeology and an MS in Civil Engineering from Florida Atlantic University. His Internet userid is `rabbit@vnet.ibm.com`.

Corrective Service Information

Figure 1 shows maintenance release levels for the listed products. This information is effective as of April 1, 1996. CSDs may have been updated since press time.

To order all service packages—except for the OS/2 2.0, OS/2 2.1, OS/2 2.1 for Windows, and OS/2 2.0 Toolkit ServicePaks—call IBM Software Solution Services at (800) 992-4777. For the OS/2 2.0 ServicePak (XR06100), OS/2 2.1 ServicePak (XR06200), OS/2 2.1 for Windows ServicePak (XR06300), or the IBM Developer's Toolkit for OS/2 2.0 ServicePak (XR06110) on diskettes or CD-ROM, call (800) 494-3044. Most OS/2 service packages are also available electronically from the following sources:

- **OS/2 Bulletin Board Service (BBS)**: In Software Library, select Option 2. (Corrective services are also listed under the General category on the IBMLink BBS.) To subscribe to the OS/2 BBS, call (800) 547-1283.
- **IBM Personal Computer Company (PCC) BBS**: Call (919) 517-0001. Service packages are located in Directory 4.
- **CompuServe**: Download service packages from the IBM OS2 FORUM library (GO IBMOS2 IBM DF2).
- **Internet**: Do an anonymous FTP from `ps.boulder.ibm.com` at `/ps/products/`. TCP/IP packages are located at `software.watson.ibm.com` at `pub/tcpip/os2`.

—Arnie Johnson and Paul Washington, IBM Corporation, Austin, Texas

Product/Component	Release	CSD Level	PTF Number	Change Date	Comments
OS/2 Standard Edition	1.3	XR05150	XR05150	02-10-93	
OS/2 Extended Edition	1.3	WR05200	WR05200	05-12-93	WR05200 replaces WR05050, which can no longer be ordered on diskette
OS/2	2.0	XR06100	XR06100	09-01-93	XR06100 replaces XR06055.
OS/2 2.10 ServicePak	2.1	XR06200	XR06200	03-01-94	This package is not for OS/2 2.1 for Windows.
OS/2 2.11 for Windows ServicePak	2.11	XR06300	XR06300	05-24-94	
OS/2 Toolkit	2.0	XR06110	XR06110	09-01-93	
	1.3	XR05053	XR05053	03-23-92	
OS/2 LAN Server/Requester ServicePak	2.0	IP06030	IP06030	04-25-93	
OS/2 LAN Server/Requester ServicePak	3.0	IP07060	IP07060	05-10-95	Supersedes IP07045.
IBM LAN Server/Requester OS/2 Warp Connect LS 4.0 ServicePak	4.00	IP08152	IP08152	11-28-95	Supersedes IP08150.
IBM Peer for OS/2 Public FixPak	1.0	IP08185	IP08185	03-21-96	Available electronically only.
OS/2 Extended Services Database Manager ServicePak	1.0	WR06035	WR06035	11-18-93	Supersedes WR06001, WR06002, WR06003, WR06004, WR06014, and WR06015.
DB2/2 ServicePak	1.0	WR07042	WR07042	06-08-95	
DB2/2 FixPak	2.1	WR08080	WR08080	02-02-96	
DDCS/2 ServicePak	2.0	WR07041	WR07041	02-06-95	
Database Manager DB2/2	1.2	WR07047	WR07047	06-06-95	
DDCS/2 ServicePak	2.0	WR07046	WR07046	06-06-95	
DDCS/2 ServicePak	2.2	WR07046	WR07046	06-06-95	
Client Application Enabler/2 (CAE/2)	1.2	WR07043	WR07043	06-06-95	
Software Developers Kit/2 (SDK/2)	1.2	WR07048	WR07048	06-06-95	

Figure 1. Maintenance Release Levels (continued on next page)

Product/Component	Release	CSD Level	PTF Number	Change Date	Comments
SDK/Windows FixPak	2.1	WR08081	WR08081	01-30-96	
Extended Services Comm Mgr ServicePak	1.0	WR06025	WR06025	11-29-93	
System Performance Monitor (SPM/2) ServicePak	2.0	WR06075	WR06075	12-10-93	
OS/2 LAN Server Macintosh ServicePak	1.0	IP06200	IP06200	03-13-96	
LAN Distance ServicePak	1.1/1.11	IP08205	IP08205	03-08-96	Supersedes IP08175, which superseded IP07050.
OS/2 Network Transport Services/2 SelectPak	2.20.5/2.20.1 2.20.2	WR07060	WR07060	05-10-95	Must be LAPS 2.11 or above. If not, order WR07045 first.
LAN Server 4.0 MPTS ServicePak	4.0	WR08150	WR08150	10-18-95	
LS 4.0 MPTS Warp Connect ServicePak	1.0	WR08152	WR08152	11-06-95	
Communications Manager/2 Version 1.01 ServicePak	1.01	WR06050	WR06050	06-11-93	Available only on diskette.
CM/2 Version 1.11 ServicePak	1.11	WR06150	WR06150	05-31-94	Available on diskette and CD-ROM.
DOS	4.0/4.01	UR35284	UR35284	09-26-91	
	5.0	UR37387	UR37387	09-22-92	
C Set/2 Compiler	1.0	CS00050	XR06150	06-29-93	
C Set C++ Compiler	2.0/2.01	CTC0002	XR06102	12-15-93	
C Set C++ Compiler	2.0/2.01	CTC0010	XR06190	09-15-94	
C Set C++ Utilities	2.01	CTM0006	XR06196	09-15-94	
C Set C++ Utilities	2.00	CTL0007	XR06197	09-15-94	
TCP/IP for OS/2 Base and Application Kit	2.0	UN64092	UN64092	08-24-94	
TCP/IP for OS/2 DOS Access	2.0	UN57546	UN57546	08-24-94	
TCP/IP for OS/2 Extended Networking	2.0	UN60005	UN60005	06-21-94	
TCP/IP for OS/2 Programmer's Toolkit	2.0	UN57887	UN57887	06-21-94	
TCP/IP for OS/2 Domain Name Server	2.0	UN60004	UN60004	08-24-94	
TCP/IP for OS/2 Network File System	2.0	UN57064	UN57064	06-21-94	
TCP/IP for OS/2 X-Windows Server	2.0	UN68122	UN68122	01-20-95	
TCP/IP for OS/2 X-Windows Client	2.0	UN59374	UN59374	08-24-94	

Figure 1. Maintenance Release Levels

CSD Naming Conventions

In the past, CSDs were known as ServicePaks and FixPaks. ServicePaks were more complete, cumulative, regression-tested packages. They were large in size and generally available both in diskette and electronically. FixPaks were smaller and more component-oriented than ServicePaks and were generally available electronically only.

All future LAN Server service will adopt the same naming convention for service that is used by OS/2, DB2/2, CM/2, and all the IBM Personal Software Product (PSP) line of products. *FixPak* will be used for all future LS and PSP service offerings; some will be Public FixPaks and some will be Controlled FixPaks. *Public FixPaks* may be total cumulative service available both in diskette and electronically; or they may be available electronically only. *Controlled FixPaks* will not be generally available until they complete testing and will be available only by contacting Software Solutions Services.

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BACK ISSUE INDEX

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___ March/April 1996

What's New?
Seton Hall Students Lead the Way From the Wireless to the Real World
"Out, Damn Spot!" or How to Rid Your OS/2 Desktop of Pesky Programs
Why SOM?
IBM System Object Model–The Wave of the Future (and Now!)
Building SOM Objects with Native C++
Distributing Objects with DSOM
Using OpenDoc and SOM in Application Development
Enabling Industrial-Strength OO Applications with SOM and CORBAservices
SOM Language Neutrality: A VisualAge for Smalltalk Perspective
SOM Language Neutrality: An OO COBOL Perspective

___ January/February 1996

What's New?
Tape Backup Products for OS/2
Fault Tolerance for LAN Server
Getting Together with cc:Mail
Sales Force Automation: Building the Intelligence-Driven Sales Organization
The New Mercantilism
Designing Lotus Notes Applications That Perform
Designing a Scalable Lotus Notes Workflow Application
Lotus Notes for AIX in a Personal Systems Environment
New Administrative Features and Enhancements in Lotus Notes Release 4
MQSeries link for Lotus Notes
Getting Warped and Connected Too!–Part Two

___ November/December 1995

What's New?
Road Trip! Shopping the Internet
Command-Line Commando
Getting Warped and Connected Too!
Infrared: LANs Without Wires
Security and Auditing in IBM LAN Server
Multi-User Performance Testing in a Client/Server Environment
DCE Cell Performance: High Water Marks
Plug and Play in PC DOS 7

___ September/October 1995

What's New for OS/2?
Mesa 2 for OS/2
Manage Your Files with FileStar/2 for OS/2
PartitionMagic for OS/2
Managing LAN Server Home Directories
IBM DualStor for OS/2
Human-Computer Interaction Overview
User Interface 2000
IBM's Strategy for OS/2 Platform Products Fix Support
Road Trip! Back to School
TalkLink Gets a Facelift
OpenDoc and Human-Computer Interaction
Supporting HCI Technologies in Applications
An Introduction to Speech Recognition with OS/2
Intelligent Agents: A Primer
CID Installation of OS/2 and Its Platform Applications
Creating Your Own INF Hyperlinked Files

___ July/ August 1995

What's New for OS/2?
The Soap Box Derby
Easily Load and Lock Desktops
Road Trip! Cruisin' to the Olympics
DB2 for OS/2 V2.1: The Next Generation
OS/2 Victories from the Data Management Front Lines
Voting Kiosks: The Future of Electronic Elections
Performance Enhancements in DB2 for OS/2 V2.1
DB2 for OS/2 Administrative Tools
Database Recovery with DB2 for OS/2
Getting Object-Oriented with DB2 for OS/2 V2.1
Enhanced SQL in DB2 for OS/2 V2.1
Enterprisewide Connectivity Using DB2
Visualizer Development
Performance: DCE RPC as a DB2 for OS/2 and DB2 for AIX Transport
Remote Program Load of OS/2 Warp from NetWare 3.12

___ May/June 1995

What's New for OS/2?
Thanks for the Memory
Road Trip! Disney on the Internet
Apache Students Use the Power of the Pen (Light Pen)
Visualizer: The Conversion Continues
The Internet: A New Dimension?
IBM LAN Doctor Services
Borland C++ 2.0 Brings OWL to the OS/2 Presentation Manager
LAN Server Logon Internals
LAN Server 4.0 Performance, Capacity Enhancements, and Tuning Tips
OS/2 Warp for Developing PC Games
Controlling the OS/2 Desktop From a File Server
Jump-Start Your PC with Component Upgrades

___ March/April 1995

What's New for OS/2?
Mesa 2: Gaining the Competitive Edge with OS/2
Managing the Workplace Shell with DeskMan/2
Circus du COMDEX: The Running of the Geeks
Road Trip! Touring the Side Roads of the Internet
What's New in PC DOS 7
OS/2 Boot and Recovery Options
TCP/IP: How It Works
A Guide to OS/2 Warp's Internet Access Kit
CID Installation of OS/2 Warp and LAPS
Wrapping Up an OO Experience

___ January/February 1995

Technical Connection Personal Software Is the Answer!
Visualizer, DB2, and You–An End-User's Perspective
Insiders' Software Unveiled
Need a Specialist for Your LAN Server 4.0?
One-Stop Shopping
OS/2 Warp
OS/2 for SMP
Multimedia File I/O Services
Need a Fix?
IBM LAN Server 4.0: New Features and Comparisons with NetWare
IBM DCE Hetrogeneous Enterprise Performance

___ November/December 1994

Evolution, Not Revolution–Pen Computing Comes of Age

Handwriting Recognition: The State of the Art
Pen Digitizing Hardware
It's HapPENing!
Bill Carr: Fastest Draw in the West
Work Management in the Field
Communicating Without Wires: IBM's Mobile Communications Module
Tomorrow's Networking Today–from IBM's Personal Systems Competency Center
Customers Speak Out About Consult Line
New DeScribe 5.0–Leader of the Pack
Super-Fast PenDOS
Pen for OS/2
A Development Environment for Pen-Centric Applications
Writing DOS Installation Programs for Selective Boot Systems
OS/2 for PowerPC: Transforming Architecture into Implementation

___ **September/October 1994**

"Sneaker Net" or Systems Management?
Like Father, Like Son
The Book Shelf
Cajun Electric Cooks Up OS/2 GUI with VisPro/REXX!
Application Development by Program Integration
IBM REXX for NetWare
GammaTech REXX SuperSet/2–Give Your REXX Programs the Power of C
BranchCard: A Viable Option to Stand-Alone Hubs
A Hands-On Primer for REXX
Visual REXX Development Environments
CID Installation of OS/2 2.11 and LAPS
Upgrading from Microsoft LAN Manager to IBM LAN Server 3.0
Stretching Your LAN with LAN Distance
DB2/2–More Than Ever Before!
NetBIOS, SNA, and NetWare IPX Coexistence Under OS/2

___ **July/August 1994**

IBM's Personal Systems Support Family–Customer-Influenced Design
OS/2 Times and Scores the 1994 Indianapolis 500
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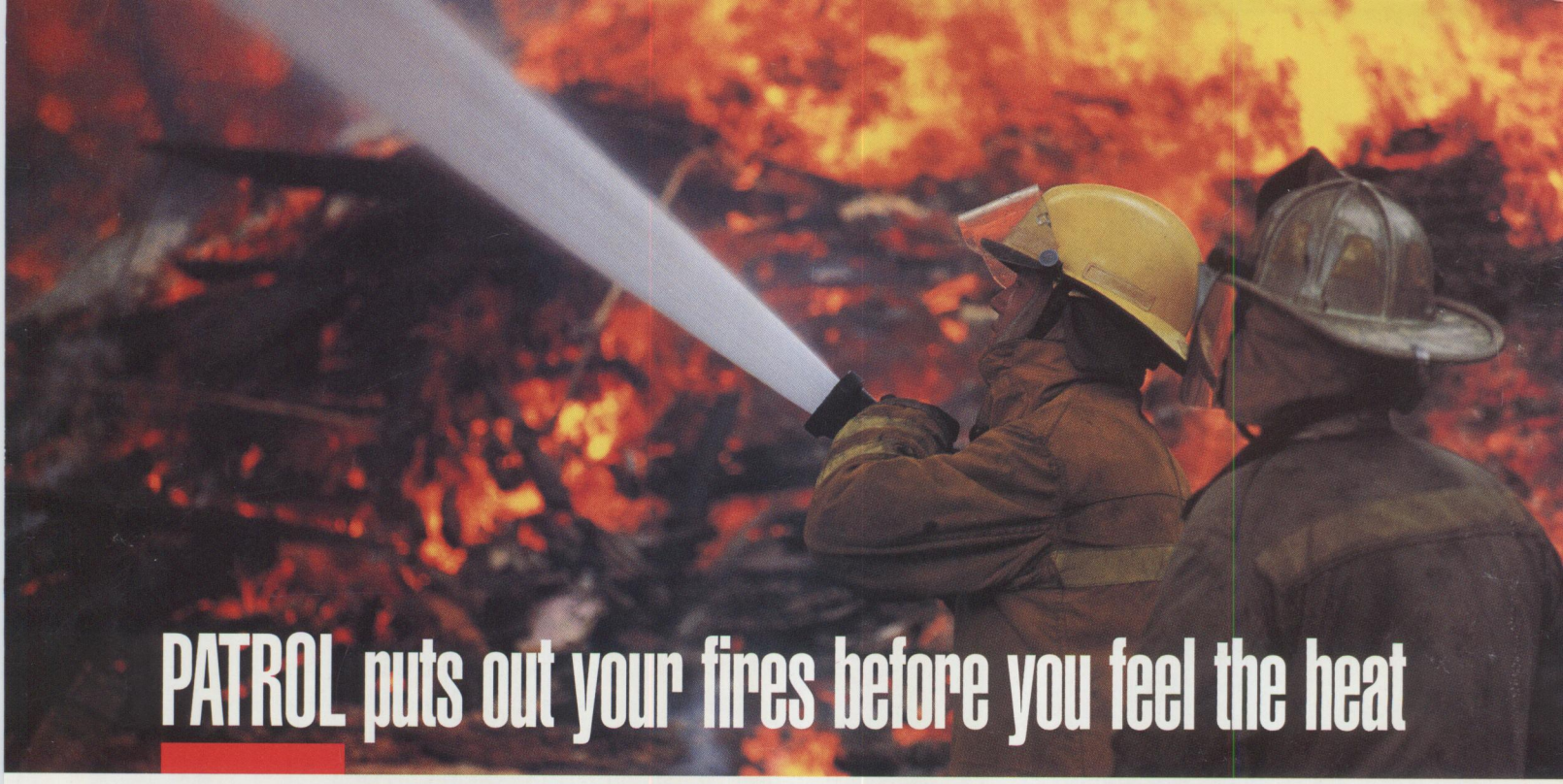

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