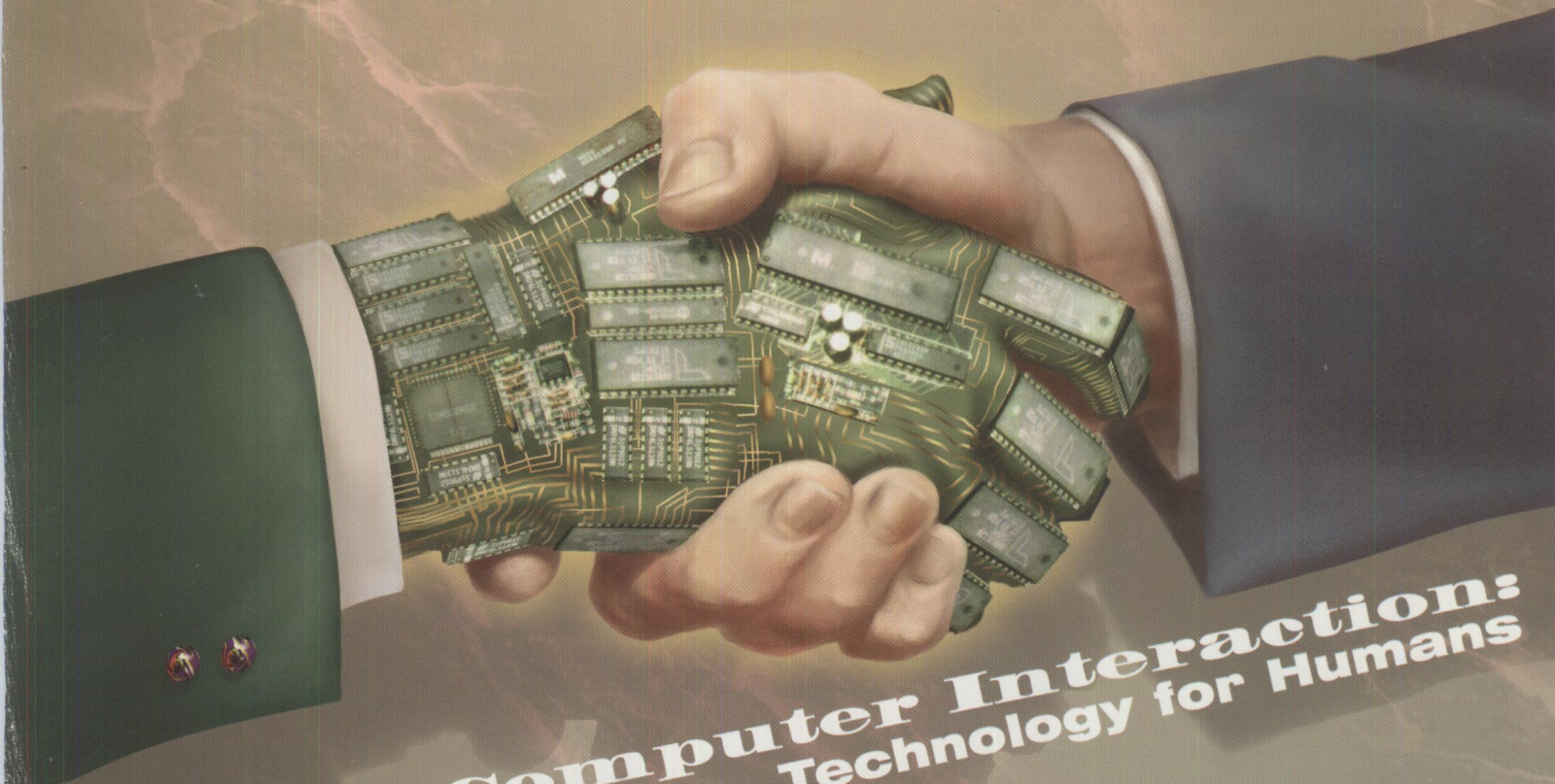


# Personal Systems

IBM'S MAGAZINE FOR TECHNICAL COORDINATORS

SEPTEMBER/OCTOBER 1995



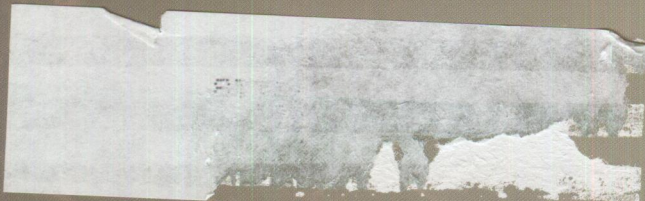
## Human-Computer Interaction: Technology for Humans

**Intelligent Agents**  
**Speech Technology**

**OpenDoc**

**INF Development**

**CID Installation of OS/2**



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# Even Houdini couldn't change partitions any faster.



“ PartitionMagic is  
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lives so much easier. ”

—ANNE EHRENSHAFT  
Information Specialist  
Lockheed Martin Energy Systems, Inc.

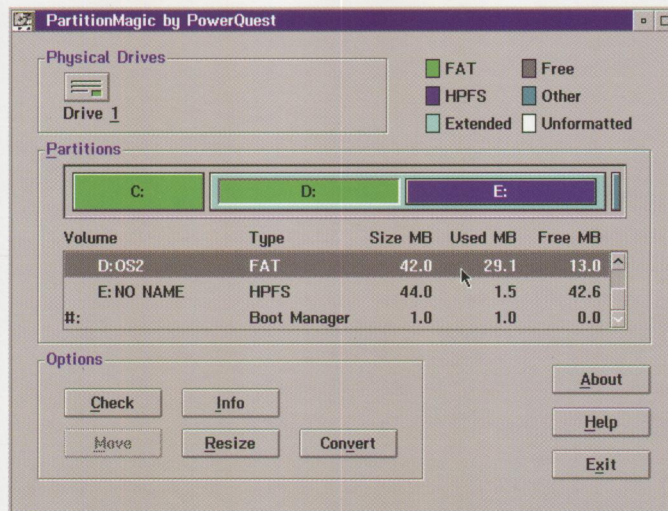


Don't get shackled by the inflexible boundaries of your hard-drive partitions. Now PartitionMagic lets you visually modify those partitions in the blink of an eye—without destroying any data. (That's a feat even Houdini would envy). Until now, managing hard-drive partitions was just a fantasy. There was no escaping the hours (or days) it would take to repartition your hard drive. You had to back up files, delete old partitions, create and format new ones, re-install the operating system, and finally, pain-stakingly restore your files.

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Rapid add/delete/update of users, groups, aliases, and applications using simple ASCII text files. Templates allow you to define prototype resources or users. Templates allow you to type in only those fields that are unique for users and resources.

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## Is Hype Hip?



I was relaxing at home, watching the late evening news a couple of weeks ago when I was intrigued by a teaser from the anchor to stay tuned for a story on “amazing new technology for personal computers.” Now, technology is the business I’m in, so naturally I “stayed tuned.” You already know what I’m going to say, don’t you (and I’m cheerfully admitting some bias in the rest of this article)? This “amazing new technology” being touted in a *news* story by a local Dallas/Fort Worth television station was Windows 95!

Windows 95 is going to “revolutionize the desktop,” they told me, then showed me a screen shot of a graphical user interface that looked *exactly* like OS/2 has looked since early 1992! I listened for what seemed like an eternity through all this glowing praise and unbridled enthusiasm for even the tiniest mention that Microsoft was finally coming out with a copycat, “wannabe” version of OS/2—to no avail.

I was just beginning to recover from the concept of what our television stations feel is newsworthy, when I picked up my Sunday *Dallas Morning News* and saw “Scoring with Windows 95” blaring in a headline on the front page of the business section. Again, not a single mention of the fact that OS/2 already does what Windows 95 can only hope to do—and OS/2 has been doing it well for years. They do, however, praise Windows 95 “as being more like the Macintosh system that was introduced by Apple Computer Inc. in 1984.” They’re hyping a product that’s emulating an eleven-year-old operating system as being innovative!

OK, I know that you can find lots of good stuff about OS/2 in industry publications, and I’m going to quote you some of it here in a minute. But I am amazed by the charisma emanating from the great Mount Redmond evangelists, and I am further amazed that the hard news media is buying it.

“There is little doubt that Warp is a more mature operating system than its perceived nemesis, Windows 95.” – Barry Nance, *BYTE*

“So, while you’re waiting for Windows 95, Warp may make you forget about Windows 95 completely.” – Bernie Yee, *PC Today*

“Corporate customers who have outgrown Windows 3.1 and are waiting for Windows 95 to come to the rescue could be in for countless problems and a colossal disappointment.” – Nicholas Petreley, *InfoWorld*

These and other quotes can be found in an article by noted computer industry consultant, author of *Migrating to Windows NT*, and contributing editor with *Windows Sources* magazine, Randall C. Kennedy, in *SQ, Software Quarterly* magazine. Where you *don’t* see any of these quotes are in your local or national TV or print media news stories.

“How does he do it?” I ask myself. And I know I’m not the only one who noticed this! I console myself because I know that people like you who are responsible for buying the right products for your desktop users are not going to place that much credibility in frantic media hype. You’re going to do your own research, and you are going to carefully weigh everything you read.

“Windows 95 is the latest in a tradition of products short on technical merit and long on hype,” Mr. Kennedy says in his *SQ* article. OS/2 is “the only operating system that scored significantly better than average for overall satisfaction” two years in a row in *PC Magazine’s* annual Reader Support and Satisfaction Survey. That’s fact—not hype.

*Betty Hawkins*

Betty Hawkins, Editor



# New OS/2 software sends messages to wireless pagers

## "It's so easy with ChipChat"

Innovative software combines the power of OS/2 with the freedom of wireless pagers to improve your communications and enhance your productivity

**I**NTRODUCING THE ChipChat® Wireless Communicator, an exciting new software product that sends text messages to pagers directly from OS/2®.

ChipChat works with pagers from virtually any paging company, including Airtouch®, Ameritech®, MobileComm®, PageNet®, SkyTel® and many others.

### Remarkably easy to use

ChipChat is object-oriented - just like OS/2. It's remarkably easy and natural to use. In fact, ChipChat looks and acts like it was "built right in" to OS/2.



Bill's Pager

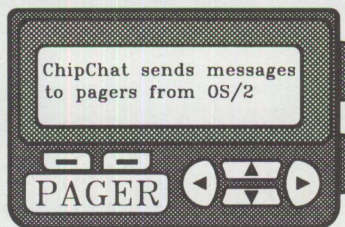
For example, say you want to send pager messages to 'Bill'. You start by dragging a 'pager object' out of a 'pager template' then dropping it on your OS/2 desktop.

Name it something like "Bill's Pager". Then whenever you want to send Bill a message, you just 'double click' on "Bill's Pager".

Up pops a friendly notepad. You simply write your message and press the 'Send' button. Using your modem and phone line, ChipChat calls the paging company and sends your message. Within moments your message is transmitted about town or around the country to Bill's actual pager.

"ChipChat's great! It's easy to understand and use, and helps me to squeeze more out of each day."

*Dr. Laura Williams M.D., Canton Ohio*



"ChipChat is a terrific product! It's helped us to vastly improve our service. It's also saved us money."

*Wm Winger, CEO Winger Inc, Mpls*

### Page-Enable your applications

You can also send pager messages from other programs via ChipChat. This is called 'page-enabling' your applications. It's possible from REXX programs, from C or C++ programs, from the OS/2 command line, even from some spreadsheet and database programs.

As an example, ChipChat's ideal for LAN administrators who want to receive an immediate detailed pager alert whenever there's a problem on the network.

Just think how page-enabling your applications with ChipChat might make your organization more responsive, more competitive, and more profitable.

### ChipChat puts you in control

ChipChat can keep a record of all your paging activities: dates, times, names, messages. It's easy to use this information to your advantage. Simply 'copy & paste' this data into a spreadsheet. Then instantly analyze your paging activity.

You can easily verify your paging bills and intelligently select the most cost-effective paging service. You can take control of your paging costs and maximize your paging effectiveness.

### Robust & Reliable

ChipChat is advanced multi-threaded 32-bit object software based on IBM's SOM technology. It's been "through the ringer" with extensive corporate beta testing. It's passed a suite of rigorous tests set by IBM®, and has earned the IBM certifications: "Available and Ready for OS/2" and also "Available and Ready for LAN Server".

### How much? Just \$79

ChipChat is an incredibly good piece of software, and at our very competitive price of only \$79 it's also an incredibly good deal!

See for yourself -

**Completely risk-free!**

### The ChipChat Guarantee

If you're dissatisfied with ChipChat for any reason, if it isn't everything we say it is and more, then return it within 30 days for a prompt, cheerful refund.

Order today and send messages to pagers the easy ChipChat way!

"ChipChat-Cawthon Software understands the OS/2 workplace shell better than some of the biggest software companies, and it shows."

*Tim Sipples, Team OS/2, Chicago*

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The ChipChat Wireless Communicator sends messages to wireless pagers. It's remarkably easy to use and can also 'page-enable' your applications. ChipChat costs **only \$79 + \$3 shipping** and comes with a **30 day moneyback guarantee**. We accept **Visa, MasterCard, & American Express**.

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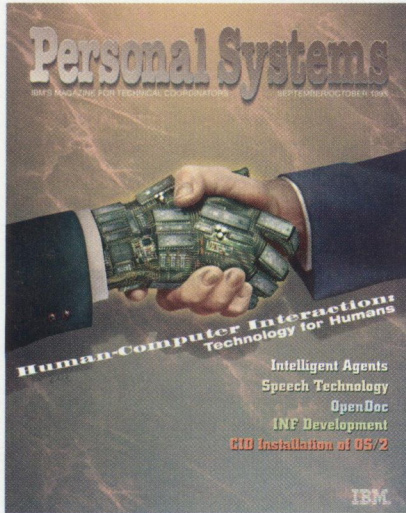
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ChipChat-Japan, Fukuoka Japan, phone: 81-(092)-943-0798 fax: 81-(092)-944-2253

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### ABOUT THE COVER

Social interfaces continue to evolve, making human interaction with computers more friendly and familiar. The concept of this human-like approach to computing is reflected in noted Dallas artist Bill Carr's cover, where man meets machine with a universally recognized gesture of cooperation.

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- 14 **Manage Your Files with FileStar/2 for OS/2**  
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**IBM DualStor for OS/2**

IBM's DualStor for OS/2 provides the features and functions necessary to ensure you can maintain the integrity of your computer's hard disk in the event of a catastrophic data loss. Steve Schmeer, certified OS/2 engineer, tested the product (both intentionally and unintentionally after an unexpected hard-disk crash) and writes about his results in this article.

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You're using computers daily in some form or another at an ever increasing pace. This article describes the social interfaces that are making our increasingly technology-controlled world more friendly.

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It's time for the kids to go back to school, and the World-Wide Web (WWW) is an excellent place for them to find reference material for their school reports. So this issue's Road Trip shows how to navigate the information highway for its namesake: information!

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**TalkLink Gets a Facelift**

TalkLink, an online service from IBM, has long been a service available to members of IBM's Technical Coordinator Program as well as other IBM customers. These charter members have never been shy in providing opinions and suggestions for improvements. This article discusses some of the enhancements resulting from their valuable input.

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**Intelligent Agents: A Primer**

Software programs that allow users to delegate tasks to computers are popularly called "intelligent agents." Since this definition allows such a broad spectrum of implementations, it is valuable to understand the basic types of agents. This article defines helpful categories and descriptions for the variety of work going on in this arena.

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**CID Installation of OS/2 and Its Platform Applications**

This article provides a step-by-step procedure for building an OS/2 remote installation code server. The procedure includes configuration/installation/distribution (CID) of OS/2 Warp (with WIN-OS2 support), Multi-Protocol Transport Services (MPTS), Transmission Control Protocol/Internet Protocol (TCP/IP) 2.0, LAN Server 4.0, and Communications Manager/2 1.11, plus a redirected installation method for OS/2 Warp. The software distribution manager (SDM) used for this procedure is the LAN CID Utility (LCU).

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**Creating Your Own INF Hyperlinked Files**

If you have used OS/2 for any length of time, you have no doubt run across stand-alone hypertext INF (information) files such as the online OS/2 Command Reference. This article overviews the INF hyperlinked file creation process, as well as provides tips and tricks for getting the job done as quickly as possible. It also examines some of the tools used to make creating hyperlinked files easier.

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**Corrective Service Information**

Refer to this section for the latest maintenance release levels and other software service information.

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# What's New For OS/2?

## Visual Rapid Application Development Tool



Prominare Inc. of Canada has launched **Prominare Designer**, an OS/2 Presentation Manager (PM) programmer's rapid application development tool for creating full-featured graphical user interfaces (GUIs) for OS/2, Windows, and Windows NT. Prominare Designer lets you create visual interfaces for an application in a matter of minutes without having to write any source code. This productivity gain remains high throughout application development, even as you add new visual interface elements.

Acting as an extended resource editor, Prominare Designer supports all versions of OS/2, including Warp. Its inherent flexibility enables the power of C and C++ to be fully exploited, with the added benefits of intelligent code generation. You can construct compact, efficient code without unnecessary overhead or proprietary modules. The product generates code for multiple class libraries and multiple compilers and offers the capability to generate code across platforms (OS/2, Windows 3.1, and Windows NT), all from one tool.

You can use one interface to create both the resources and source code for PM applications. Prominare's resource editing capabilities are backward-compatible with all versions of OS/2. This offers unique facilities in the areas of custom controls and PM Control Extensions (PMCX) facilities, which are lacking in other tools.

Prominare-created applications easily conform to individual companies' programming standards, coding conventions, and selected levels of Common User Access (CUA) compliance. This is essential to speed up programming in companies developing large applications.

Prominare supports all OS/2 PM controls including multimedia (MMPM/2) and Pen

for OS/2. It will also be available for OS/2 for the PowerPC.

For more information, circle 1 on the Reader Service Card.

## Graphics for Scientists and Engineers



Scientific Endeavors Corporation's **GraphiC**, a high-resolution graphics software package, provides scientists and engineers many time-saving features. GraphiC is available on a wide variety of PC platforms including OS/2, DOS, Windows, and Windows NT. The GraphiC interface remains constant regardless of application or platform.

This powerful and flexible scientific software product encompasses over 240 functions, letting you write scientific graphing programs without having to learn GUI programming. The software package includes dozens of sample programs that can be used as templates when writing programs.

GraphiC can be used to produce effective, high-quality graphics including linear and logarithmic X-Y plots, 3-D surfaces, polar, pie, bar, and Smith charts. Three-dimensional surfaces are shaded to allow color changes at contours of constant height or in colored ribbons along grid lines. The software includes nine different curve types with varied curve thickness and 16 different curve markers.

Printer output is extremely flexible, allowing you to specify page output, plot size, and margins. GraphiC takes the best advantage of each platform to enhance printer speed. Its output can be converted to most of the popular file formats that can be imported to desktop publishing packages or used directly in scientific publications.

For more information, circle 2 on the Reader Service Card.

## Next Generation Class Library



ObjectSpace, Inc. has introduced **Systems<ToolKit>**, a comprehensive set of cross-platform C++ foundation classes that provides object-oriented developers with the benefits of the advanced standard template library (STL). Bundled with Systems<ToolKit> is **STL<ToolKit>**, a cross-platform commercial implementation of STL that gives you a choice of OS/2, UNIX, or Windows environments. (See "What's New for OS/2?" in the May/June 1995 issue of *Personal Systems* for more information on STL<ToolKit>.)

In addition to including a comprehensive multithread-enabled implementation of STL, Systems<ToolKit> addresses one of the most time-consuming aspects of a developer's job, interfacing with operating system features such as files, sockets, threads, and processes. Systems<ToolKit> includes a set of components that provide a simple interface to the operating system so you can focus time and effort on components specific to the project.

Systems<ToolKit> adopts the STL approach, resulting in super-fast object-oriented code. It provides cross-platform coverage of many useful operating system features such as sockets, threads, and pipes. Code written using the cross-platform classes is fully thread-safe and works without modification across OS/2, UNIX, and Windows.

Most C++ projects require support for elementary components and data structures. Systems<ToolKit> includes a set of utilities, template containers, and non-template containers that follow ANSI standards whenever possible.

For more information, circle 3 on the Reader Service Card.

## Multi-Platform Edition of Watcom SQL



Watcom International Corporation has announced new multi-platform editions of



the **Watcom SQL** product line, making it the first database vendor to deliver support for OS/2, NetWare, and Windows in a single package.

Watcom SQL addresses the rapidly growing market for an affordable database server that can be broadly deployed, with little administrative support for desktop, mobile, and workgroup applications. Watcom SQL was designed with a small disk and memory footprint for the desktop PC and LAN server environments. It requires minimal database administration, takes only a few minutes to install, and its self-tuning query optimizer offers excellent performance out of the box. It is appropriate for applications where no administrator is readily available, such as field force automation and branch office systems.

Watcom SQL is available in the following configurations:

- **Watcom SQL 4.0**—A stand-alone version for customers developing single-user or mobile applications, as well as users requiring relational database solutions beyond the limited capabilities of personal databases.
- **Watcom SQL Server 4.0**—Available in various numbers of concurrent user versions to meet the multi-user requirements of workgroup environments.

For more information, circle 4 on the Reader Service Card.

### Speedy Word Processing

Released late last year, **Clearlook**, an OS/2 word processing program from Clearlook Corporation, has quickly become known to users as the fastest word processor in the OS/2 marketplace. Its compact code requires only 3 MB of hard-disk space.

Using a cell structure, Clearlook provides layered text areas, individually sized and positioned, to define document margins, footers, headers, and insets. Each text area can contain an unlimited number of text cells with individual width and position; each text cell can contain document text and bitmaps. While other word processors use cells to structure tables, Clearlook significantly expands the concept with object-oriented technology. A document can consist of one or more cells

that can be individually sized and include separate attributes. Clearlook's cellular document structure gives you extraordinary control over elaborate documents.

Created exclusively for 32-bit OS/2 from start to finish, Clearlook is free of any compromise to achieve the best performance. It uses OS/2's excellent multi-threading capabilities extensively to provide a smooth and responsive user interface.

For more information, circle 5 on the Reader Service Card.

### Editors for Programmers



MicroEdge, Inc., specializing in developing advanced tools for the professional programmer, has made its **Visual SlickEdit 1.7** available for OS/2.

Visual SlickEdit is the only editor that allows you to switch easily between its supported platforms. Macro source, dialog

Now, *this* is a genuine Rocky Mountain "Hi!"



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**OS/2 Programming  
Summit!**



In the fall, the bugling of the elk can be heard echoing through the Colorado high country. Trumpeting both challenge and accomplishment, these magnificent animals gather every fall to form groups for the year ahead. Solitary for much of the year, and social for the rest, they rely on each other without compromising their maverick nature.

Programmers committed to OS/2 gather in the Colorado high country at the same time of year, for similar reasons: to gain strength and wisdom from their peers, while drawing inspiration from the ever-increasing numbers of those peers.

ColoradOS/2 is renowned throughout the world for the quality of its technical content, but that is only part of its appeal. The rest is the friends and contacts you make here. Isn't it time you were part of this unforgettable experience?

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templates, and bitmaps are binary-compatible with Visual SlickEdit on all other platforms. It provides you with a macro language called **Slick-C** as well as a new dynamic link library (DLL) interface for extending the editor. Slick-C is a powerful, typeless, C-style, object-oriented macro language that programmers familiar with C and C++ can easily comprehend. In addition, the macro recorder allows you to customize the editor by recording your actions as Slick-C source code and requires no knowledge of the macro language.

Visual SlickEdit is loaded with time-saving features. SmartPaste automatically re-indents pasted or dropped source code according to nesting level. Syntax color-coding, expansion, and indenting make writing code not only much faster, but easier as well. To help further cut your workload, Visual SlickEdit offers procedure tagging, new drag-and-drop editing, multiple clipboards, and compiler error processing.

For more information, circle 6 on the Reader Service Card.

### CD-ROM-Mastering Software



Cirrus Technology, an OS/2 software developer, introduced **Unite CD•Maker**, an advanced OS/2 Warp CD-ROM-mastering software. Cirrus Technology's development of OS/2 CD-recordable storage solutions, including **Unite Storer** for jukebox management, represents a commitment to align the company's product direction with IBM's strategic technology initiatives.

Based on IBM's Workplace Shell and System Object Model (SOM) technology, **Unite CD•Maker** is a desktop CD recording solution for creating permanent records of critical data. Designed to solve backup, archive, and distribution problems, **Unite CD•Maker** takes full advantage of OS/2's multithreaded performance to increase the speed and reliability of CD-ROM creation while providing a cost effective long-term storage solution. It uses multiple threads to read data from the hard drive and write data to the CD-ROM drive simultaneously. This performance boost allows you to burn your CDs at higher speeds. The multithreaded design also provides a user-adjustable memory buffer and visual buffer meter to greatly reduce the chance of failed burns.

**Unite CD•Maker** provides two methods to burn a CD-ROM: choose to burn "on-the-fly" or build a virtual CD image file. Both methods produce CD-ROMs that conform to the ISO 9660 universal mastering standard and can be read from any OS/2, DOS, or Windows system.

For more information, circle 7 on the Reader Service Card.

### Multi-Platform File Transfer



**LinkWiz** from PCX solves the problem for OS/2, Windows, and DOS users tired of shuffling from disk drive to disk drive, floppy disk in hand, just to copy a file from one computer to another. **LinkWiz** is a new file-transfer program designed for "road warriors" with a computer at work, another at home, and a notebook computer for traveling. It's also designed for users frustrated by multimedia, graphics, and other large files that exceed the capacity of a floppy disk.

**LinkWiz** makes file transfers fast, convenient, and error-free with graphical interfaces that operate under OS/2 2.1, OS/2 Warp, OS/2 Warp Connect, Windows 3.0 and higher, and DOS 3.1 and higher.

Under OS/2 and Windows, **LinkWiz** supports drag-and-drop file transfers and is able to clone an entire source computer onto a target computer. The utility software features file and disk management. Its high-speed data-transfer capability, with built-in error correction, moves up to 8 MB a minute over special parallel and serial cables that come with the software.

For more information, circle 8 on the Reader Service Card.

### Toolkit and Image Products for OS/2



**TWAIN for OS/2** by Solution Technology, Inc. (STI) is a full 32-bit, multitasking, multi-threaded OS/2 implementation of TWAIN, a cross-platform, industry standard application programming interface (API) for imaging devices.

**TWAIN** allows images to be efficiently captured in bi-level, gray scale, palette color, or full 24-bit production color without restrictions on image size. In addition, **TWAIN for OS/2** production scanners

easily achieve scanning at or near their full rated speeds.

STI provides a full range of TWAIN components and toolkits, three of which are listed below:

- **TWAIN.DLL**—The TWAIN for OS/2 image driver source manager that enforces protocol and connects any TWAIN-enabled OS/2 application to any TWAIN for OS/2-enabled imaging device.
- **TWAIN SDK**—A developer's kit for TWAIN-enabling any OS/2 imaging application.
- **TWAIN DDK**—A developer's kit for scanner and image source manufacturers for developing 32-bit TWAIN drivers compatible with TWAIN for OS/2.

In addition to toolkits, STI has a range of commercial products:

- **APPLAUSE**—a TWAIN-enabled image utility for use in native OS/2 mode, provides fast scanning, printing, and file conversion of bi-level, gray scale, and color images.
- **REVIEW**—has the capabilities of APPLAUSE, but adds multi-page scanning management and a personal-sized document imaging database.
- **BARCODE ANYWHERE**—a fast, all angles barcode reader.
- **GENIE**—a TWAIN-enabled imaging workflow environment to lift fields of data directly from scanned forms.

For more information, circle 9 on the Reader Service Card.

### Wide Area Network Software



Eicon Technology has announced **CM/2 Connect**, a new software product that bundles Eicon's **Frame Relay**, X.25, and SDLC communications capabilities with the next release of IBM's **Communications Manager/2** (CM/2) LAN to SNA host application (over dedicated, switched, and digital ISDN networks). With these new wide area network (WAN) connectivity options, corporations can further extend CM/2's communications capabilities for numerous mission-critical applications while simultaneously preserving their SNA networking infrastructures and providing support for new SNA network technologies.

This bundle will allow CM/2 to utilize any of Eicon's PC-and server-based remote



networking hardware products. CM/2 Connect has been designed to IBM's "deep adapter" specification for CM/2. In this architecture, CM/2 provides the SNA stacks, applications, and APIs, while third-party remote access devices, such as the family of **EiconCards**, provide the link-layer protocols used at the DLC level.

CM/2 Connect supports the full range of concentration and conversion capabilities of CM/2, which converts between X.25, Frame Relay, SDLC, and LLC2. CM/2 Connect extends the life of existing SNA devices such as 3274s, LAN gateways, etc. that are currently unable to support these newer link types. This maximizes SNA resources and allows SNA customers to choose the most effective communication links for their areas with support for multiple logical connections.

For more information, circle 10 on the Reader Service Card.

## OS/2-Based System Diagnostics



**The Graham Utilities for OS/2 1.04** from WarpSpeed Computers includes a systems

diagnostics package for OS/2 systems. This version adds six programs and modules to the already strong suite of over 50 applications. The new utilities add two more High-Performance File System (HPFS)-specific programs, two disaster recovery assistance programs, a systems diagnostics package, and a new disk editor module that allows HPFS disks to be edited in their native format.

The diagnostics program allows you to test and report on individual aspects of your computer system including system configuration, parallel and serial port tests and configuration, video tests including text and graphics tests, floppy-disk tests, hard-disk tests, and keyboard tests.

For more information, circle 11 on the Reader Service Card.

## GigaPak for OS/2 Warp



Two CD-ROMs with over one gigabyte of the best shareware and freeware available for OS/2 Warp are contained in this software package from Abacus. GigaPak for OS/2 Warp is targeted at OS/2 owners who want to experience the speed and power of OS/2 with

an array of user-friendly applications, tools, games, and utilities.

Shareware is not a genre or type of software, but a marketing method. Products such as Mosaic and Doom were first marketed this way. GigaPak is part of just such a marketing strategy. Hundreds of the best programs written for OS/2 by authors from all over the world, all with 32-bit speed and power in a stable, crash-proof environment, are contained in this package.

GigaPak also comes with a software browser that lets you browse the CD-ROM for a "quick look" at a description of the program, copy it to your hard drive, or install it immediately from the browser's interface. GigaPak contains games, graphics, information highway tools, applications, communications, utilities, programming tools, device drivers, and more.

For more information, circle 12 on the Reader Service Card.

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# Mesa 2 for OS/2

By Marcia Watson Gulesian

*Mesa 2 is a quintessential OS/2 application. This article discusses its architecture and capabilities and outlines how the author has used this spreadsheet—on the desktop and across networks—with DB2 for OS/2, Lotus Notes, and the like.*

**A** native 32-bit spreadsheet application, Mesa 2 from Athena Design, Inc. takes advantage of OS/2 features including System Object Model (SOM), OpenDoc, multithreading, and an object-oriented user interface. In addition, Athena Design provides the Mesa Developer Object Kit (DOK) so that you can integrate Mesa objects into your own line-of-business applications.

## 3-D Workbooks

When you open a Mesa 2 file, the first thing you see is a collection of rows and columns—a layer of cells. However, that layer is only the first page of a multiple-page workbook, which can contain many different types of pages. Think of a workbook as a three-ring binder that contains data and calculations, presentations, notes and reminders, checklists for performing common tasks, and other items related to a particular project or person.

For example, you might have a workbook containing sales information for a number of related products in a given month.

For clarity, you can keep product information for each product in a separate layer. You can build layers that refer to information in other layers to collate that information into total sales statements and comparative analyses of product success. You can graph that information and drop the graph directly into a layer, next to the information it represents. And you can keep all of these calculations, data, graphs, and reports together in a single file.

If you are using a multi-page workbook, it is important to be able to move quickly to the page with which you want to work. The easiest way to do this is by clicking the page tab along the right-hand side of each file window (Figure 1).

## Threads

Mesa 2 is a multithreaded application—each file is a 3-D workbook running in its own thread, which means activity in one file won't interrupt your work in another. Real-time data can be incorporated from stock feeds and other sources through yet another thread, updating your files smoothly and continuously.

A description of how to interface with Mesa's real-time feeds is beyond the scope of this article. However, Mesa 2 ships with two sample applications that demonstrate how Mesa deals with real-time data feeds. The first, FEED.EXE, simulates the behavior of a real-time stock market data feed that sends stock market information into Mesa. The second, PAGE.EXE, simulates the behavior of a pager that accepts messages from Mesa.

## Mesa Objects

Mesa's object interface lets you access Mesa's functionality in your custom applications, easily integrating any of Mesa's business objects, or allowing other programs to access Mesa. That is, the same SOM-compliant C++ objects that work together with Mesa 2 are available for use in other applications. With Mesa objects, you can reuse part or all of the spreadsheet. For example, the user interface can be reused, modified, or even eliminated.

Most of the spreadsheet's functionality is built into a dynamically linked library (DLL), which communicates with the Mesa 2 executable programs by means of a controller object built into the program. Once your OS/2 application subclasses the controller, it can send messages back and forth to Mesa's core objects. For example, with a few lines of code it can create a three-dimensional array of cells (a *model*), populate the model with data, and display that data in tabular form in a scrollable view that supports row and column resizing, selection, etc. The tools

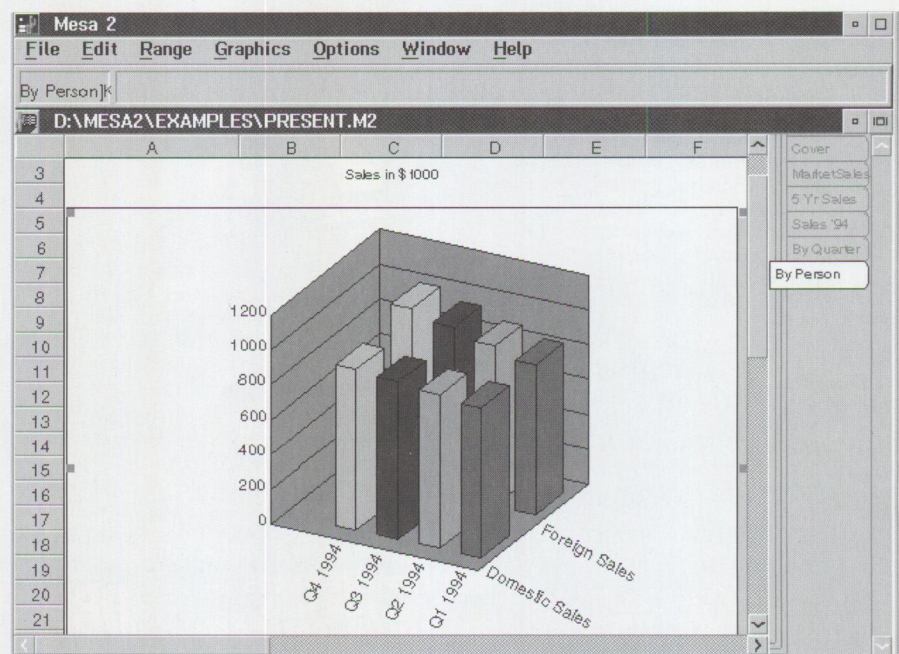


Figure 1. Mesa 2 Application Window



for doing this are part of Athena Design's DOK, currently being tested by select commercial OS/2 sites.

## OpenDoc

OpenDoc, designed to run software across multiple operating systems from Macintosh to Windows to OS/2 to UNIX, is an emerging industry standard supported by IBM, Apple, WordPerfect, Novell, Lotus, Borland, Oracle, and Taligent.

Athena, too, has shown a serious commitment to OpenDoc. This emerging standard for document-centered computing allows you to combine several small applications (OpenDoc *parts*) into a single integrated document—for example, combining text editing, tabular data display, graphics, and video parts into a single presentation—rather than depending on a single application to do everything. Athena Design tested a Mesa OpenDoc spreadsheet part for OS/2 in 1994 and recently developed a data-table/graph OpenDoc part for the Macintosh called DaveCalc. Because Mesa's objects are designed to be easily exposed, creating an OpenDoc part is mostly a matter of packaging existing objects in a different way.

## Scripts

Mesa *scripts* are sequences of commands that can be executed automatically to perform operations in a workbook. Think of a script as a list of instructions you are giving Mesa so it can perform routine tasks by itself.

You can write and edit scripts directly in Mesa, using the basic editor included with the program, and you can include those scripts in your workbook files, making them easy to review and access.

Mesa scripts are written in REXX, an OS/2-wide standard command language. Mesa scripts can also access special MScript commands (included with the spreadsheet software) that interact directly with the active workbook. Mesa-specific MScript functions can be called from within a REXX program to retrieve information about Mesa workbooks, to format ranges, and much more.

Because REXX is a general purpose language and not a Mesa-specific one, you can include scripts in your Mesa workbooks that interact directly with the

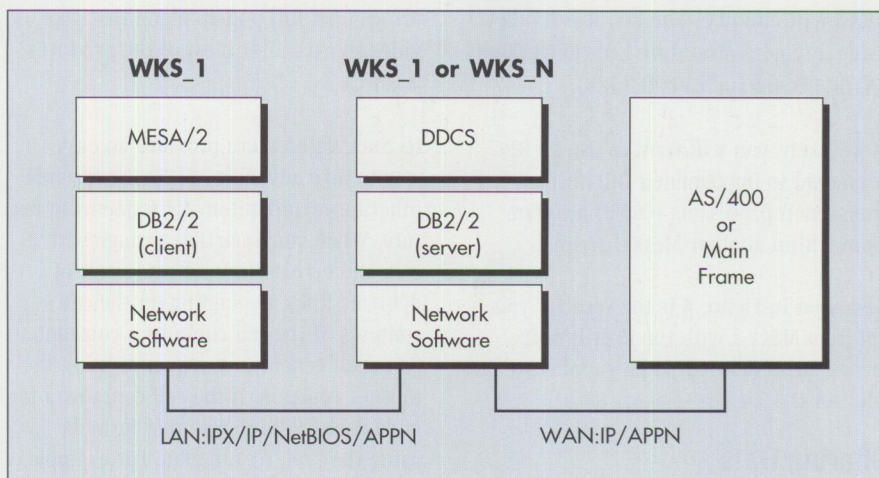


Figure 2. Mesa 2 Connecting to Distributed RDBMSs

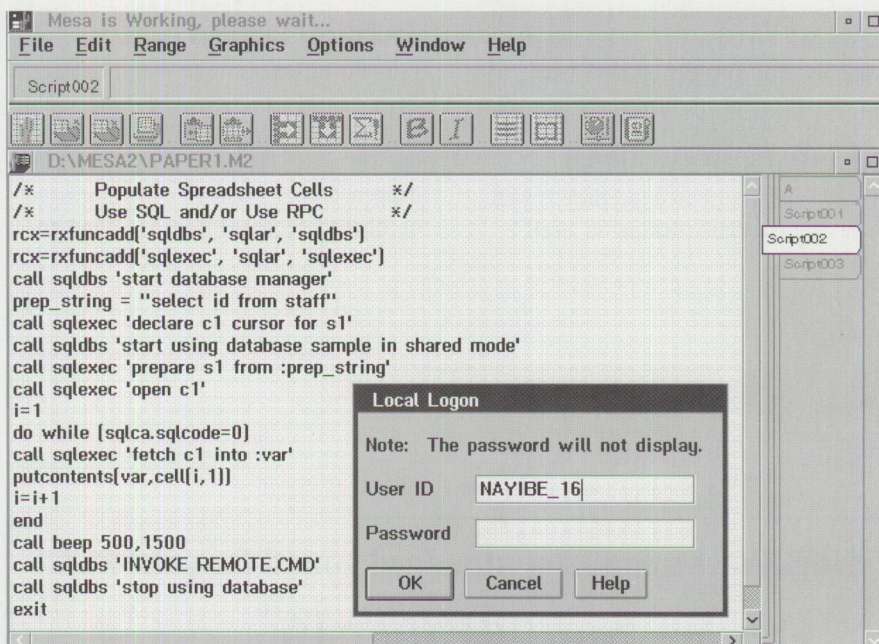


Figure 3. Mesa 2 Script

OS/2 desktop or with other REXX-enabled OS/2 applications. In other words, you can not only automate Mesa commands, but you can also develop scripts that integrate Mesa, OS/2, and other applications into integrated software solutions.

## Connectivity to Databases

The DB2 for OS/2 SQL database comes with a set of REXX extenders that allow a REXX script to insert, select, and update entries in DB2 for OS/2 and, with the Distributed Database Connection Services (DDCS) gateway option, in AS/400 and mainframe databases as well. Figure 2 shows the outline of a system by which

Mesa 2 can populate the cells of its spreadsheet directly from any one of these relational databases.

When you want to exchange data between Mesa 2 and a relational database, a number of approaches are available. Figure 3 shows a simple script which accomplishes this task, and more. It automatically starts a local (or remote) relational database management system (RDBMS), connects to a particular database (*sample*), and returns selected data from a table named "staff." After the database query has been completed, this same script runs a local beep and then plays (remotely) the



REXX-written ditty "The Red River Valley" using a remote procedure call (RPC). The INVOKE command calls the RPC.

More likely, you will want to use an RPC command to implement a full online transaction processing (OLTP) program from within another Mesa 2 script.

Also seen in Figure 3 is the security you get from Mesa 2 with the User Profile Management Services login supplied with DB2 for OS/2.

### Sharing Data

Mesa 2's dynamic data exchange (DDE) and clipboard capability enable it to communicate with other OS/2 and Windows applications (e.g., Lotus Notes) locally, with OS/2 alone, and remotely, when used in conjunction with LAN Server 4.0's network DDE and clipboard.

### Other Bells and Whistles

Mesa 2's object-oriented interface is well-implemented. Right-clicking on a cell

brings up a full pop-up menu that provides shortcuts for most of the product's features.

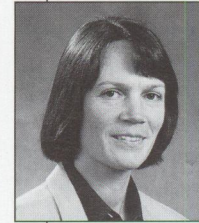
Its SmartFill feature provides an easy way to take advantage of Mesa's formula inheritance and automatic sequencing feature. When you SmartFill a range with a cell, Mesa creates one of two kinds of dynamic links, depending on the cell's contents. If the cell contains a constant, SmartFill generates a sequence using the NEXT() function. If the cell contains a formula, SmartFill inherits that formula using the SAME() function. For example, when you enter January into a base cell, SmartFill fills the rest of your range with the succeeding months.

### Technical Support

Virtually all software has bugs, and Mesa 2 is no exception. And in my evaluation of Mesa 2, I encountered one. That's the bad news. The good news is what happened after I sent an e-mail message to Athena's technical support. About an

hour later, I had my answer. They acknowledged the problem and provided me with an effective workaround. They hadn't seen this bug before and promised to correct it. A Mesa 2 update (Version 2.0.2), which I have since received, includes the maintenance fix.

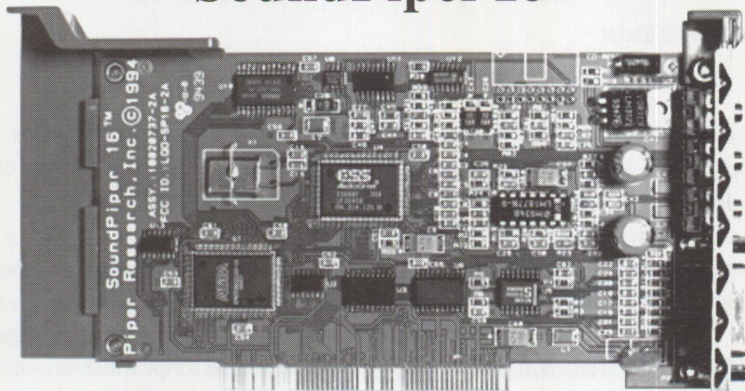
For more information about Athena Design's Mesa 2 product, circle 13 on the Reader Service Card.



**Marcia Watson Gulesian** is founder and director of the Boston OS/2 Users' Group. In addition, she serves as technical director of Gulesian Associates, a consulting firm in Concord, MA. She is currently developing distributed systems built around the OS/2 versions of IBM DB2, Lotus Notes, and Sybase SQL Server.

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# FILESTAR/2™

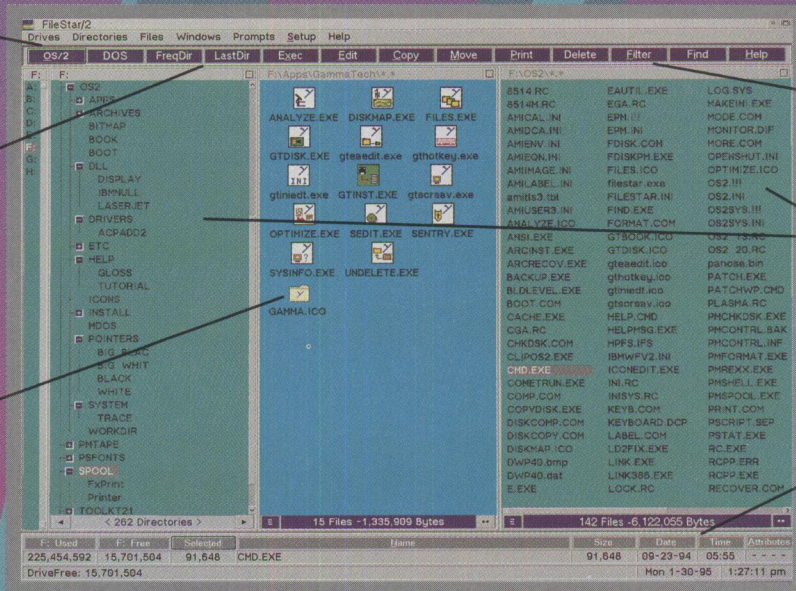
## File Manager for OS/2

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# Manage Your Files with FileStar/2 for OS/2

By Michael Norton

*In the shadow of Windows 95, SoftTouch Systems released FileStar/2 for OS/2, a graphical file manager bridging the gap between graphical user interface (GUI) and object-oriented user interface (OOUI) file management. This article describes the features of this easy-to-use method for managing your hard-disk files.*

FileStar/2 is designed to complement the OS/2 Drives object, easing the transition for DOS and Windows users migrating to OS/2 Warp, as well as providing advanced file management functions not provided by the Drives object. FileStar/2 provides a unique and attractive interface to your data.

## Drive, Directory, and File Windows

FileStar/2 employs the time-honored dual file windows approach to managing files—you will immediately feel at home! (See Figure 1.) This approach allows you to view the contents of two directories simultaneously for file operations such as copying or moving files between the two directories. You can display files in text, name, details, or icon views independently in either file window, plus you can use filename masks and attribute filters to display only the desired files.

Adjacent to the file windows are drive and directory windows. Changing the displayed directory is as simple as pointing and clicking, or, if preferred, you can use a dialog to quickly locate directories by entering a minimal number of characters in the Change Directory pop-up window. Lists of previously accessed and frequently used directories are maintained and accessible with a mouse click. As with files, you can copy, move, or delete directories. In addition, you can query directories to display the amount of disk space occupied by the directory and its files and subdirectories—a feature especially useful in managing network drives. Multiple drives can be displayed in the directory

window; you can rapidly change the directory displayed in the active file window.

## File Operations

The primary purpose of any file manager is to expedite copying, moving, and deleting files. FileStar/2 shines in these basics. File selection is simple and powerful. You can select contiguous files by swiping the mouse, or you can select an entire directory by simply pressing a button. You can select multiple discontinuous files by pressing the CTRL key while clicking on the desired files.

Initiating actions is just as easy as the basic operations of FileStar/2. It provides a variety of methods for invoking actions,

allowing you to select the method which is more convenient and comfortable for you. You can select actions from traditional, Common User Access (CUA)-compliant pull-down menus on the action bar or summon identical menus by clicking the right mouse button in the appropriate area on the screen. The most commonly used operations are also included on the button bar on the FileStar/2 display, which you can remove if you prefer to use the area to display more files. If you prefer using the keyboard to the mouse, you can use hot-key combinations to perform the same actions provided on the menus.

FileStar/2 also provides extensive drag-and-drop support, letting you drag and drop objects between windows or any Desktop object that supports drag-and-drop (such as the Shredder or Printer objects).

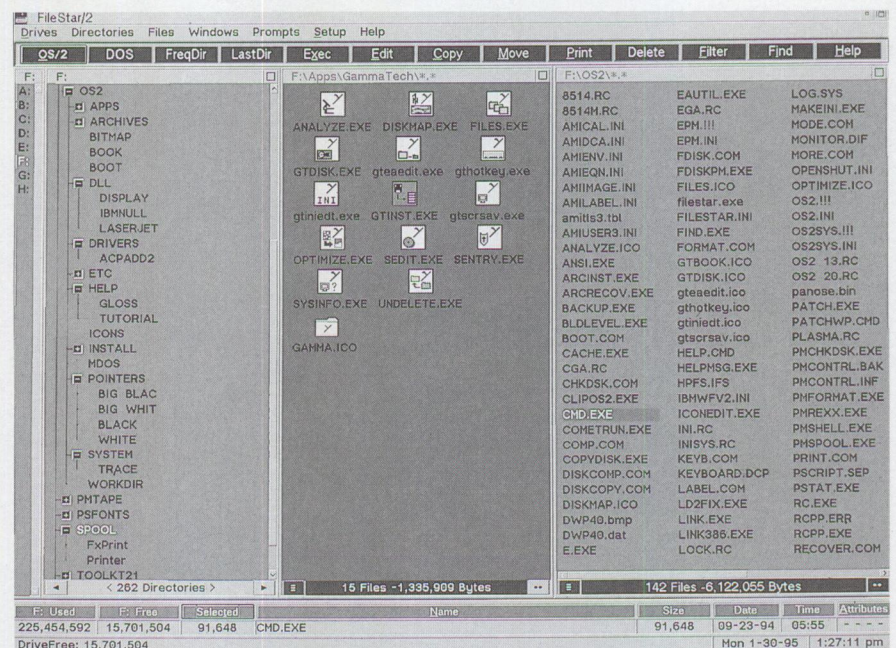


Figure 1. FileStar/2's Dual File Windows Approach



## Displaying and Editing Files

Managing files often requires viewing a file's contents to jog your memory as to just what the file contains. FileStar/2 allows you to double-click on a file and view its contents. You can view text files with the OS/2 System Editor or any editor you prefer. You can also use different programs for editing and browsing (such as E.EXE for browsing and EPM.EXE for editing or even a full-fledged word processor such as DeScribe or Ami Pro). FileStar/2 is especially useful as an interface for REXX programming. You can use the Edit feature to edit the .CMD file, then simply click on the file name in the file window to execute it.

If you are using any of the popular online services, Internet, and/or bulletin board systems (BBs), you will find FileStar/2 extremely useful in managing graphics files. It allows you to associate your viewer of choice with the graphics files, letting you browse the graphics files by pointing and clicking on the file you want to display.

## Archiving Files

While disk space has become less expensive, it is quickly exhausted, as you know. Even a gigabyte-sized hard drive fills up before you know it! Therefore, no file manager is complete without archiving support. FileStar/2 interfaces with the popular InfoZIP program, available for years as freeware from online services and BBs and also provided free of charge with FileStar/2. Compatible with PKZip, InfoZIP provides numerous user-specified options for controlling file compression, including the level of compression desired as well as an option for compressing multiple files or entire directories.

Creating zipped files has never been easier: Use FileStar/2's advanced file selection methods, invoke a pull-down or pop-up menu, and zip the file. It's that simple. InfoZIP parameters even let you automatically delete the original files. To view zipped files, you simply double click on the desired files to display them in a ZIPView window, where you can selectively view or extract files.

## Interfacing with OS/2 Facilities

InfoZIP is not the only program FileStar/2 interfaces with; it also makes clever use of

native OS/2 facilities such as PMFORMAT, PMCHKDSK, and PMSEEK. By interfacing with these programs, FileStar/2 reduces the amount of code that must be loaded into memory. Particularly useful is the PMSEEK interface, which allows you to rapidly find files and change to the file's directory by pointing and clicking.

## Swapping Windows

FileStar/2 minimizes to a "sticky window," which you can post anywhere on your Desktop for quick, convenient access. The sticky window constantly monitors the amount of free disk space, size of the swapper file, and amount of memory available to the system, alerting you when the amount of available memory falls below a level you specify.

## Customizing FileStar/2

For all its powerful features, most users are drawn to FileStar/2 because it is . . . well, quite simply, fun. It is easy to use but, more interestingly, personable. From customized "frequent directories" to the colors of the buttons, FileStar/2 was developed with the philosophy that data is, in the end, personal on a personal computer. FileStar/2's developer, Jim Read, is a

retired test pilot, which explains the cockpit feel of the program—that you're in control of your files. The menus provide convenient access to the OS/2 color and font palettes. You can customize your editors and viewers. You can define and quickly access frequently used directories. You can have everything just like you want it—all with FileStar/2!

SofTouch is proud to present OS/2 users with the highest quality, next generation software such as FileStar/2 and the recently released UniMaint, as well as the established GammaTech Utilities, Power Pack, File Secure, and REXX SuperSet/2. For more information about SofTouch and these products, contact SofTouch at 1300 S. Meridian, Suite 600, Oklahoma City, OK 73108, (800) 944-3028, or circle 14 on the Reader Service Card.

**Michael Norton** is the workstation division manager at SofTouch Systems. Previously, he has provided technical support and has written mainframe and PC technical reference books. He has a B.A. in Philosophy and has been involved with personal computers since 1982.

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Please circle #24 on reader service card.



# PartitionMagic for OS/2

By Steven P. Schneer

*PartitionMagic, which Personal Systems reviewed in "What's New for OS/2?" a couple of issues ago, seemed like a dream come true. So we asked Steve Schneer, a certified OS/2 engineer, to take a look at the program and tell us if it does everything it claims to do. This article describes Steve's very satisfactory testing of PartitionMagic from PowerQuest.*

**H**ave you ever wanted to change the size of the partitions on your hard-disk drive? How about change a partition's file system from File Allocation Table (FAT) to High-Performance File System (HPFS)? Wouldn't it be nice if you could make both of these changes in just a few minutes?

If you support multiple machines that are evolving from DOS/Windows to OS/2 plus DOS/Windows and you want to set up Boot Manager, how do you add Boot Manager without the BACKUP/FDISK/RESTORE routine?

These tasks can be accomplished quickly and easily by using PartitionMagic for OS/2 from PowerQuest!

If you've been working on an OS/2 system for a while and the layout of the logical drives wasn't working for you, you had few options—until recently. The most common solution was to back up all of your data, run FDISK to rearrange your partition alignments, then restore your data. If you had a large hard drive and no tape backup unit, you probably didn't bother. It took too much time for the limited benefit. Even with a tape drive, it might have been too risky or time consuming to do this just for a more convenient arrangement. PartitionMagic 1.0 by PowerQuest eliminates all these problems. It allows you to modify the partition layout on your hard disk without removing or risking damage to the data or programs already on your hard drive.

## Overview

Power Quest provides three versions of the program. First is a Presentation

Manager (PM) version that can modify any partitions except the one from which OS/2 is booted. Second is a graphical 32-bit DOS version if you haven't installed OS/2 yet but want to modify your hard disk partitions (i.e., to install OS/2 with Boot Manager). Finally, there is an OS/2 character mode version that you can run from a floppy boot (or maintenance partition) to modify the OS/2 boot partition. I used each of these versions while I prepared this review.

In addition to its main partitioning task, PartitionMagic contains Check and Info functions. The *Check* function performs the equivalent of a CHKDSK many times faster than CHKDSK itself but does not fix errors (you still have to use CHKDSK for that). The *Info* function provides detailed information about the physical layout of your partitions and disk.

## Sizing Partitions

The initial screens of the PM version and the DOS version are very similar (Figure 1). The top box shows the physical drives on the system. The main box shows the logical layout of the currently selected volume. Below this is the options box for selecting the various actions on partitions. The buttons for help and exit are in the lower right corner.

When you select a partition to modify, the diagram of the current partition is shown (Figure 2). You can resize the partition by dragging the right or left edge of its block. Likewise, you can expand or contract the partition(s) to the right or left of the partition being

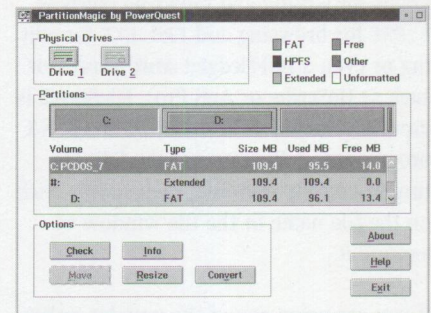


Figure 1. PartitionMagic Main Screen

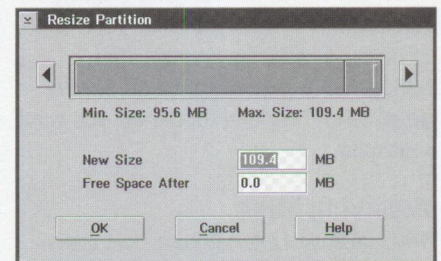


Figure 2. Resize Partition Window

changed (assuming there is sufficient free space in the partition to do so).

To be successfully contracted, a partition must have enough free space to "lose" the amount of shrinkage. To be successfully expanded, a partition must have enough free space in the volume to allow the expansion. This translates into the following scenarios: *Volume full* (no unused space) must shrink one partition to expand the other or allow addition of a new one. *Volume not full* must shift the partition either direction and expand or contract up to the limit of available space.

The rearrangement scenarios have an additional limitation if using the FAT file structure: no FAT disk can have more than 65,525 clusters. Because the cluster size is determined at format time, not partition time, this will limit the range of adjustment that PartitionMagic can allow. Also, if the partition being modified is a FAT partition or is bootable, it must reside entirely within the first 1024 cylinders of



## Quick Fixes

As this review was being written, I continued to monitor electronic forums for information about the progress of PartitionMagic's acceptance in the marketplace. Based on this admittedly unscientific process, I found that the product is well received and widely used. I also found that PowerQuest quickly fixes problems identified by users, making these fixes available on their BBS and Internet Web site ([www.powerquest.com](http://www.powerquest.com)).

These updates are provided as patches to each of the prior versions as well as the current version of 1.04, thus saving download time since they replace only the wrong code. The patch looks for specific coding to replace and is totally

useless to someone without an installed copy of PartitionMagic.

PowerQuest's staff is very responsive to customer problems, working hard to ensure the product won't cause data loss or corruption. Critical problems are fixed and released immediately, while cosmetic problems are addressed at a lower priority.

PartitionMagic is a well designed product, fitting a specific need, and sold and supported by a responsive and technically competent company. PowerQuest is working on the next release due late this year, and they are constantly reevaluating pricing and licensing details to best suit the marketplace.

the physical drive (or have logical remapping done via drivers or the BIOS).

### Boot Manager Issues

One of the main reasons I use PartitionMagic is to install OS/2 on a DOS/Windows machine using a Boot Manager setup. I prefer the Boot Manager setup because it allows me to decide at boot time which OS/2 to go to. Since most of the machines I work on do not provide any unused space on the drive, installing Boot Manager requires repartitioning even if there is already a partition that could receive OS/2. PartitionMagic allows me to install with Boot Manager without destroying the existing data on the drive. There still must be sufficient room for the install, but now I won't have to back it up, repartition, and restore just to begin installing OS/2.

In the current release of PartitionMagic, the process described above sometimes causes Boot Manager to lose track of the partition name or its "bootability." Both PowerQuest and IBM are investigating this problem. The workaround in the PartitionMagic documentation does work and restored the ability for me to boot with the partition I had resized.

### FAT to HPFS Without Tears

If you want to change from FAT to HPFS, PartitionMagic can do the conversion

without reformatting. This is presently a one-way change for two reasons:

- Potential file name clash when converting from long file names to FAT's 8.3 format
- Potential problems with FAT cluster sizing

PartitionMagic handled the conversion of extended attributes from the EA DATA.SF file (in FAT) to the directory (in HPFS) without a problem. Several online forum discussions about this during this review prove there is significant interest in being able to change back, but at present it's a one-way operation.

### Stacker

I also have Version 4 of Stacker for OS/2 and DOS installed. According to the documentation, PartitionMagic works fine with Stacker. Since Version 4 of Stacker had just been released when I was testing PartitionMagic, I wondered if PartitionMagic had been tested with the new Stacker version. I tested it with both stacked and non-stacked partitions and, with one exception, it worked fine.

The exception was caused by upgrading from Stacker 1.0 to Stacker 4.0. The Stacker upgrade program uses slack space in the FAT table for the additional space available with the Stacker 4.0 release.

This slack space is the same space used when Stacker resizes a drive. Since Stacker uses the same space for both purposes, I couldn't expand my stacked partitions until I got the workaround from Stac. If I had been using Stacker 4.0 from the beginning and not an upgrade from Stacker 1.0, I wouldn't have encountered this problem.

### Conclusions and Thoughts

The program works very well for a 1.0 release. Initially, I used it very cautiously and had double sets of backups "just in case." I found no evidence of data loss or corruption during the testing. During the testing, a fix was released to resolve minor problems and to provide a diagnostic program, PARTINFO.EXE. This program reports on the partition layout to help resolve technical support questions.

PowerQuest strongly recommends a backup before any action (actually, I wouldn't do this type of operation with *anyone's* product without a good backup). In the case of PartitionMagic, the program worked like a charm and saved me the time I would have spent restoring and verifying all my files.

The documentation could use some improvement. The list of error messages in Appendix C could be enhanced by explaining each error, including typical causes and possible cures.

PowerQuest is working hard to eliminate the minor rough edges.

For more information about PartitionMagic, circle 15 on the Reader Service Card.



**Steven P. Schmeer**

is an independent consultant and a certified OS/2 engineer. He is a member of the board of directors of the Tampa Bay OS/2 user's group and active in TEAM

OS/2. He has been an application developer, systems analyst, and database analyst, and he has worked with mainframe computers since the punch card days and with personal computers since the Apple II+.



# Managing LAN Server Home Directories

By Bob Labenski

*Whether you are managing one home directory with a few users or a multitude of home directories spread throughout your organization, you need to establish guidelines for storage, and you need a management tool. This article examines the benefits and pitfalls of managing these home directories and also describes how Client Server Networking's MANAGEIT product can help with your management efforts.*

In an acronym-laden world of INIs, ACLs, and DLLs, the phrase "home directory" seems familiar and friendly. A home directory is an IBM LAN Server shared file resource for one or more users that provides disk space to store private data. This resource increases personal storage for personal computers constrained by disk space. Media-less workstations gain the essential disk storage necessary to be usable. In both of these cases, home directories extend the life of smaller machines, saving time and money while providing function. Home directories also provide security, enabling mission-critical data to be backed up.

## The Need for Control

At first glance, home directories seem like a great idea. LAN Server home directories can be an effective, efficient, and comprehensive tool if used properly. But they require management controls to meet even minimum performance levels. Too often, directories are exposed to abuse, either willfully or by neglect.

Administrators tend to handle these abuses in three ways. When abuse is epidemic, some desperate administrators simply choose not to use home directories, thus losing the many advantages the directories can offer the organization. Other LAN Server administrators, not wanting to open a Pandora's box of troubles, ignore their users' home directory files and let them fill with an unknown assortment of treasure and trash. These LAN administrators rationalize that the home directory is a necessary mechanism for users to get

their work done efficiently, even if it does grow at an uncontrolled rate. A third strategy used by a brave minority of administrators is to try to control the

number and type of programs and files stored on the home directories. Too often, this undertaking parallels the burden of Sisyphus, who was condemned by Zeus to forever roll a rock uphill only to have it forever roll back upon him!

Before LAN Server 4.0 Advanced, users could readily ignore, without consequence, any home directory thresholds you set. With LAN Server 4.0 Advanced, if you arbitrarily set a particular user threshold at 1,000 KB (and the given

Storage (KB)			
User ID	Allowed	Used	Path
Bob	5	14	\\MOD55\D\$\HOME\BOB
Buffy	10	12	\\MOD55\D\$\HOME\BUFFY
Carolyn	10	12	\\MOD55\D\$\HOME\CAROLYN
Dave	10	12	\\MOD55\D\$\HOME\DAVE
John	10	12	\\MOD55\D\$\HOME\JOHN
Linda	10	12	\\MOD55\D\$\HOME\LINDA

Figure 1. CHKSTOR Output

MANAGEIT 'the space is out there'						
Listing of Home directories		MOD55.USR	05-26-1995			
Home directory						
User ID	Type	Limit	Assignment	Server	Path	
Linda	Admn	10	H:	MOD55	\DS\HOME\LINDA	
Buffy	Admn	10	H:	MOD55	\DS\HOME\BUFFY	
Dave	User	10	H:	MOD55	\DS\HOME\DAVE	
Carolyn	User	10	H:	MOD55	\DS\HOME\CAROLYN	
Bob	Admn	5	H:	MOD55	\DS\HOME\BOB	
John	User	10	H:	MOD55	\DS\HOME\JOHN	

Figure 2. MANAGEIT-Generated Home Directory List



home directory is on an HPFS386 partition), the user is limited to this size. Conversely, if you don't set a threshold for the user, LAN Server does not enforce a limit. You can change the thresholds for any LAN system from the graphical user interface (GUI). In LAN Server 4.0 Advanced, you must select the CHKSTOR threshold check box and indicate a separate threshold limit for each user account.

This new LAN Server 4.0 Advanced directory limit lets you more easily monitor and control the size of each user account in the home directory. However, the story doesn't end here with a solution and a "happily ever after." Hidden problems such as useless clutter, games, and unlicensed programs can be lurking in the contents of the directories. Outdated or incorrect data might be used to make invalid and irrelevant business decisions.

### The Management Process

The management process starts with a list of users and the locations of their home directories. You can use the CHKSTOR command to provide this information. Unfortunately, the CHKSTOR command can be used on only one server at a time. Many administrators must monitor two or three locations or as many as a dozen home directory servers on any one domain.

Additionally, CHKSTOR reports on only those users who were given threshold limits (Figure 1). To ensure a complete report, you must set a limit for every home directory user. To overcome the potential of an incomplete CHKSTOR report, you can issue a NET USER command for each user to obtain the assigned home directory's location and name.

Even after you know the locations of all home directories, supervising them is a Herculean task. You can manually mark, copy, and paste the location obtained by a CHKSTOR or NET USER command to create a DIR command to get detail at the file level. However, this time-consuming activity is error prone and, once the data is obtained, still requires more effort to audit. An automated process will control these errors if you have the time and are familiar with REXX.

MANAGEIT 'the space is out there'					
Detail of Home directories			SAMPLE.DTL	05-26-1995	
Home directory					
User ID	Limit	Assignment	Server	Path	
Linda	10	H:\	MOD55	\D\$\HOME\LINDA	
		4/04/95		15	123.EXE
		4/04/95		14	PW.COM
		4/04/95		8	TEST.WK1
		4/04/95		9	LETTER.TXT
		10/01/89		505	PARK.COM
		12/28/94		217	CONFIG.SYS
Total space used				768	

Figure 3. MANAGEIT-Generated Home Directory Detail

Figure 4. MANAGEIT's FILTER Program

MANAGEIT 'the space is out there'		05-26-1995
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To: LINDA

Subject: Please help in the clean up

From: Your friendly LAN administrator

We need more disk space!!!  
The enclosed list is only a suggestion of files that could be removed from the system.

It contains files that are vintage and are probably of no use to you.

Please look them over and delete them where appropriate.

Thanks for your assistance.

Bob

Number of files: 6 Total space used: 768  
4/04/95 15 123.EXE  
4/04/95 14 PW.COM  
4/04/95 8 TEST.WK1  
4/04/95 9 LETTER.TXT  
10/01/89 505 PARK.COM  
12/28/94 217 CONFIG.SYS

Figure 5. User Notification



MANAGEIT 'the space is out there'				
Billing of Home directories      SAMPLE.DTL - 4/12/95      05-26-1995				
Space			Home directory	
User ID	used bytes	Charge	Server	Path
Linda	768	50.04	MOD55	\\D\$\HOME\LINDA
Buffy	768	50.04	MOD55	\\D\$\HOME\BUFFY
Dave	768	50.04	MOD55	\\D\$\HOME\DAVE
Carolyn	768	50.04	MOD55	\\D\$\HOME\CAROLYN
Bob	1273	50.06	MOD55	\\D\$\HOME\BOB
John	768	50.04	MOD55	\\D\$\HOME\JOHN

Figure 6. MANAGEIT Report to Show Usage Charges

MANAGEIT 'the space is out there'				
Summary of Duplicates      BIGSERV.DTL      06-12-1995				
File name	Date	Size	Total space used	Number
123.EXE	2/21/95	33	66	2
DATA.TXT	3/06/95	39	78	2
E.COM	2/17/95	19	38	2

Figure 7. MANAGEIT Report to Summarize Duplicate Files

The ideal situation is to have the level of detail for each user shown in Figure 2.

This report, generated by MANAGEIT, a software program available from Client Server Networking, provides all the detailed information you need. For example, you now know the home directory's owner, location, and size. Once you obtain a list of all user directory locations and with a little more automation, you can obtain the content of each user's home directory. Figure 3 provides an example of the information you can gather. In this MANAGEIT report, you can display the server, directory, user-assigned drive, total

space consumption, file content, and file sizes. This report, which may be too large and cumbersome to be practical, may require further reduction. You can achieve better results after setting guidelines, as discussed below.

### Setting Guidelines

The next step is to determine—at the detail level—what files should or should not be in the users' home directories. Before starting this process, you should establish a few rules and guidelines. The following list details what kinds of parameters should be set:

- **Archive storage**—Determine a time limit (one year, for example).
- **Program and application storage**—If programs and applications are shared or available on a local disk, you should not allow files with .COM or .EXE extensions on home directories.
- **Miscellaneous temporary files**—Determine a time limit (one year, for example).
- **Project directories**—Require users to create directories by project so that when the project is completed, the directory can be archived.
- **Backup option**—Where possible and practical, disable the backup option some applications provide. This will reduce duplicating the same data in different locations.
- **Common shared libraries**—Place shell documents and spreadsheets (letterheads, logos, FAX cover pages, expense sheets, etc.) in a common shared library to reduce wasteful duplication.

Paper reports are workable for smaller domains, but most administrators need more automation. To begin distilling the amount of data needs, you must first be able to exclude specific files or users. Set a cutoff date and size to further refine the process. To complete the filter definition, you must now force the inclusion and exclusion of files by name. By selecting the proper criteria, you can generate a list of the offending files and users. MANAGEIT's FILTER program implements the criteria described above (Figure 4).

### Considering the Users

Once you determine a particular home directory is out of control, completely entangled, or just plain "messy," another problem arises. To perform any action on the files, you must first consider your users' needs and requirements. While you might consider deleting certain files as ridding the system of unnecessary bulk, your users might consider this same data indispensable and demand it not only be saved but be backed up as well. You must establish a dialog between you and your users and gain agreement for the established criteria so that home directories are used to their full potential.



At this point you have obtained a detailed listing of all files in all users' home directories and created a list of files you would like to see removed. The next step is to notify the users. Send a notice in two forms: one on paper for the mail room to handle and another across the network (to avoid the "I was on vacation" or "the dog ate my copy" excuses that may follow). This correspondence can be generated by the MANAGEIT program as shown in Figure 5.

Gaining your users' cooperation will require patience and time. Some will respond to your request, while others will resist or ignore you. To resolve this problem, the next step may be to educate users and their management on the costs of space management.

These costs are typically overlooked and frequently may be higher than you or your users think. The costs include the original purchase of the disk space, amortization, expansion, capacity planning, performance management, backups and restores, and, last but not least, your time to perform these tasks.

Using MANAGEIT, you can generate a report as shown in Figure 6 to report space used, charges incurred, plus server and directory location by home directory user. Even if you don't use the report to recover internal costs, you can use it to indicate misuse and wastefulness in relation to actual need. The MANAGEIT package includes the process to create this report by department or by organizational unit. When organized at this level, it indicates to the unit manager misuses that should be addressed.

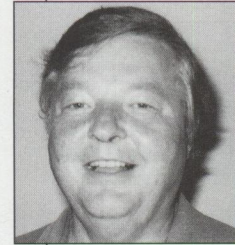
Do you think the job is done? Have you considered duplicate files? You now have all the data to make this analysis. You probably want to find duplicate files by name, size, and date. With a sort and merge and a little more programming, you can create the report in Figure 7.

### Gaining Control

No matter what your corporate culture, managing home directories is a necessary process, but it does not have to be a tedious process. At the very least, you have the responsibility to maintain license control and hardware expansion.

You can also conserve costly electronic storage space by providing guidelines for using home directories.

Managing your storage on your home directories can be simplified with MANAGEIT, which was developed with the objectives discussed in this article. For more information about MANAGEIT and other Client Server Networking products, call (203) 233-2951 (voice or fax) or circle 16 on the Reader Service Card.



**Robert Labenski**

retired from IBM in 1991 after 25 years as a systems engineer, primarily in the insurance industry. In

1992, after rebuilding a British sports car, he formed Client Server Networking Inc. Since that time, this organization has produced three original management products for IBM LAN Server: WATCHIT for performance and capacity, CHECKIT for availability, and MANAGEIT for home directory oversight.



# IBM DualStor for OS/2

By Steven P. Schneer

*IBM's DualStor for OS/2 provides the features and functions necessary to ensure you can maintain the integrity of your computer's hard disk in the event of a catastrophic data loss. Steve Schneer, certified OS/2 engineer, tested the product (both intentionally and unintentionally after an unexpected hard-disk crash) and writes about his results in this article.*

**W**ould you like a tape backup program that is inexpensive, supports most floppy-based quarter-inch cartridge (QIC) tape drives, and is easy to use? How about a native OS/2 Presentation Manager (PM) application that also has a stand-alone command-line restore capability? What if it also has plenty of features and good performance, too? What if it has versions with the same user interface for OS/2, Windows, and DOS?

Too good to be true?

Nope. Just take a look at IBM's DualStor Backup Program for OS/2 Version 2.0.

## Backup and Restore

The first thing a backup program must do is back up and restore. This seems obvious, but sometimes the most obvious things are overlooked. How many systems use more than one disk partition? A backup program should be able to back up all of the desired partitions in one session to ensure synchronization of files that are contained on different partitions. For example, an application might reside on your E: drive, but that application might also have .INI files on your OS/2 boot drive. If these files are not kept in sync, the program might not work as expected (or at all).

Another nice DualStor feature is that it lets you select the subdirectories you want to back up. If you happen to have a system with several subdirectories that don't change very often (e.g., fonts, clip art, icons), it is sufficient to back them up once (or only when they change substantially) and then forget them.

On the other hand, you probably want to make frequent backup copies of your directories containing work in progress (programs you are developing, letters, spreadsheets, etc.). In this case, you want a configurable "JOB" feature that can be scheduled to frequently save this work to a tape so you have a recent copy in the event of a hardware failure or possible user error (you just dropped the only copy of your "Great American Novel" manuscript on the shredder icon instead of the fax icon while sending it to your publisher!).

You might also want a simple "one click backs up everything" mode as well as a "pick and choose down to the individual file" mode.

DualStor has all of these features and a few others as well.

## Installation and Overview

After a quick installation (several minutes), followed by a reboot (since it adds a driver to the CONFIG.SYS file to support the tape drive), DualStor appears as a folder icon on the OS/2 desktop (Figure 1), which contains icons for the program, several shadows of preconfigured JOBS (\*.TPF files), and an AutoTape scheduler.

Use the DualStor program icon to carry out interactive backups and restores, as well as various tape volume and tape

## IBM DualStor Product Information

The native OS/2 version of DualStor was reviewed in this article. DualStor Backup Program for DOS and Windows Version 2.0 is also available.

Both the OS/2 version and the DOS/Windows version are sold as stand-alone software packages or as part of a convenience kit that includes an internal tape drive. The tape drives included in the convenience kits are either the DualStor 250 Internal Tape Backup Unit or the DualStor 450 Internal Tape Backup Unit.

The DualStor 250 drive supports the QIC-80 and QIC-80-XL mini-cartridges. The DualStor 450 also supports the QIC-WIDE as well as the QIC-80 and QIC-117 mini-cartridge tapes. These drives can read and write in the QIC-80 format as well as the SERVO

format that is compatible with the former PS/2 Internal Tape Backup Unit (also known as Irwin Accu-Trak format).

The drives come with hardware for mounting in a standard 5-1/4" floppy drive bay, or the extra mounting hardware can be removed and the drive can be mounted in a 3-1/2" floppy drive mounting space. In addition, supplemental hardware is available for mounting in PS/2 drive bays.

Included with the drive is an extension/splitter cable for the power and an ingenious piggyback cable for attaching to the floppy drive cable. This cable lets you add the drive even if you already have two drives attached to the floppy controller.



library management functions. JOBS are preconfigured settings that allow you to back up or restore a specific set of files, subdirectories, or drives with complete flexibility to include and exclude files by name, date, or attribute.

The AutoTape scheduler, which can be shadowed into your Startup folder for convenience, will run backup JOBS at predetermined times.

### Interactive Use

The simplest way to begin using DualStor is to double-click on the DualStor icon, launching the program in interactive mode. A "Backup Basics" option allows for a fast and easy backup or restore of entire drives with a minimum of interaction. This assumes that you want all files on the drive and asks a minimum of questions before the backup or restore. In the standard backup/restore mode, you are given many more options for files and drives selection. In addition, you have much greater control over the destination of the files being processed.

Initially, you are presented with the basic DualStor screen (Figure 2). This screen contains icons for the various resources that DualStor uses: Drives, Servers, Session Logs, and Tapes. Each of these icons can be expanded (Figures 3 and 4) to provide a tree type diagram of the contents.

The *Drives* object contains the physical drives, subdirectories, and files to be backed up. The *Tapes* object contains the tape directory information from either the library or the tape itself. The *Session Logs* object contains the log of previous backup/restore sessions. The *Servers* object contains the drives and servers of networks to which your workstation is connected. This feature allows the local backup of files that are stored on network drives (LAN Server, Novell 3.x, LANtastic for OS/2, and NetBIOS-compatible networks).

You can accomplish a full drive backup or restore by selecting the drive's check box, then backup, or by selecting the tape's check box, then restore. This will prompt for a new tape (backup) or the appropriate tape volume (restore) and will proceed to back up or restore as requested. Options for backups include preserve directory structure and erase

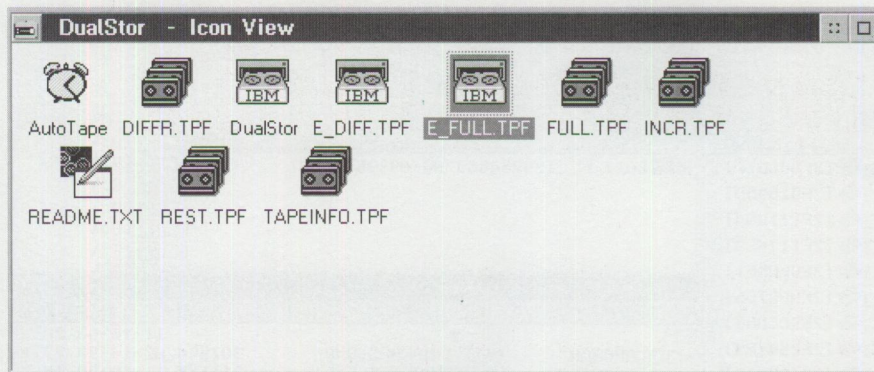


Figure 1. DualStor for OS/2 Folder

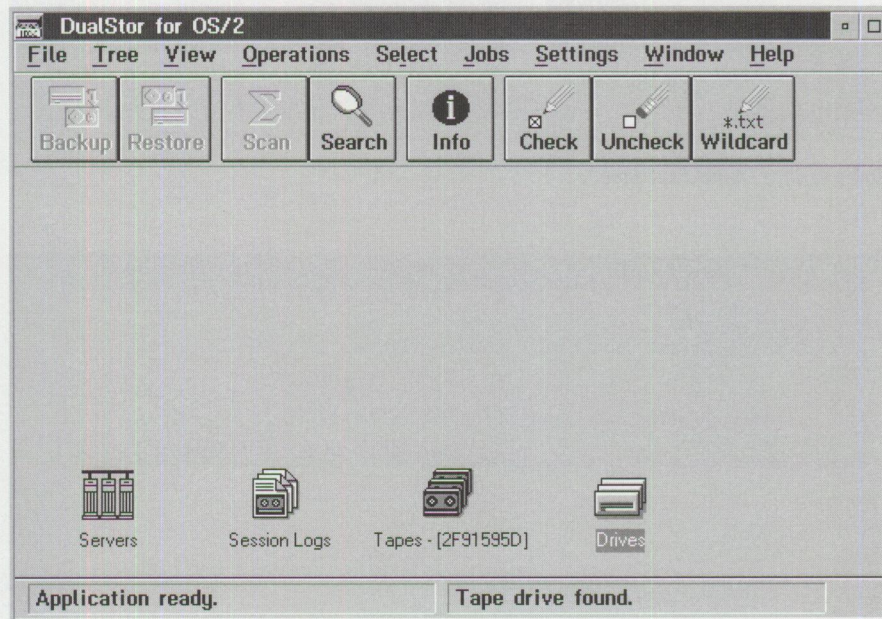


Figure 2. DualStor Base Screen

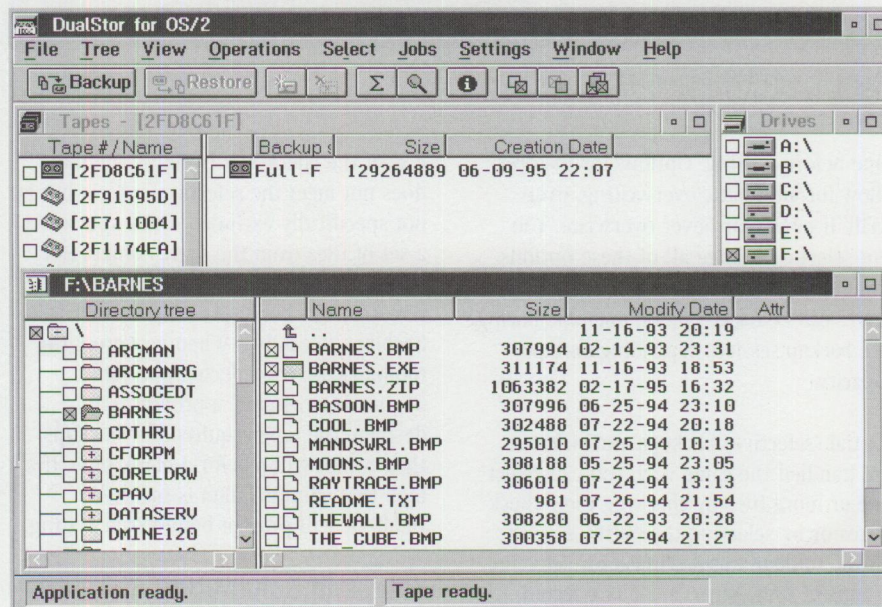


Figure 3. Drive Object Expanded



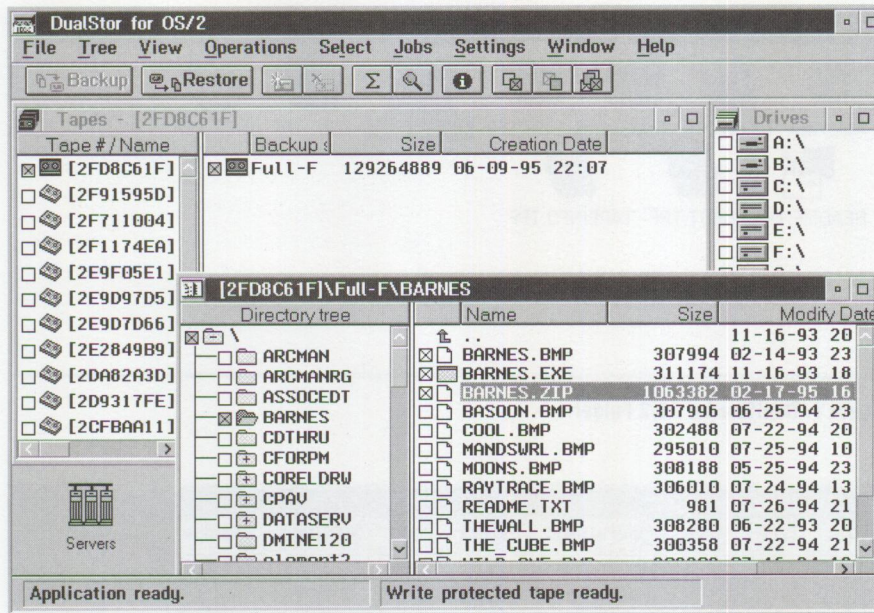


Figure 4. Tape Object Expanded

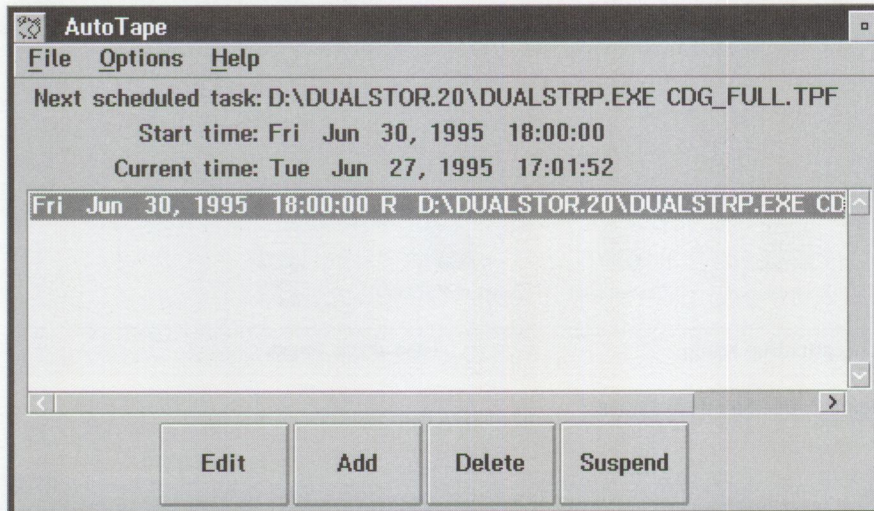


Figure 5. AutoTape Scheduler

tape before writing. Options for restores allow for automatic overwriting, overwrite if newer, or never overwrite. You can select or change all of these options from the options menu bar entry. Multiple drives can be backed up on one tape during one backup session, depending on tape capacity.

Partial (selective) backups and restores are handled the same way. You can select one or more files by checking their check boxes or by selecting the "CHECK" icon on the toolbar to set criteria for selecting groups of files. When a file is selected, you will see an 'x' in its check box. If a file is excluded, a "∅" replaces the check

box. If the check box is blank, the file does not meet the selection criteria but is not specifically excluded. Once you select a set of files from the drives object (for backups) or from the tape object (for restores), the corresponding toolbar icon becomes selectable. When you press the toolbar icon, the selected operation begins. For restores, a prompt will describe the tape required; for backups, the prompt will ask for a blank tape. If a tape that contains data is inserted, DualStor will prompt before overwriting.

### Jobs and Scheduling

Using DualStor interactively works well but can become tedious if you are

working on many different projects on a large machine with multiple partitions, and especially if the hard drive's entire contents don't fit onto one tape. In either of these situations, DualStor's ability to create JOBS can make backup management substantially easier. This ability goes a long way to ensure that backups are actually performed as frequently as needed.

A JOB contains all of the settings for a particular backup. This means that you can interactively set up a backup (or restore) to pick and choose the drives, directories, and even files to back up and all options associated with this backup (overwrite tape, compression enabled, etc.), and save these settings to a JOB file (indicated by default extension .TPF). This JOB file (and DualStor to run it) is then associated with a specific program that you can launch by just double-clicking on the .TPF file icon. You can also shadow this .TPF file to the DualStor folder, making all of the backup (and restore) JOBS immediately accessible without having to start DualStor and select the job to run.

AutoTape operates in conjunction with JOBS. The AUTOTAPE.EXE program acts like a mini-scheduler to start a preconfigured job at a specified date, day, or time to perform a backup (or a restore if you happen to *know* you will need a restore at some future time). AutoTape allows for scheduling daily, weekly, and monthly jobs as well as scheduling based on a time interval (Figure 5). This allows you to establish a thorough backup strategy based on automatically scheduled jobs that require only initial tape setup and replacement as needed.

### Stand-Alone Restore

One of the long-standing concerns with most backup solutions for OS/2 has been the contradictory requirements to have a PM-based solution as well as to have a stand-alone restore (SR) capability. Generally, the PM solution is desirable for routine daily interaction because of its ease of use. However, since PM requires a significant number of files and configurations, it is usually impossible to establish when booted from diskettes—the solution you need when you have to restore to a blank hard disk.

*Stand-alone restore* is generally defined as the ability to boot from floppy (or a



small maintenance partition) and restore the entire OS/2 environment without reinstalling. DualStor comes with the capability to build a set of three diskettes that can be used to do a stand-alone restore. These are built based on the install disks for the system in question and are simple to create. Once a set is built (*and tested*), it becomes very easy to recover a full OS/2 implementation.

While I was testing DualStor, my hard disk failed. This was unrelated to the testing—the planned testing of SR was not supposed to be this realistic! After the hardware was replaced, I followed the SR instructions to repartition the drive, format the partition, and restore the OS/2 partition from the three disks and the most recent full backup tape. I also restored all the other partitions on that tape—just to prove it could be done.

When the SR completed, I crossed my fingers a couple of times and rebooted. Without hesitation, the system came back up exactly as it had been prior to the backup and was entirely functional. Once the hardware was replaced, the entire restore to a fully functional 90 MB OS/2 2.1 boot partition took just over one hour. This time is far superior to manually restoring: 30 minutes for the base system install, 30 minutes for the Communications Manager install, 30 minutes for the NetWare Requester install, one hour

for the TCP/IP install, and then two or three days to reconfigure, recustomize, and rebuild the desktop. Not to mention all the things that would be forgotten until the next time you try to use them! I figure it saved at least two days of effort to get this workstation fully functional.

### Documentation and Support

DualStor comes with a *Users Guide* manual, a *Getting Started* booklet, and a pamphlet with licensing information. The *Getting Started* booklet has the install information and instructions for creating a set of stand-alone restore diskettes. The licensing information has the license and a table containing the supported hardware configurations. Updated listings of supported hardware configurations are available from the IBM PC Company HelpCenter at (800) 426-7299.

DualStor is supported by the IBM PC Company HelpCenter, which can be contacted via a toll-free phone number. They also have a presence on CompuServe in the IBMobi forum. During my product testing, I kept in touch with Tim Mullaney, senior support specialist, who provided excellent support. I was pleased by the level of answers provided, the accuracy of information, and the timeliness of the support. I subsequently determined this level of support is provided by all the members of the HelpCenter.

### Limitations

The program currently supports only tape drives that attach to the floppy controller. In most cases, it will support either regular or high-speed floppy controllers. It also does not support small computer system interface (SCSI) tape drives. According to sources in the development area, the need for these features is known and being pursued.

### Conclusion

During the testing, I found that DualStor is the kind of product I like a lot. It works the way it is supposed to work, it has just the features I need without a lot of extra and unnecessary bells and whistles, and, in the case of the stand-alone restore capability, it did just what it had to do to recover my system.



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OS/2. He has been an application developer, systems analyst, and database analyst, and he has worked with mainframe computers since the punch card days and with personal computers since the Apple II+.



# Human-Computer Interaction Overview

By Ed Hilpert

*Whether you like it or not, whether you are ready or not, the computer is encroaching on your everyday life at an ever-increasing pace. Small or special-purpose computers that power automated teller machines, digital cellular telephones, pagers, and video games have all become widely accepted by people other than the technical gadget-hounds who originally bought them. This article describes the social interfaces that are making our increasingly technology-controlled world more friendly.*

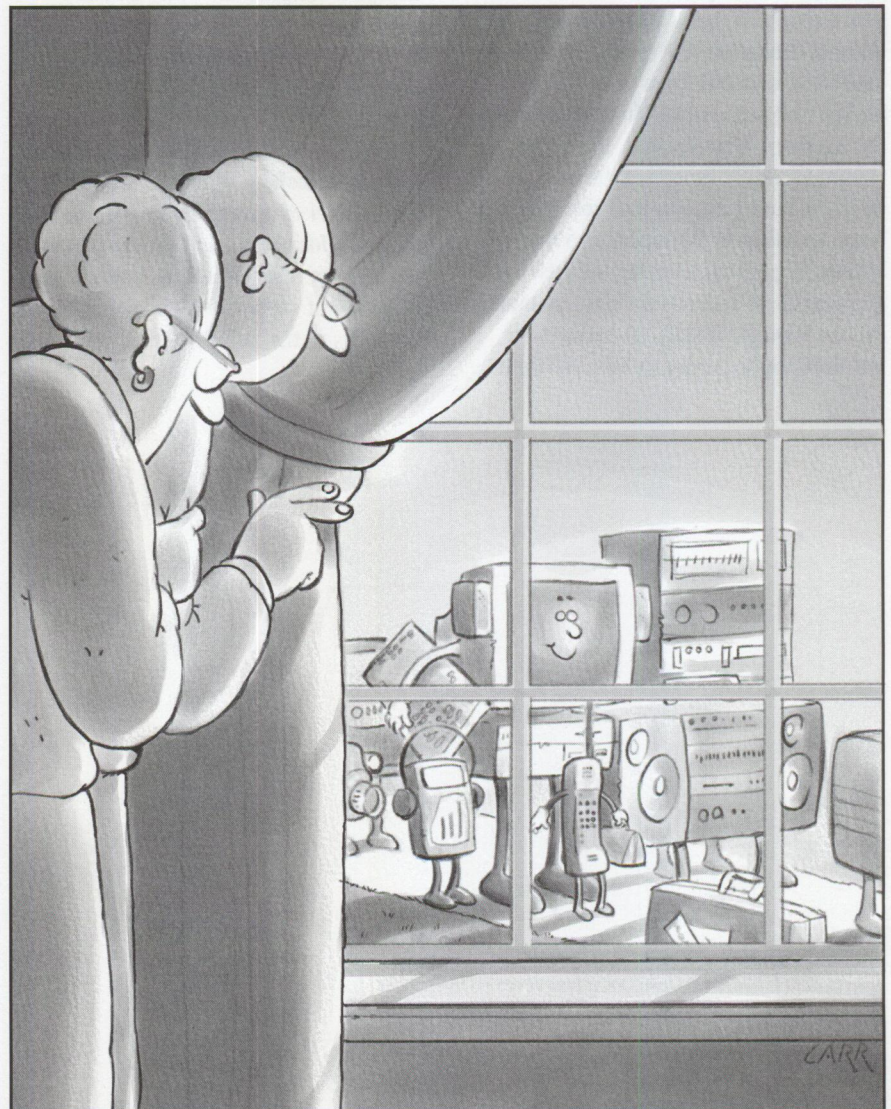
**M**any futurists predict that personal computers, in one form or another, are destined for broad usage, controlling everything from your evening entertainment to your air conditioner. Vice President Al Gore's widely accepted vision of a national information infrastructure as the backbone of an America that leads the world in information technology has sparked a rush of activity.

If America is to succeed in achieving this vision of widespread computer use, a fundamental change must occur in today's computer user interface. Studies have shown that before the personal computer can be brought to the ubiquitous consumer product level, it must be made easier for the broad range of consumers who will use it. Computers must be accessible to people without formal education, people who are afraid of computers, people who are physically challenged, and people who just aren't inclined to read manuals or attend training classes. We in the computer industry need to make it possible for people to apply the skills they already have to their computers—making this interaction closer to how they interact during their normal day-to-day activities. In OS/2 development, we are studying ways we can increase the “human-ness” of human-computer interaction (HCI) to lead us into the age of *natural computing*.

Natural computing? An obvious oxymoron, right? In the past it certainly has been, with the proliferation of manuals, cables, command lines, and “techno-babble” that only the propeller-head crowd could love. Our HCI work concentrates on improving the way you deal with your

computer in a manner that is more consistent with the way you deal with other human beings in the real world. HCI includes new graphical user interfaces, enhanced communications, collaborative

applications, speech and handwriting recognition, and signature verification. On the not-so-distant horizon, additions to this list will include agent technology, on-screen actors, virtual reality, computer vision, and speaker verification. Above all, HCI must be intuitive for the average consumer. We must remember that people have trouble setting the time on their digital watches and VCRs. We cannot expect consumer-level users to deal with their CONFIG.SYS file or install a new device driver.





## Promises, Promises

Just about any "futuristic" science fiction movie or TV show in the past 30 years depicts people interacting conversationally with computers, without the aid of today's standard, limiting keyboard and mouse interfaces. Gene Roddenberry's (and Paramount Pictures) *Star Trek* TV series and movies are perhaps the most widely recognized and popularly followed examples of this genre. Throughout the years we have heard captains and crew verbally request data and actions by addressing the computer with the word "Computer" (or a more personal name), had the computer *independently* decide how to solve the problem without human guidance, and heard the responses from a soothing voice.

Other examples outside *Star Trek* hold similar promises: HAL from *2001: A Space Odyssey*, the holographic picture viewer from *Blade Runner*, and the vehicle security and operations interfaces in *Demolition Man* and *Earth/2*, just to name a few. All have a common thread woven throughout their stories. All depict verbal interfaces with flawless and immediate speech recognition, natural language analysis, independent computation and/or action on behalf of the user, often through vast networks of data and natural-sounding speech responses.

Writers, producers, and studios show the promise of "the future" through the magic of TV, movies, and the pages of novels. Those of us in the business of delivering these capabilities to the consumer have to live up to the promises that have been made for us by these imaginative, forward-thinking people. To use an entertainment industry cliché: it's a tough act to follow.

## Foundations

The increase in personal computer power, with the accompanying decrease in size, has opened up new computer application possibilities. Notebook computers are now a popular alternative to their desktop brethren, providing almost as much functionality and speed, but for a price premium (mostly for the flat screen liquid crystal displays [LCDs]). Subnotebooks, tablets, and hand-held computers, while not enjoying as meteoric a rise in popularity, have found their niches. Wireless

communications are beginning to impact portable computing and will really explode when digital cellular (CDPD) and Personal Communications Services (PCS) are fully deployed and pricing re-enters earth's atmosphere from its current orbital levels. The stage is nearly set for "anytime, anywhere" computing.

Even with all the advances, computer hardware has not yet provided enough processing power to fulfill all the promises made by science fiction writers. We are still limited by the speed and storage space of today's machines, especially for comprehensive natural language processing. Much of the interesting university research is being conducted with workstations considerably more powerful than today's average personal computer. Once the researchers discover new algorithms and applications, it will take several years for average computer equipment to attain the requisite computing power to perform these functions. Dr. Raj Reddy of Carnegie Mellon University in a recent talk at IBM in Boca Raton, Florida, predicted a "giga-computer" by the end of the millennium: one billion instructions per second and one billion bytes of RAM. In his speech he also predicted that even this advanced computer will still limit what computer scientists will be able to achieve.

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*Wouldn't it be nice to have the computer worry about how to fax a letter or find a file for a change?*

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Recent trends in personal computing have brought us multimedia computers, with larger, brighter, denser displays, high-fidelity speakers, and CD-ROMs. The next advance promises the marriage of telephones, cable TV, and computers and will integrate—in the same box—voice activated automatic dialers, speaker phones, answering machines, video phones, video on demand, and two-way communication with the mass media.

Personal computer software has moved with hardware into the 32-bit realm of nearly unlimited addressing capabilities, preemptive multitasking, and

breath-takingly beautiful graphics. But if computers are truly going to move into the consumer electronics marketplace, software must be easy to write (for the producing companies), and it must be able to be "played" on a variety of systems, just like a music CD can be played on CD players from a multitude of providers. The competing standards of Object Linking and Embedding (OLE) from Microsoft and OpenDoc from the consortium including IBM, WordPerfect, Lotus, and Apple and the principles of code reuse that object-oriented programming and C++ provide are ushering in a new era in software that promises faster time to market, fewer programming bugs, and code that operates on more than one type of machine and operating system.

## HCI Today

So if HCI means dealing with computers using the interpersonal skills you have developed in your lifetime, how have the advances of hardware and software advanced this interface, and what skills can you use today in dealing with your computer?

Much of the data absorbed by the average person in a normal day is through sight. It is not surprising then that considerable attention has been paid to the computer's graphical user interface (GUI). Apple Computer's Macintosh, originally touted as "the computer for the rest of us" because of the innovative graphics and plug-and-play ease of use, has lost much of its technological lead in the interface race. At the time this article was written, Microsoft had just announced "Bob," their first attempt at a "social interface" on a personal computer. This interface has drawn quite a bit of flack from the computer trade press and to date has been a marketing failure. Nevertheless, it is an interesting attempt at making the computer more accessible to "normal" people.

Most other computer manufacturers and software producers have added or will be adding a navigable real-world interface to their software. This means that the user is greeted by a picture, then chooses objects representing programs to accomplish tasks. To date these are mostly "launcher" technologies that thinly wrap the underlying window interface with a rich graphical representation of the world—not a fundamental change in the way the user



interacts with the computer. Representative examples of these offerings are General Magic's Magic Cap, Packard Bell's Navigator, and Computer Associates' Simply Village.

Writing and speech are also common ways for people to interact. Several companies, including IBM, have products today that recognize a person's handwriting and speech. Touch, or pointing with a pen, is a more natural method of relating to objects than using a mouse or arrow keys, even though people have adapted well to using them. To date, however, there has been no compelling reason for computer manufacturers to include pen hardware on personal computer systems for general consumption. Internet commerce will create the need to verify an individual's signature. The technology exists today to encapsulate a signature and verify it with great accuracy against a previously stored signature. IBM's Pen for OS/2 and the pen computing market was highlighted in *Personal Systems'* November/December 1994 issue, so we won't focus much attention on it in this issue. Microsoft's Windows for Pen Computing, Telxon's PenRight!, and IBM's Pen for OS/2 are the major forces in the pen computing arena today.

IBM's VoiceType speech recognition system is the focus of Andy Hirshik's article in this issue. Speech is beginning to find its way into major manufacturers' preloaded offerings with speech navigation of the GUI as well as control of well-behaved applications and leading-edge games. These functions are considerably easier than free-form dictation because the limitations on the grammar and vocabulary allow the software to make better guesses at ambiguous input. It also lessens the strains on computer resources by requiring smaller memory and disk storage. Speech recognition has the potential for being a breakthrough technology for computer neophytes. Figuring out how to do something on a computer has always been the user's burden. Wouldn't it be nice to have the computer worry about

how to fax a letter or find a file for a change? This interaction is modeled more after that of an assistant or associate and represents the horizon of the new HCI.

Two final areas of interface that are being incorporated into the HCI are agents and collaboration. *Agents* are people who undertake tasks *for* you within a specific set of guidelines *from* you. Travel agents are a good example of this type of interaction. You provide guidelines to a travel agent for dates, times, airlines, meals, and seating preferences. Using your guidelines, the travel agent books travel on your behalf, if a critical mass of your criteria is met. Agent technology on personal computers works the same way. Some of the available agents today help filter and prioritize e-mail, remind you of appointments, and react to conditions on your computer. Future agent technology promises a much richer set of functions, including replacing the human travel agent for making travel arrangements and researching information in remote databases. Agent technology is still in its infancy, with General Magic's Telescript being the first and most prominent agent technology in the industry today. IBM offers a product called IntelliAgent, which will perform some tasks for you on your desktop without your intervention. The result is that you can spend less time doing mundane tasks.

People work together to accomplish shared goals. They *collaborate* using meetings and processes that automate the work flow in a business. Recent articles in computer trade magazines indicate that the marketplace for solutions involving teleconferencing and groupware is heating up. Teleconferencing requires multimedia computers, microphones, cameras, and relatively high speed communications lines to create virtual meeting spaces. Teleconferencing has the potential for reducing travel budgets while increasing the quality of communications between geographically disparate parties who have to cooperate to get something done. This technology is being used today (although

it is still expensive and the required communications services are not pervasive) to allow many people to work from home. The term coined for this form of working is "telecommuting." Many municipalities are encouraging businesses to adopt this technology because of the potential impact it has on road use, energy consumption, and air pollution—not to mention giving people more time at home with their families.

*Groupware* is a term that defines software for automating a process within a business. The process may be creating a document or specification that many people must contribute to or review, or a progression of stages in a pipeline, like a mortgage approval. Groupware allows computer users to conduct business more like they would if there were no computers—collaboratively—with unencumbered communications. Today, Lotus Development Corporation's Notes is the most popular groupware software on the market.

Much more work will be devoted in the coming years towards making HCI more natural. These technologies, in combination or individually, have the potential to profoundly impact our everyday lives. Just think, someday you *will* be able to say "Computer, plot a course to the nearest pizza restaurant, top speed . . . Engage."



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in programming tools and utilities; real-time communications and industrial software; and design, architecture, management, and marketing support. Since joining IBM, Ed has also had assignments in Pen for OS/2 and mobile software. Ed graduated with honors from Colgate University in 1980 with a BA degree in Computer and Information Technology.



# User Interface 2000

By Les Wilson

*"I will know the future has arrived when my left cufflink can communicate with my right cufflink through a satellite."*

—Nicholas Negroponte

Literature, theater, and film have long given us illustrations of life in the future. While the arts and futurists may influence the industry, dreaming up computing in the year 2000 can be done by anyone with an imagination and time to think. However, accurately predicting computing environments for future product development challenges us to use a healthy balance of vision and reality. So, while it's easy to dream what *could* be, let's look at what is *likely* to be.

This article is based on the research and analysis done by IBM's PeopleWare for OS/2 Technical Strategy and Architecture team. It presents our vision of what computing will be like and how the user interface (UI) can be expected to change as computing and user interface technologies mature between now and 2000.

The year 2000 is less than five years away. Most in the technology industry agree that advances in key user interface technologies will be integrated into mainstream systems during these last years of the 20th century and shift away from today's electronic desktop metaphors to more personal, familiar, and natural ones. While it is debatable just how entrenched each technology will become in that short time, the trend is clear and the journey toward that end has already started.

The emerging technologies of speech, voice, pen, computer vision, video, intelligent agents, natural language processing, and 3-D virtual world metaphors (or "place" metaphors) will change the human-computer interaction (HCI) as we know it today. Analysis of these technologies and their state of maturity shows that each one will follow its own time-line and will change various aspects of human-computer interaction when it becomes pervasive.

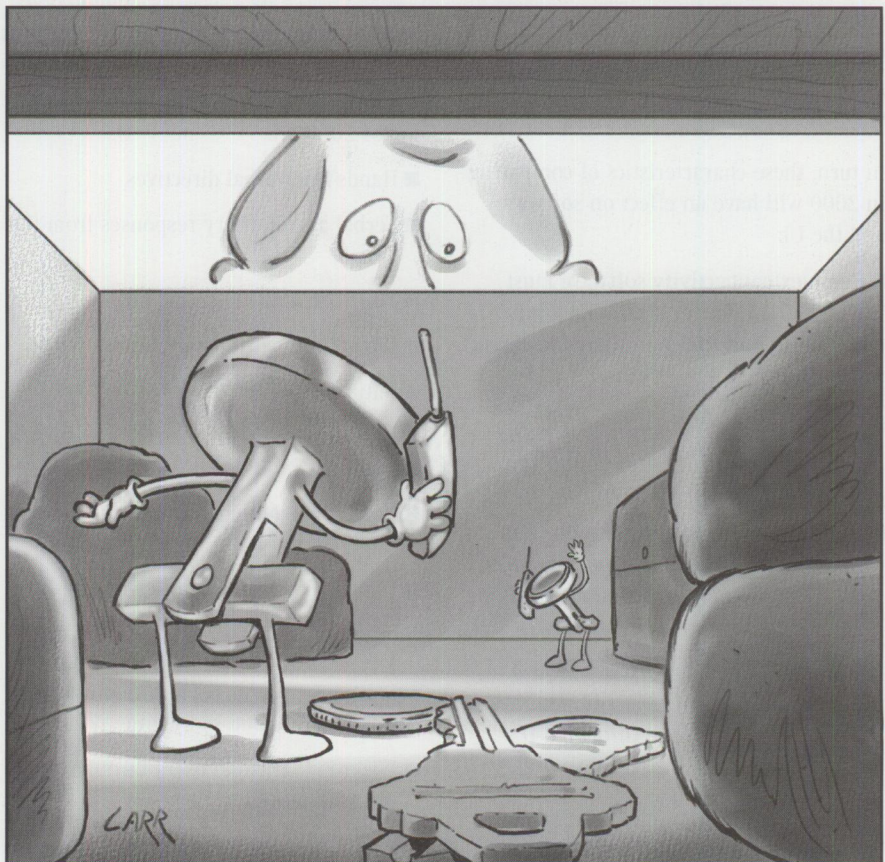
So, with a variety of things combining into a whole, one way to think of the computer interface of tomorrow is like a stew made from the matured evolution of individual technologies with a sprinkling of dazzling new stuff for good measure. For the system provider, tomorrow's interface will be the result of correctly mixed and measured ingredients that evolve into a widely accepted way for computers to work for more people and in new ways. We call it UI 2000.

## What's Cooking in 2000

UI 2000 is inextricably tied to the anticipated computing environment in 2000. For mobile or "roving user" environments, personal electronic devices (PEDs) in

various combinations of smart badges, organizers, pagers, and telephones will be pervasive. Less wearable but still portable computing environments will use wireless laptop and tablet computers to receive, transmit, and communicate increased amounts of digital information. In general, expect high speed communications networks carrying large volumes of data that result in powerful operations being performed on a variety of wearable, personal, and desktop systems.

Other common hardware packaging developments will likely include various combinations of microphones, cameras, and telephones on wearable, mobile, and desktop systems. Furthermore, mobile systems will continue to see color flat panel displays of all sizes as standard equipment. Power hungry "command central" environments and desktop systems will likely continue





to enjoy the largest screens, the most peripherals, and massive connectivity options.

Finally, as client/server computing gives way to network-centric computing, workplace, home, and neighborhood servers will provide information, communication, entertainment, and connectivity services to users wherever they are, on whatever personal computing device is handy.

### The First Taste

New and different environments and computer uses will force changes in the way computers both look and behave. Let's look at some causes and effects. For instance, to be practical, hand-helds and wearables must have a long battery life, must turn on instantly, and must survive the rigors of jostling and knocking around. More powerful information systems with hands-free interfaces will need to physically conform to non-desktop form factors such as dashboards, refrigerator doors, wall units, and so on.

Furthermore, connections to external devices and communications links will be hot-pluggable and cause system activation without human interaction. While keyboards and mice will likely continue to be the high bandwidth input devices of choice, wearables and hand-held devices will leverage speech and pen to compensate for their smaller size.

In turn, these characteristics of computing in 2000 will have an effect on software and the UI:

- Complex connectivity software must handle data synchronization among wearable, portable, personal, and server systems.
- Network-centric computing needs intelligent surrogates to substitute for disconnected mobile clients.
- Incoming requests from outside connections need to allocate system resources on their own behalf as well as occasionally attract the attention of humans.
- Power users will drive systems hard with coordinated speech and pen input as they navigate through 3-D "place" environments with live objects that look and respond like their real world counterparts. Still other users will lurk around making occasional

requests while the system largely "acts" on its own.

### Putting it All Together

The human-computer interface in 2000 integrates many modes of input, output, and system behavior. The characteristics of this interface will be that it:

- Provides a rich object-oriented environment using real-world metaphors
- Allows navigation by speech, pointing, and virtual reality devices
- Responds to outside requests
- Interacts more naturally and, for some users, socially
- Is sophisticated enough to handle input from sophisticated wireless personal devices
- Combines many powerful interaction techniques and visuals into a single unified "place"

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*... the individual ingredients combine into something that is far better than the sum of its parts.*

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The user interface techniques employed for UI 2000 are:

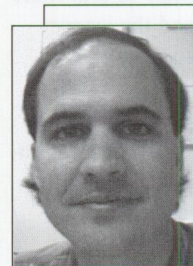
- Hands-free verbal directives
- Verbal and auditory responses from the system
- Place-oriented electronic desktops
- Dictation for text input
- Natural language queries
- Keyboards/pointers for high bandwidth input
- Non-verbal animated responses to user interaction
- Digital actors serving as surrogates for activities both inside and outside (connected) of the system
- Intelligent agents performing information filtering and searching
- Wizards that guide users through complex tasks

Finally, the evolving technologies that form the basis for UI 2000 are:

- Cross-platform component software
- Speaker-independent continuous speech recognition for command and control
- Natural language processing
- Text-to-speech output
- Multimedia
- Speech recognition engines
- Multi-agent digital actors
- Autonomous intelligent agents
- Artificial intelligence (AI) engines that enable task automation, advisory agents, assistants, and wizards
- Place/object graphical user interfaces (GUIs)

While some individual elements of UI 2000 presently exist, the continued advancement in system power, accuracy, and reliability will enable them to be integrated and standardized in the user interface. Furthermore, new techniques, specialized environments, and wireless communications place more demands on the UI to seamlessly provide consistent and easy-to-use systems.

Like a well-cooked stew, the individual ingredients combine into something that is far better than the sum of its parts. Careful and precise mixing of all these technologies will produce a user interface that is new and exciting. The work effort to create human-centered interfaces is exciting; the results will be intriguing.



**Les Wilson** is a senior programmer in the Personal Software Products Boca Raton Programming Center. Having worked on OS/2 multimedia and on 3-D graphics for the

RISC System/6000 before that, he now works on intelligent agents for OS/2 Warp. He has a BS degree in Computer Science and Electrical Engineering from Rutgers University. Les can be contacted at [ultimotion@vnet.ibm.com](mailto:ultimotion@vnet.ibm.com).



# IBM's Strategy for OS/2 Platform Products Fix Support

By Debra Young

*"Finally!"*

*"It's about time!"*

*"Now, let's see if they listened!"*

*"You mean they are actually going to tell us what the fix strategy is?"*

One or more of these declarations may have crossed your mind as you looked at the title of this article. For some of you who have worked closely with us during the review and validation period, our hearty thanks for helping us to design and begin implementing an OS/2 platform fix strategy that addresses a diverse set of your requirements.

In early July 1995, an enhanced OS/2 Platform Products Fix Strategy was announced via Internet and bulletin board systems (BBSs). The new strategy, effective September 1, 1995, is really the culmination of listening to requirements from our small office/home office (SOHO) customers as well as our medium and large enterprise customers and addressing as many of their requirements as possible. In short, we're announcing a strategy that considers the needs of many, varied communities with enough flexibility to satisfy the end user as well as the corporate customer set.

All IBM products running on the OS/2 platform will implement this strategy. Yep, that means consistency across the platform—something all of you have been asking us to do for some time!

Here are the key components of the strategy:

- Standard Fix Support
- Custom Fix Support
- Product Service Life (Currency)

- Enhanced Communications of Fix Availability and Contents
- National Language Version (NLV) Support
- Common Product Installation and Service Tools

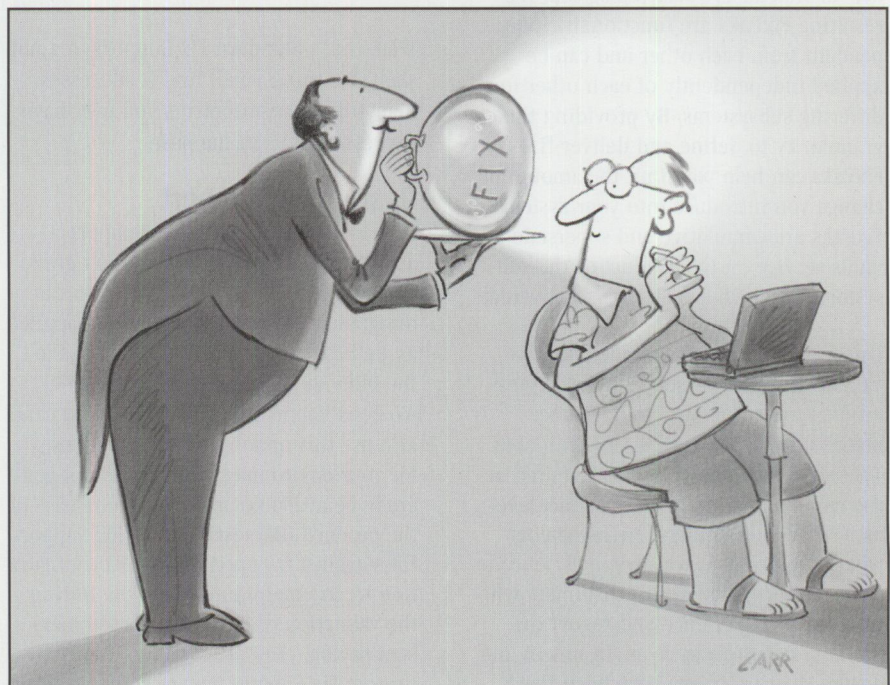
Defect problem reporting remains unchanged by this announcement. It is consistent with the 1994 announcement of the IBM Personal Systems Support offerings and IBM's technical support strategy. You can refer to Announcement Letter 695-014, dated 05/10/94, for more information on the 1994 announcement.

(Announcement letters can be found on IBMLink.)

You will continue to be able to report suspected defects by severity level (1, 2, 3, and 4). If you have entitled services as announced in your country, we will work these suspected defects at your designated severity until the source is identified and validated as code related. Based on the nature of the defect, we will schedule the defect to be fixed in the next product release or in a future product release.

IBM will let you know how we resolved the defect and what kind of fix is available, if applicable. If the defect must be closed as a permanent programming restriction, we will also communicate that to you.

Using an option called Standard Fix Support, we will provide you with a fix for the current release version at the product's latest service level. (We'll cover





Standard Fix Support later in this article.) We use the following Fix-in-Current criteria:

- Data corruption
- Regression of supported function, major application, or device driver compatibility
- Frequent trap or system hang
- Serious visual problem
- Significant portion of hardware or software environment is non-functional

When we covered this criteria with those of you who helped us validate the service, you agreed it represents what you would expect us to address in the standard support, that is, making fixes available for you on a regular basis. In this new strategy, defects that do not meet these criteria are scheduled for consideration in a future release and referred to as Deferred Fixes.

Most of you told us that you anticipate that Standard Fix Support will meet your needs. Standard Fix Support begins when platform products are put on the market and is designed to promptly identify and deliver fixes.

### Standard Fix Support

Standard Fix Support updates code (packaged in frequent FixPaks) for individual products or product subsystems. The product subsystems are selected so that the resulting FixPaks are functionally independent from each other and can be applied independently of each other for differing subsystems. By providing this granularity to define and deliver fixes, FixPaks can help you limit the amount of change you introduce into your systems. FixPaks are cumulative and supersede previous service on the product or the subsystem for which the FixPak is delivered.

Using appropriate testing methods, we validate FixPaks for solution correctness, product execution, and performance before making them generally available. These tests are performed as required at the module and integrated product level as well as in customers' environments where the problem was originally encountered. We provide fixes to customers who discover or experience and report the problem to test in their environment and ensure their problems have been fixed.

After these customers validate the fixes, FixPaks are released for general availability via electronic bulletin board services (such as CompuServe and OS/2 BBS), Internet, and diskette. So, if you hear about a FixPak being available, check the electronic bulletin boards for it. If it is not yet listed, it is probably still going through the validation period with the customer(s) who experienced or reported it. Then we'll make it available. No secret fix stuff—just a validation process before a fix's general availability!

Sometimes, we combine FixPaks for a product into a preventive maintenance FixPak. With these preventive maintenance FixPaks, you can conveniently service your complete system. We may also use them to refresh the product manufacturing line. This approach has the added benefit of keeping subsequent FixPaks small by maintaining separation between the subsystems, resulting in less impact to your environment if future service is needed. You may be required to install the preventive maintenance FixPak in order to resolve a subsequent defect.

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### *Exactly how long are you going to service this product?*

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Well, that's Standard Fix Support in a nutshell. We think you'll find it addresses many of the requirements you may have expressed to us in the past.

### Custom Fix Support

Let's look at the Custom Fix Support aspects of the strategy. This option gives you sole control of a code base. You can designate what and when fixes are applied, as well as the granularity of the fixes to the individual Authorized Program Analysis Report (APAR) fix level. You can also use this option to accelerate fixes for your environment that would not generally be available until a future release of the product. IBM tests Custom Fix Support fixes against the specific product configuration we are maintaining for you. During the validation of the strategy, customers kept saying, "You mean when I have Custom Fix Support, you're going to set up

and maintain a specific configuration/environment that matches mine to test the fixes I request?" As you can imagine, this is one of the strategy's components that caused smiles and heads to nod in a vertical direction when we said "Yes!"

The Custom Fix Support option is available for a fee through the IBM Special Bid Process. You can obtain a special bid during the product's service life as well as after the product's service life has expired.

*Note:* The Custom Fix Support option can be used to extend product service life for Communications Manager (CM/2); however, the option is not available to establish a total content ownership of a CM/2 code base.

### Product Service Life (Currency)

One of the questions you most frequently ask us is, "Exactly how long are you going to service this product?" We fondly call a product's service life *product currency*.

Each product covered by this fix support strategy announcement will continue to have a service life stated as part of the formal product announcement. The service life refers to the period of time program services (code-related defect support) are available. You asked that IBM establish a standard length of time a product will be supported after a new release of the product becomes available. In response to this request, IBM will provide a one-year overlap period between a platform product and its successor, whether it's a new release or a new version level. FixPak releases to the products do not extend or change the overlap period. After product service life ends, you can extend the product's service for your mission-critical applications via a special bid.

Platform products covered by this announcement will be supported for a total of five years. The five years are divided between the currency provided with the product and a fee-based period if you want to extend service life on your products via a special bid. Again, this is a requirement many of you clearly told us was needed for your planning and budgeting.

To aid in your planning, we will announce service withdrawal and extension information at least 90 days before the effective date. Now, between the actual



product announcement information on currency and this withdrawal/extension information, you will have the data you need for planning.

### Enhanced Communications

Communicate . . . communicate . . . communicate. You've asked for more, timely, effective communications on fix support. We're using the Internet and bulletin boards to tell you about fix availability and contents. We are also putting more precise information about the fix in the FixPak itself. Our goal is to provide you with comprehensive documentation of the FixPak contents, including defining the operational environment in which the problem(s) occur.

An APAR cross-reference list will be provided with FixPaks, point releases, and preventive maintenance releases. This cross-reference list will contain APAR numbers, problem descriptions, statement of the environments impacted by the problems fixed, symptoms reported with the problem reports, the code level on which the fixes were tested, and, if applicable, configurations where FixPaks should not be applied.

### National Language Version

National Language Version (NLV) support is provided in this new strategy, including Double Byte Character Set (DBCS). Periodically, FixPaks containing Fix-in-Current fixes which need translation will be provided as required in the requested

NLVs. NLV customers who purchase a Custom Fix Support special bid will be provided translated fixes for all requested custom fixes.

### Common Product Installation and Service Tools

Well, although we think we've come a long way, we're not yet where we'd like to be in responding to the requirements you've given us for common product installation and service tools.

Currently the OS/2 platform products use different and unique product installation tools as well as different service installation tools. The diversity of tools and techniques has challenged trainers and systems administrators. IBM is currently working toward enhanced installation and service tools that are common across the software products. These tools will provide enhanced systems management of product installation and product maintenance on your systems. We're actively involving our customers in gathering and validating requirements for these enhanced tools.

So bear with us! We're listening to you! You'll see more in this area in the future.

### Summary

The changes and enhancements to the OS/2 Platform Fix Support Strategy are designed to provide a clear and consistent set of maintenance policies and practices across the OS/2 platform. This strategy

will provide improved fix quality and greater system stability through smaller FixPaks that have been more stringently tested. Additionally, you have greater control of your software operating environment via the fee-based Custom Fix Support option.

During the strategy review and validation, we met with many customers, customer focus groups, resellers, and IBM account teams who focus on IBM personal systems software. They helped us revise the strategy and validate that it addressed many of the service requirements in their diverse environments. We hope that you will experience the benefits that we're anticipating you will from the new strategy. And, we know we will hear from you on the boards and Internet.



**Debra Young** is a managing partner in IBM's Personal Systems Competency Center in Roanoke, Texas, home of national product service and support for OS/2 since 1987,

and also home of *Personal Systems*. Debra was a member of the team led by Lindell Small from IBM's Personal Software Product division to turn customer requirements into the new fix support strategy for OS/2 products.



# Road Trip! Back to School

By Van Landrum

*It's time for the kids to go back to school, and the World-Wide Web (WWW) is an excellent place for them to find reference material for their school reports. So this issue's Road Trip shows how to navigate the information highway for its namesake: information!*

Let's begin with IBM's World-Wide Reference Library at <http://www.ibm.net/library>. This page lists five areas you can enter: General Reference Material; Science and Technology; Family and Health Resources;

United States Information; plus Education and Training.

■ *General Reference* contains a reference shelf where you can find dictionaries, world maps, area code and zip code information, and a thesaurus, to

mention a few. The General Reference also contains flags of the world, the Encyclopedia Britannica Online, U.S. Library of Congress Home Page, and other online educational resources.

■ *Science and Technology* connects you to the Jet Propulsion Laboratory, NASA, U.S. Patent Office, National Oceanic and Atmospheric Association, Friends of the Environment, and the National Science Foundation.

■ *Family and Health Resources* connects you to The Virtual Hospital, Genealogy Home Page, Disability Information Gopher, AIDS Related Information Gopher, Medicine Related Information Gopher, WWW Virtual Library, and Family History Research.

■ *United States Information* contains census information plus home pages for the U.S. Constitution, White House, FedWorld Information Network, Department of the Treasury, United States House of Representatives, United States Senate, Library of Congress, and United States Supreme Court.

■ *Education and Training* includes the AskEric Virtual Library, National Parent Information Network, Eisenhower National Clearinghouse for Math and Science, National Center on Adult Literacy, NASA Educational Resources, University of Oregon Department of Physics, NASA's K-12 Internet Initiative, and the Adult Dyslexia Organization.

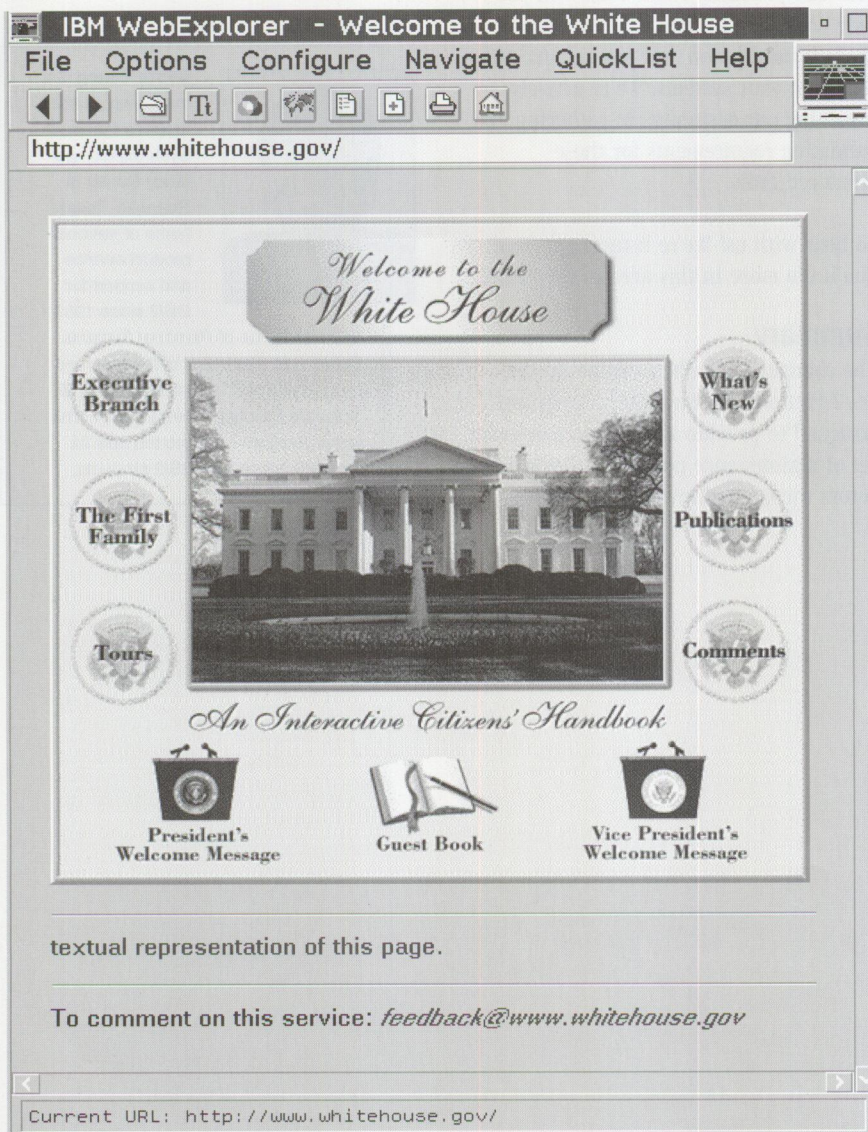


Figure 1. White House Home Page

The White House (<http://www.whitehouse.gov>—see Figure 1) is an interesting place to visit on the WWW. This web site has many pictures of the White House, the president, and the first lady as well as other elected officials. You can learn about the different branches of our government, read current events news items, plus send e-mail to the president and others in the government.

By drilling down from the NASA pages, you can find video clips in the Space Video Archive (<http://www.univ-rennes1.fr/ASTRO/anime.html>).



The video clips display solar eclipses, meteorology, science fiction, space, Shoemaker-Levy, Apollo missions, lunar probes, and more. The clips come in a variety of formats and are quite wonderful to view. In general, the NASA pages are rich in images and information for all ages.

While these pages provide a great start in finding research materials, try the IBM Internet Exploration Toolkit (<http://www.ibm.net/explore>) if the topic you're looking for is not here. Select WWW Search Tools, and you will find a variety of ways to search the WWW for specific information. I usually like to use the Web Crawler. Just enter a few key words and click on Search for a list of sites. The list that is returned is indexed with the best match listed first and indexed at 1000. The other sites will be listed in order of best match and indexed relative to the first item. You can set the number of results to return from 10 to 500 on the search page.

One of the more famous educational resources on the WWW is the interactive frog dissection at <http://george.lbl.gov/ITG.hm.pg.docs/dissect/dissect.html>. The Whole Frog Project is at the Lawrence Berkeley Laboratory in California and sponsored by the U.S. Department of Energy, Energy Research Division, Office of Scientific Computing, John Cavallini, program manager.

This page displays an illustration of an intact frog (Figure 2). Checkboxes on the page let you include or exclude any of a number of organs in the illustration. Select Skin Off and then SEND, and you will see the frog's skeleton and internal organs.

By selecting only the heart, lungs, and skeleton and changing the view from top to bottom, you can isolate these or any other set of organs. (A movie is also available—the frog rotates for you to see it from all sides.) This page, using interaction, graphics, and multimedia, is

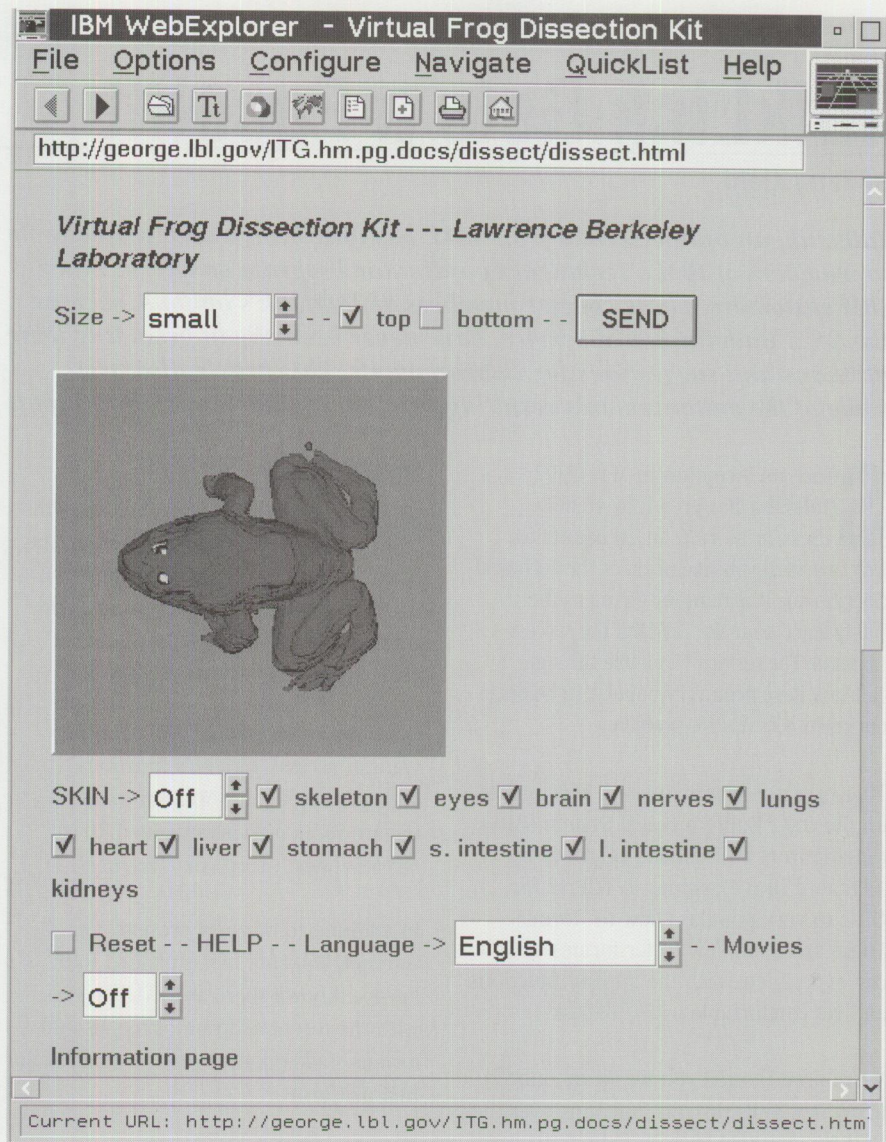
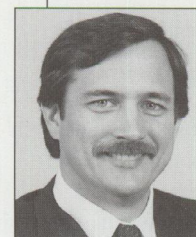


Figure 2. Virtual Frog Dissection Kit

an excellent example of the Internet's capabilities.

Show your kids how to find information on the World-Wide Web for their school reports. Available 24 hours a day, the information can be easily downloaded into their notes. Pictures and illustrations can be captured and dropped into word processing programs for final reports. You don't have to drive from one library to another—just jump into your WebExplorer and head down the information highway.



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# TalkLink Gets a Facelift

By Terry Klein

*TalkLink, an online service from IBM, has long been a service available to members of IBM's Technical Coordinator Program as well as other IBM customers. These charter members of TalkLink's options, such as the OS/2 Bulletin Board Service, have never been shy in providing their opinions and suggestions for improvements. This article discusses some of the enhancements resulting from this valuable customer input.*

Since its inception in May 1992, TalkLink has grown to 40,000+ users in more than 20 countries. Our thanks to you—members of the Technical Coordinator Program—for giving us the “jump start” to make TalkLink the success that it is. The services available through TalkLink have been very popular in helping our customers resolve problems.

There are now approximately 150 forums on the OS/2 Bulletin Board System (BBS), ranging from a discussion of games by Advanced Idea Machines to TCP/IP for OS/2 to very popular “how to” forums. There are also a few tester forums so you can experiment with the append functions and get comfortable with TalkLink.

We're proud to tell you we've announced many new features and functions over the past few months, including the following:

- **Feedback**—Feedback has been streamlined to give the look and feel of electronic trouble reports (ETRs). Additionally, you can now set your keyboard for power typing.
- **Cross-forum search**—Cross-forum search has been enhanced so you can now search across multiple forums and browseable files within a forum, then use new tools to further refine the resulting “hit list.”
- **ForumManager**—The summarize functions have been enhanced to let you customize your append list and follow your appends by reference or subject. ForumManager's performance and ease of use has also been significantly improved.
- **Personal append**—This function allows you to save all your appends into a personal log. This was recently added as a result of many user requests.

## New Territory

By the time you read this, TalkLink will be available through the Internet on the World-Wide Web. If you have your own Internet access, you can view our public preview area (Figure 1), download an order form, and mail or fax it to us.

Once you've subscribed to TalkLink, you can access TalkLink's functions and services via any Web browser (Figure 2). Come visit us—our URL is <http://www1.ibm1ink.ibm.com>.

In addition to our new presence on Internet, TalkLink has expanded into Europe, known there as DIALIBM. Plus, with the recent addition of the AS/400 forums, TalkLink now represents all major IBM platforms.

## Coming Attractions

You'll be seeing a lot of TalkLink enhancements in the coming months:

- The **WhatsNew** application will be updated to recognize pruned forums. This will eliminate the confusion currently caused by presenting pruned forums as forums with new appends.
- The **download** application will be enhanced to identify which packages and/or files have been added or updated. We'll also be adding a subscribe function at both the package and file level so you will be automatically informed of updates.
- **ForumManager** will be enhanced so that any forums stored on your PC will use the real forum name. Currently, forums are stored under an abstract name (BH11\_AQ instead of TESTER), causing confusion when you try to view the ForumManager directories.

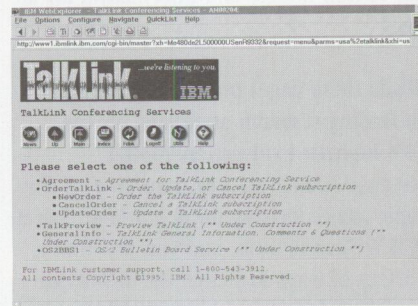


Figure 1. TalkLink Internet Preview Area

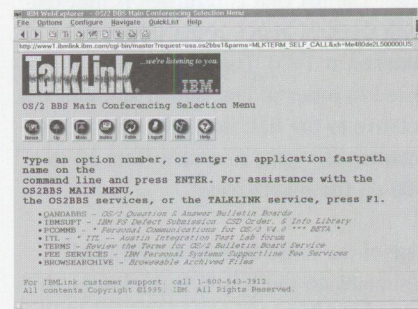


Figure 2. TalkLink Services on Internet

- We'll implement a **search across forum applications** within a store. This means that a full text search will result in a “hit list” of forum applications containing the search string.

We look forward to providing you—our customers—with even more improvements to TalkLink based on your requirements. Send us your suggestions via the ChatTalkLink forum in TalkLink's Preview area or to one of our Internet e-mail addresses: [dbiscan@vnet.ibm.com](mailto:dbiscan@vnet.ibm.com) or [theresak@vnet.ibm.com](mailto:theresak@vnet.ibm.com).



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# OpenDoc and Human-Computer Interaction

*This article describes how OpenDoc and advancements in human-computer interaction (HCI) can work together to enhance the usability of computer systems. It also presents an example of using a system that is integrated with OpenDoc and these HCI features.*

*OpenDoc compound documents will be the vehicles traversing the information highway, carrying us into the next century. This article provides a view of what those vehicles may be carrying.*

OpenDoc offers tremendous new opportunities to apply the technologies associated with human-computer interaction (HCI). While OpenDoc components can utilize the many new HCI modes of information input and output, they can also be participants in the exciting new world of agents.

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OpenDoc mechanisms allow components to coexist, communicate, and interact in an environment of unanticipated diversity. OpenDoc allows the collection of information, knowledge, and intelligence in a consistent, platform-independent, industry-standard fashion. For the first time, computers will be able to share wisdom, not just data. *Wisdom* is defined as the computer's ability to learn and apply knowledge.

OpenDoc brings us one large step closer to achieving the

dream of a computer easy enough for anyone to use. Speech and handwriting recognition lets you interact in more natural ways with computers. OpenDoc lets you achieve your objectives more naturally, too. The world of components created by OpenDoc allows you to mix and match off-the-shelf products to produce exactly the results you need. And that's not all:





Dissemination of the information produced will be more direct, easier, and more widespread.

## OpenDoc

OpenDoc is a packaging of technologies available from Component Integration Laboratories (CI Labs) that define an architecture for compound documents.

CI Labs is an industry consortium whose key members are Apple Computer, IBM, and Novell. Each has contributed significant aspects to the combined OpenDoc package. Apple contributed OpenDoc, the component collaboration architecture; Bento, the file-format architecture for persistent object storage; and Open Scripting Architecture (OSA), the scripting architecture that supports application-independent scripting on multiple platforms. IBM contributed System Object Model (SOM) and distributed SOM (DSOM), the Object Management Group's (OMG's) Common Object Broker Request Architecture (CORBA)-compliant object model providing language- and location-independent object accessing. And Novell contributed Open Linking and Embedding of Objects (OLEO), providing seamless interoperability between OpenDoc and Object Linking and Embedding (OLE) components.

### Documents

A *simple document* contains one kind of content. The content might be text, a graphic, or a movie. A *compound document*, then, is a document containing more than one kind of content. For example, a document that contains text and graphics is a compound document. However, OpenDoc does not limit the notion of a document to something that can be put on paper. Therefore, a compound document can include any combination of content—text, audio, video, and images.

### Parts

The different pieces of a compound document are called *parts*. There are text parts, image parts, chart parts, and so on. Each part contains the data for its type. Each type of part has a part handler that allows you to view and edit the part's contents.

Since each part is produced separately, there must be rules for how the parts can interact or collaborate. The OpenDoc

component collaboration architecture from Apple defines these rules. The rules determine how the visible parts share the screen, how parts know what you are doing, and how parts contain other parts.

Data that represents the contents of a part can be depicted in two ways: 1) a copy of the data can be included in the part (replicated), or 2) a reference to the data can be included (a link). The differences are similar to those in any shared data environment. If a part has its own copy of the data, then changes to the data affect only that part. If a part has a link to some data, then changes to the data are seen by everyone having a link to the data.

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*... a compound document  
can include any  
combination of content—  
text, audio, video,  
and images.*

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### Replicating

Replicating the data into a part is the most natural way to depict the contents of a part. It is the appropriate choice for the original copy of the information. It is also used when all you require is the current value of the data. However, if the data is likely to change and you need to be aware of the changes, replication leads to the classic data-consistency problem, in which various reports of the same data contain different information.

### Linking

Linking is a convenient way to provide consistent data between sharers of data. Another advantage of linking is location transparency. Thanks to DSOM, links to data are not restricted in scope; that is, a link to data can be within the context of the same document, different documents on the same system, or different documents on different systems.

### Scripting

Another key feature of OpenDoc parts is that they can be scripted. *Scripting* allows customization beyond what is provided by the developer of the part.

OpenDoc scripting via OSA allows a finer granularity of scripting than has been possible with other scripting architectures. Administrators, installers, or end users can fine-tune a particular part in a particular document to behave exactly as desired.

Each OpenDoc part has a set of semantic events that it understands. When a part is added to a document, it tells OpenDoc which events it understands. When one of these events occurs, OpenDoc notifies the appropriate part.

OSA defines a platform-independent way of expressing that an event has occurred. Scripts may be attached to a part and set to run when certain events occur (for instance, selecting a button).

### Distribution

As with all documents, OpenDoc documents need to be distributed. Because the Bento file format architecture is implemented within a file of the system's underlying file system, document distribution is essentially a file transfer between the document's source and destination.

The nature of an OpenDoc compound document is so general that many OpenDoc documents do not resemble traditional documents at all. Some OpenDoc documents appear to be more like application programs (e.g., a clock part). Others seem more traditional, with text in a text part and graphs in chart parts. Most documents are combinations of traditional document parts and newer "live" parts featuring audio, video, animation, etc.

When documents are distributed, only the data (or links to the data, depending on how the data is depicted in the document) travels with the document. The receiving system must provide the OpenDoc part handlers to view the document. If the receiving system does not have the exact part handler that was used to create a part, OpenDoc tries to find a part capable of handling the part's data type. OpenDoc even tries to translate the data into a type for which the system has a part handler.

Documents with attached scripts represent the data and intelligence needed to distribute wisdom for autonomous agents.



When a graphical user interface (GUI) delivers an event to a window containing an OpenDoc compound document, OpenDoc supplements the GUI event-handling with two abstractions: a dispatcher and an arbitrator. The *dispatcher* is an object that routes the event to the correct part handler within the document. An *arbitrator* is also an object that provides a way for parts to tell the dispatcher who owns a shared resource, such as the keyboard stream or the menu bar.

You can extend both the dispatcher and the arbitrator. At any point, you can add a new focus, called a *focus module*, to the arbitrator. Similarly, you can add dispatch modules to the dispatcher to handle new kinds of events and behavior.

## Human-Computer Interaction

Using all the components mentioned above, OpenDoc gives you a whole new experience. Today you may find yourself stuck with an application that doesn't provide exactly what you want because you cannot afford (either economically or educationally) to buy or use a completely different application.

OpenDoc components are more specialized than today's applications. One component does not do everything. If you don't have the necessary component or are unhappy with the one you already own, you can obtain an OpenDoc component with the appropriate characteristics for a smaller financial and educational investment than for a whole new application.

With the use of advanced interface technologies such as speech synthesis, handwriting and speech recognition and some standard connection capabilities such as the Internet, you will be able to interact with the computer to produce the results you want in more natural ways than ever before. Take, for example, the production of a report. Using Web searching facilities, you can quickly obtain many references about your topic. Using speech synthesis, new HCI Web browsers can read text references to you so that you can determine their appropriateness. Once you get an

adequate amount of pertinent material, you can begin producing your report. Your finished report can be composed of text, numeric data, audio clips, images, or videos—all of these data types are available on the Internet now.

Today the Internet data is not in the form of OpenDoc parts. You can, however, use the following example to make OpenDoc parts from this data.

### Putting Data into OpenDoc Parts

The process of making OpenDoc parts from Internet data is simple enough. OpenDoc comes with standard parts for all the data types mentioned above. Therefore, for each reference that you want to include in your report, you simply copy the Internet data into a part of the appropriate type.

You can dictate the accompanying text in the desired context. You can then further edit and customize the data using combinations of pointing and spoken directives. For instance, you can change a font by selecting a passage of text with a pen swipe and saying "font Helvetica bold 12." You can draw graphs, shorten audio tracks, enhance images, and highlight colors to suit your taste. To perform all these activities, you can speak, gesture with a pen, or select from a menu with a mouse or other pointing device. Combined into a single document and arranged to present the desired message, the data takes on a polished professional look in a modicum of time.

What will this scenario be like as OpenDoc becomes more pervasive? Even the most sophisticated Web searcher contains little information about the requester—you. But it is not hard to imagine an OpenDoc Web searcher document that includes not only search criteria but a profile of you (perhaps obtained from observing your other uses of the system), providing a more detailed insight into your interests and intent.

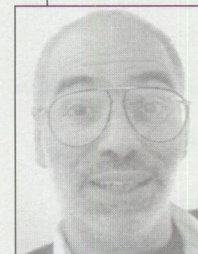
You will be able to easily send such a document with a script attached out on the Web, where it can perform

intelligent searches and put links back in a response document for you. The search can continue until it exhausts all possibilities, exceeds a time limit, acquires a certain amount of information, or spends a certain amount of money. With the capability of sending both data and script, the potential seems limitless. Let your mind run free—a whole new world of computing seems possible!

## OpenDoc: Part of the HCI Future

This article has described some of OpenDoc's features that enhance its usefulness in the world of human-computer interaction. These features, when merged with HCI technologies, can enhance and simplify the human experience with computers. OpenDoc with HCI technologies will be the basis of many future user interface enhancements.

OpenDoc is a new, highly flexible programming model as well. New user interface metaphors are easily modeled within an OpenDoc document. The addition of new HCI technologies will fuel the search for easier and more natural interfaces between humans and computers. OpenDoc will be a part of that future.



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ensuring the integration of HCI technologies into OpenDoc components. Since joining IBM in 1968, he has developed software for the IBM 1800 process control computer, System/7, Series/1, Personal Computer AT, and Personal System/2. Ralph has numerous IBM hardware and software patents and technical disclosures. He has a BS degree in Mathematics from the University of Illinois at Chicago and is currently a career advisor at Palm Beach Community College. His Internet user id is pipitone@vnet.ibm.com.



# Supporting HCI Technologies in Applications

*New technologies are appearing all the time in the computer industry, which creates a dilemma for application developers—when and how to implement these technologies in applications.*

*This article addresses some of these issues and discusses the various ways that you can explicitly incorporate these new technologies into your applications. In some cases, you may be able to use these technologies with existing applications.*

*This article specifically discusses the human-computer interaction (HCI) technologies that are available on OS/2 Warp today, either as integral parts of the operating system or as system extensions.*

**T**wo important factors to consider before implementing a new technology in your application are the technology's maturity and the users' readiness to accept a new way of doing things.

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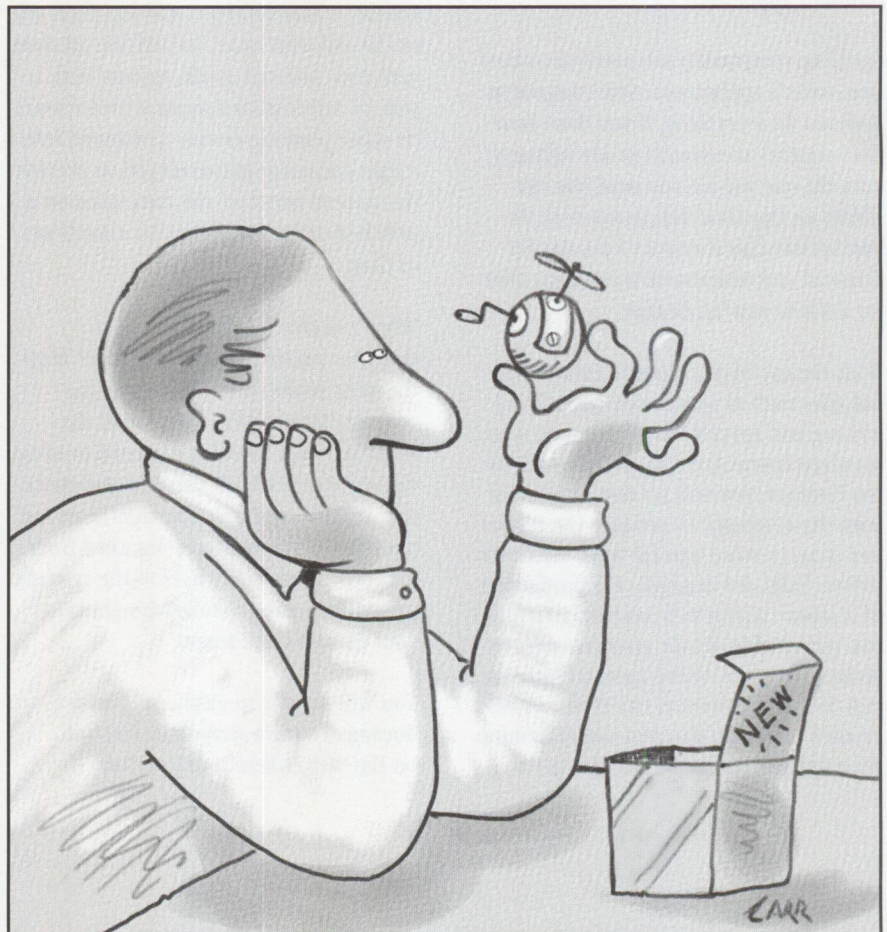
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Various technologies exist at different points on the technology maturity curve, which may span many years from a technology's initial introduction until it becomes widely accepted. For example, multimedia technology is fairly mature—multimedia features such as audio and video were introduced several years ago, yet they have only recently become standard in today's personal computers and operating systems. Many developers are now starting to use multimedia content to make their products—games, as well as educational

and general productivity software—more appealing. Other HCI technologies such as speech recognition are quickly moving up the technology maturity curve.

Many factors can influence when users are ready to accept a new technology, but probably the most important is whether it helps solve a problem for the user. Therefore, you not only need to know which market segments or organizational groups you are trying to address, but you also must understand your users' needs.





You must also consider the amount of effort you expend to incorporate a new technology. All of these things contribute to your decision whether to implement a new technology in an application and to what extent the application will embrace the technology.

As this article demonstrates, the job of implementing new technologies can be simplified by taking advantage of IBM's high-level application programming interfaces (APIs), which shield the application software from hardware- or technology-specific considerations.

This article summarizes the options available for implementing three of the HCI technologies—multimedia, pen/handwriting recognition, and voice/speech recognition—available today in OS/2 Warp or as system extensions. You will get some useful tips for making your applications better unaware applications, as well as for creating aware applications that incorporate these HCI technologies. You will also find out where and how to obtain more information about these technologies and how to get assistance.

## Aware Versus Unaware

Let's begin by exploring examples of how to use several HCI technologies with little or no modification to existing applications and how you may want to modify other applications in order for them to be "aware" of the HCI technologies.

Consider the Pen for OS/2 extensions. This product provides the operating system extensions for using a pen or pointing device as an input device for pointing, gesturing, or handwriting recognition.

For pointing, Pen for OS/2 extensions provide support without modifying most applications. Because Pen for OS/2 emulates mouse functions, it makes no difference to most applications whether the user is using a pen or a mouse to point to a location on the screen. This kind of application is called an *unaware* application.

In contrast to unaware applications, *aware* applications need to know that the user is using a pen input device, and the applications must use the pen APIs to exploit the pen technology. An example is an application where a user must fill in

```
open c:\mms2\movies\macaw.avi alias myclip wait
set myclip time format frames wait
seek myclip to 5 wait
play myclip to 20 wait
close myclip wait
```

Figure 1. Playing a Specified Movie File, Frame 5 to Frame 20

various types of fields. If the application is unaware, it may allow a user using a pen to write directly into the fields, but the application may have difficulty recognizing the written input. But if the application is pen-aware, you can allow the user to write directly into almost any application window, and you can increase the handwriting recognition accuracy by specifying which characters (e.g., alpha, numeric, upper case, lower case) are allowed in certain fields. You can also provide more flexible input controls by using the pen functions with OS/2's single-line entry (SLE) and multi-line entry (MLE) edit controls.

Similarly, when using IBM's speech extensions, voice input can be made to appear to an application as though the input is coming from a keyboard or a mouse. This allows a user using a speech-unaware application to verbally navigate through text pull-down menus. An example of a speech-aware application is a word processor that allows the user to verbally give formatting commands while dictating.

## Multimedia

OS/2's multimedia subsystem is a good example of a technology that has moved through the normal stages of the technology maturity curve. It was first made available on special IBM multimedia systems; then as an extension to the operating system in OS/2 2.0; then, in OS/2 2.1, as a part of the operating system, but separately installable; and finally as an integral part of the operating system in OS/2 Warp Version 3.

The next phase, which is well under way, is to increase the use of multimedia by a greater variety of applications, not just by games and multimedia-specific applications. Basically, any application, as well as other operating system components (such as the user interface, tutorials, help text, etc.), can be enhanced with multimedia features.

Because the multimedia subsystem is now an integral part of OS/2 Warp, and most hardware systems are capable of accommodating various types of multimedia data, you can now enhance your applications by adding audio, video, animation, and image data. The multimedia subsystem controls the various hardware and software components, thereby making it easy to add multimedia support independent of the actual hardware and system configuration to applications. This is accomplished using the media control interface, which provides a complete 32-bit, device-independent programming interface to OS/2's multimedia subsystem through a string command interface or through procedural APIs. Additionally, a set of object-oriented multimedia parts based on OpenDoc will be available, thus making multimedia components even easier to include in applications.

The multimedia string command interface—from an application, a REXX command file, or macro languages in applications such as Lotus 1-2-3—provides an easy way to include multimedia data, sometimes without modification, in an application. This interface uses simple commands to perform the standard functions that people are accustomed to having in their home entertainment systems, such as seek and play. For example, the series of string commands in Figure 1 could be used to play a portion of a video clip.

The OS/2 Warp multimedia subsystem includes two command files, PLAY and RECORD, that further simplify the playing and recording of audio files from an OS/2 window or from a command file. The format of the PLAY command is:

```
play [FILE="filename"]
[DEV=device] [TIMEFMT=timefmt]
[FROM=from_position]
[TO=to_position]
```



The PLAY command can also be used to play video files, but it must be run in the Presentation Manager environment by invoking the PMREXX program. The following PLAY command (all on one line) will produce the same results as the above string commands:

```
pmrexx play
file=c:\mmos2\movies\macaw.avi
timefmt=frames from=5 to=20
```

You can find additional information about using the multimedia string interface commands from REXX by selecting the Multimedia with REXX icon in OS/2 Warp's multimedia folder.

You can access the media control interface from C language programs using procedural APIs through a command message interface. Programming support, language bindings, and online documentation for using these APIs are included in the multimedia portion of the OS/2 Warp Toolkit. For programming examples and detailed information about these APIs in hardcopy form, refer to the *OS/2 Warp Multimedia Programming Reference* (G25H-7114).

Another way to access the OS/2 Warp multimedia subsystem is to use the new multimedia OpenDoc support. (See the article in this issue titled "OpenDoc and Human-Computer Interaction" for more information about OpenDoc.) The implementation of the multimedia OpenDoc components uses IBM's Open Class Library that provides multimedia C++ objects. OpenDoc parts for audio, video, animation, and image are currently under development, and beta versions are available on The Developer Connection for OS/2 CD-ROM (see the last paragraph in the Pen and Handwriting section for ordering information).

The OS/2 Warp multimedia subsystem easily expands to support additional hardware devices, logical media devices, and file formats, including compression and decompression algorithms. If you program to the IBM Open Class Library or the media control interface to OS/2's multimedia subsystem, you can be sure that your applications will remain device-independent and that new devices and data types will automatically be supported without modification to your programs as

soon as these devices and data types are supported by OS/2.

## Pen and Handwriting

Pen for OS/2 is an extension to the OS/2 Warp operating system. It provides support for pointing, gestures, and handwriting recognition as well as for many different types of pens and tablets. Pen for OS/2 is available from IBM Direct by calling (800) 3IBM-OS2 (800-342-6672). It is also included with pen hardware, including the IBM ThinkPad 730T and 360P.

### *The OS/2 Warp multimedia subsystem easily expands . . .*

As discussed earlier, applications can be either aware or unaware of pen extensions; unaware applications need not be modified to adopt some aspects of pen technology. Some programming guidelines that enhance the usability of the unaware support include:

- Avoid keyboard-only functions; use buttons and menus.
- To enable gestures, provide accelerator key mappings for menu and dialog functions.
- For data entry, implement list boxes, combo boxes, or spin buttons (where possible).
- Add drawing and annotation features that are easy to use with pens.

Pen for OS/2 provides default gesture assignments, primarily for pen-unaware applications. All gestures except letter gestures have a recommended action. The user can tailor these actions by modifying the gesture assignments under the Gesture tab in the specific applications' program object settings folder. Further information about customizing the pen gesture assignments can be found in the *Pen for OS/2 User's Guide* or in the online information that comes with Pen for OS/2.

Some examples of aware support were given previously. Another example might be an application that takes specific

actions based on certain gestures. A pen-aware application receives messages from OS/2 Warp's pen support that a specific gesture has been received, along with other information such as the window and location where the gesture was recognized. The application can then take whatever application-specific action is necessary.

The Pen for OS/2 Toolkit provides the pen APIs plus additional device-independent support for applications. Both procedural and object-oriented interfaces are provided in the latest version of Pen for OS/2, version 1.03. These interfaces give you a choice of how to implement pen technology. You can implement pen awareness as unique pen support in existing applications or as new, pen-specific applications.

Details about the pen APIs are in the *Pen for OS/2 Programming Guide and Reference* (G25H-6977). An online version of this document is included in the Pen for OS/2 Toolkit, which is distributed on The Developer Connection for OS/2 CD-ROM and can be ordered by calling (800) 6-DEVCON (800-633-8266). Developers who are using OS/2 Warp's pen support are encouraged to join the Pen Developer Assistance Program. Call (800) 627-8363 to obtain additional information about the program.

## Voice/Speech Recognition

OS/2 Warp's voice input and speech recognition support is provided today by two products—IBM Continuous Speech Series (ICSS) and IBM VoiceType Dictation (VTD) for OS/2. Previous versions of VTD were called the IBM Personal Dictation System (IPDS) for OS/2. You can find additional information about these products in this issue in the article titled "An Introduction to Speech Recognition with OS/2."

The VTD product provides navigation and dictation capabilities for existing applications plus APIs for creating speech-aware applications. It uses a large-vocabulary, speaker-dependent, discrete-speech model.

As with the pen extensions, applications can be either aware or unaware of the speech extensions. Unaware support is available for navigation and dictation with most OS/2 applications. Navigation requires that the VTD product can extract



text obtained from menu bars, buttons, etc. to generate the vocabulary. It may also be necessary to add pronunciations for application-specific words to the dictionary.

The following programming guidelines will enhance the usability of the speech-unaware support:

- Use standard Presentation Manager controls.
- Use text with graphics (so the user knows what to say and the system can extract the text).
- Provide accelerator key mappings for menu and dialog functions.

Unaware support is also provided for dictation, depending on the application. It allows speech input from the dictation window to be passed back to the application as text as if it had been entered on the keyboard. Applications in which you want to fully integrate and exploit speech recognition will need to be made speech-aware.

Speech-aware applications are programmed to accept and handle the speech input themselves. An example of this might be a word processor that allows speech input or dictation that goes directly into the word processor's text area, as opposed to using the dictation window. The word processor would also have to provide methods of interacting with the user to correct words that may have been incorrectly interpreted.

The VTD APIs provide function calls and data structures for performing the following tasks:

- Query parameters, identifiers, and vocabularies
- Define multiple users
- Enable and disable the user's microphone
- Collect, process, and decide what action to take for spoken input

- Switch between dictation and spoken words
- Replay dictated text
- Define dynamic vocabularies

Details of the specific APIs can be found in the *VoiceType Dictation for OS/2 Application Programming Guide and Reference*, which is part of the VTD for OS/2 Software Development Kit. You can get information about joining the IBM VoiceType Dictation Developers Program and ordering VTD Developers Program options by calling (800) 627-8363. You can get additional information about IBM speech recognition products by calling the IBM Speech Support Center at (800) TALK2ME (800-825-5263).

### Three HCI Technologies Ready to Use

While the various HCI technologies are at different points on the technology maturity curve, the three we have discussed are all ready to incorporate in applications. For example, while multimedia has matured and become a standard part of the operating system, speech recognition is now beginning to mature, and handwriting recognition is being used extensively in niche markets. As these technologies mature, they too will be integrated into the operating system, and the operating system and applications will begin to use them more extensively to solve user problems.

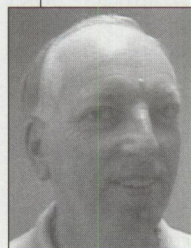
### Aiming Toward the Future

Providing a single application programming interface through the IBM Open Class Library and using strategic tools such as VisualAge and OpenDoc parts will provide cross-platform access to these technologies. As OpenDoc parts are created, they should be enabled for advanced HCI support. For example, if a text part allows input from the handwriting and speech-recognition extensions, then all software that uses those parts will automatically be enabled for that HCI support. Making these cross-platform tools and

components available to application developers will accelerate the development of applications that utilize the technologies.

### Leading-Edge Technologies

Application developers who want to create leading edge applications will be the first to take advantage of these technologies. By incorporating the HCI technologies, you will be able to create more natural human-computer interfaces and shift the focus from computer-oriented people to people-oriented computers. Even if you do nothing to modify your existing applications, you can depend on the unaware support provided by OS/2 Warp's system extensions as the first step in using HCI technologies with your applications.



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# An Introduction to Speech Recognition with OS/2

*Today, people are using speech recognition to control OS/2 applications and to dictate text instead of typing. This article provides an overview of speech recognition concepts and the IBM products that embody these concepts.*

According to Hollywood, a starship commander converses with computers as though the machines were human—maybe better than human. These machines can understand every word and do all sorts of handy things, like looking up information in huge databases and recommending how to behave under almost any circumstance. (However, I recollect that they had some difficulty opening pod doors.)

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The bad—and probably obvious—news is that we are a long way from that. The good—but perhaps not so obvious—news is that we can, today, use voice to both give commands and dictate to computers. The technology that enables computers to recognize the words we speak is available

through IBM products right now. This technology has been referred to in the past as *automatic speech recognition*, or ASR. Today, it is more commonly referred to simply as *speech recognition*.

It takes more than mere word recognition to perform those Hollywood feats of wizardry, however; it takes the ability to interpret those words within a context. For example, suppose the starship commander wants to know how much fuel he has. He might say, “Are the fuel cells low? How much time do we have left?” He expects the computer to understand that “How much time do we have left?” refers to how long he can travel based on the fuel available. His words have to be recognized, then interpreted within the context of his conversation with the computer. This process, called *natural language input*, requires “rules of understanding” and is a separate topic.

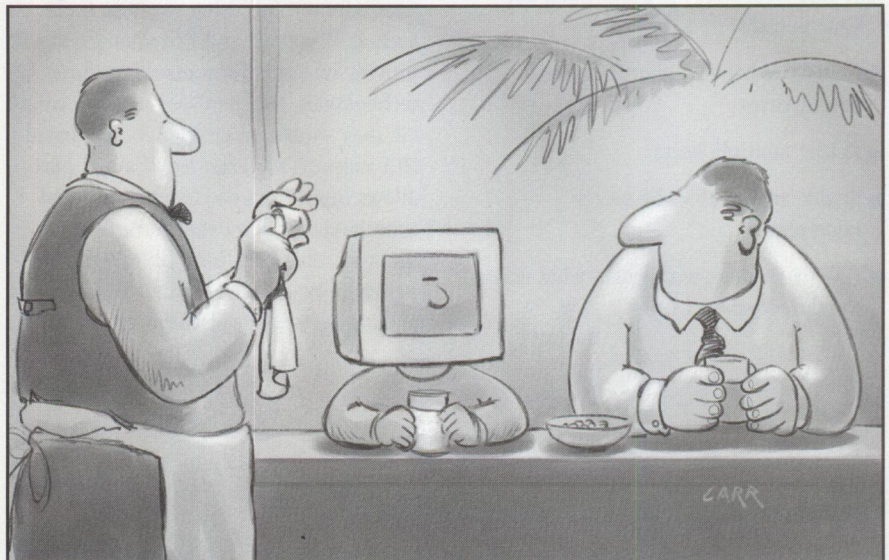
To simplify, speech recognition can be thought of as an alternative to keyboard or mouse

input. The ability to recognize spoken words, however, does not give the computer the ability to understand what is expected from those words any better than if they were input via a keyboard.

## Natural Language Input

That’s not to say there is no value in word recognition; there’s plenty. For the great many of us who steal glances at our fingers as they jump about the keyboard striking keys, the ability to wear a headset microphone and focus on reading notes or to watch the screen as we “speak” to our computers can be a godsend.

A related discipline is the ability of the computer to “speak.” This is called *speech synthesis* or *text-to-speech*. It is also available today, although it is not nearly as melodious as Hollywood depicts. It has its own set of complexities and uniquely descriptive vocabulary. However, in this article, we are looking at speech recognition only.





## Recognizing Speech Today: General Concepts

Speech recognition first requires acoustically matching the speaker's speech with that of previously defined word models.

Sound from a microphone is sampled, for example, at 11 KHz. The data is then digitized in a manner similar to a CD (except that a CD is sampled at 44 KHz), with the objective of building a digital representation of the audio wave. Data considered useful for recognition is extracted, while other information such as intensity and pitch is not necessarily used. After the sound is digitized, it is matched on a probabilistic basis to existing phonemic pronunciations. Like atoms of a molecule, *phonemes* are the fundamental building blocks of word pronunciations. The recognition process then combines the phonemes into possible words selected from a predefined vocabulary. This process considers not only the acoustical information but also considers which phonemes are most likely to occur in sequences that make up the words from the predefined vocabulary.

The result of this effort produces a list of 10 to 500 possible words, identified and ordered on a best-guess basis. Additionally, the words themselves are reviewed within the context of a language model to further improve accuracy. A *language model* is a representation of the likelihood that one word follows another in sequence. If the top word candidate has a very low probability of appearing in the current sequence, it may be replaced by a lower candidate with a higher probability of occurring in the sequence.

For example, suppose I dictate "Turn on the light." When I speak the word "light," the computer might acoustically match "like" as a better candidate than "light," depending on my pronunciation. But next, using a language model, it determines that the word "light" is more likely to follow "on" than "like," so it selects "light" instead.

### Command and Control: IBM Continuous Speech Series

Command and control is the most common conversation form that Hollywood depicts. A starship commander gives the computer a verbal command for

```
<action> ::= <command> <num> SHARES OF <company>
<command> ::= BUY | SELL
<num> ::= <num1> <num2>
<num1> ::= ONE | TWO | THREE .....
<num2> ::= HUNDRED | THOUSAND .....
<company> ::= IBM | EXXON | GE .....
```

Figure 1. Sample Voice Command Context

information. (If he were talking to a human, it would be called a question, but when the computer is the target, it is a command.) The computer then responds. More commands for information and responses follow, until the starship commander issues his final command: "Make it so."

During this exchange, where the commander is using normal everyday language, the computer must recognize the spoken words and understand what to do. It is not enough to simply identify each individual word—the computer must exhibit understanding as if it were human and be able to perform the required actions.

This kind of exchange is far more complex than can be accomplished today; the technology to "understand" the natural language input on commercially viable hardware platforms is still in the research phase. However, using the IBM Continuous Speech Series (ICSS) speech recognition product, it is possible to add voice command and control to current OS/2 applications.

ICSS is basically a toolkit for enabling OS/2 applications to recognize voice commands. Using this product, predefined sets of voice commands, also known as *contexts*—with a vocabulary of 1,000 words at any given moment—are recognized and passed to the application. The program specifies which context is to be used and is then notified whenever a voice command in the active context is recognized. A context is defined using a syntax known as Backus-Naur Form (BNF, also called Backus Normal Form) of all possible commands for a particular context.

For example, let's say a stockbroker would like to issue voice commands to buy or sell stock. He or she might define a set of voice commands, which the programmer

then converts into a context using ICSS and the BNF syntax such as the one in Figure 1. The context becomes part of the program for trading stocks and is activated when the stockbroker wants to make a trade. In this manner, all possible phrases are defined, and speech recognition is limited to those phrases.

When the context in Figure 1 is compiled and integrated with an application to buy and sell stock, the stockbroker is able to speak into a microphone attached to his or her computer and say, for example, "Buy two hundred shares of IBM." No particular voice "training" is required, and the stockbroker can speak at a normal speed—pauses between words are not required. Recognition accuracy is a function of microphone capability, the degree of similarity of each possible phrase, the number of phrases, and the degree of the speaker's accent.

### Dictation: VoiceType Dictation for OS/2

In the previous Hollywood example, the starship commander wanted some information, so the speech recognition system had to recognize his words and understand how they fit together to form a semantically correct command. This kind of requirement, however, is not always the case in a real-life application.

A common requirement is simply to verbally record ideas and information that may be referenced later or converted to another media, such as print. A starship captain begins each day with a captain's log entry, where he enters the date and some information that sets the stage for the week's episode. His words must be recognized individually but not necessarily understood in a particular context, because there are no actions required by the computer other than storing the information. This form of conversation, referred to as *dictation*, does not require



Telephone numbers	10
Radiology reports	50
Office correspondence	200
<i>New York Times</i>	500 - 700

**Figure 2. Examples of Perplexity**

the same kind of analysis as command and control.

The IBM VoiceType Dictation for OS/2 (VTD) product is a large-vocabulary, speaker-dependent, isolated-word speech recognition product. Huh? Well, it has a *vocabulary* of 20,000 to 30,000 words that can be recognized. However, before you can take advantage of that recognition, you must first “enroll”; that’s the *speaker-dependent* part. During enrollment, you spend about an hour and a half reading two short stories into the computer. The computer then processes what you have read to determine your particular pronunciation of all the words in the vocabulary. As for *isolated-word* speech, you speak with a brief (very brief, 1/10 second) pause between each word. It’s not as bad as it seems—most people get the hang of it pretty well during enrollment. After a short time, typical users

can dictate approximately 80 words per minute with 95 percent accuracy.

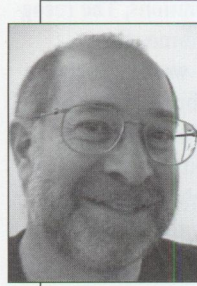
But why do you have to bother with enrollment and isolated-word speech? Part of the answer lies in a measurement used in speech recognition called perplexity. Basically, *perplexity* is a measurement of the predictability of word sequences. The more easily you can predict the next word in a sequence, the lower the perplexity and the simpler the recognition task. Conversely, when many words are likely to appear next in a sequence, the higher the perplexity and the more difficult the recognition task. Figure 2 shows some examples of perplexity. Enrollment processing and isolated-word speech are used to reduce the computational requirements demanded in high-perplexity environments.

In addition to dictation, VTD includes voice desktop navigation. Standard Presentation Manager (PM) controls are automatically enabled for speech recognition, so that you can say commands such as “save” or “file,” and the command will be executed as if you had used the mouse.

VTD is supplied in US English, UK English, French, German, Italian, and Spanish, and additional specialized vocabularies for journalism, radiology, emergency medicine, and law can be purchased. A toolkit is also available.

**Speech Recognition: The Future**

Continued improvements in approaches to recognizing speech and natural-language understanding, in conjunction with ever more powerful hardware platforms, mean Hollywood’s vision of the future can’t be too far off. Not only will we be talking to computers, but cars and some appliances (well, maybe not a blender) will also become speech-enabled. But why wait? You can take advantage of emerging speech-recognition technology to communicate with computers in a more natural way today. And you can do it at the speed of sound.



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21 years with IBM, Andy has also worked in COBOL compiler support, operating systems design, fault-tolerant systems, and pen computing. He has a Masters in Applied Mathematics from the Polytechnic Institute of Brooklyn.



# Intelligent Agents: A Primer

*"The future of computing will be 100% driven by delegating to, rather than manipulating, computers." – Nicholas Negroponte*

*Software programs that allow users to delegate tasks to computers are popularly called "intelligent agents." Since this definition allows such a broad spectrum of implementations, it is valuable to have an understanding of the basic types of agents. This article defines some helpful categories and descriptions for the variety of work going on in this arena.*

In the community of artificial intelligence (AI) researchers and developers, an *intelligent agent* is an independent AI-based computer program that is designed to solve (or help solve) complex problems within a particular area of expertise (for example, power management or medical prescriptions). But in the fast-paced PC industry of hype, vaporware, and dazzle, the term "intelligent agent" has been thoroughly polluted to mean just about anything that does something helpful.

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Since this dichotomy is causing a great deal of consternation and grief in the AI community, some people are trying to come up with a new name for their "real" agent work. In the meantime, those of us in the industry are left to face another onslaught of "market-ecture" and hype as

the computer industry muddles through another integration cycle of an emerging technology. It's *deja vu* all over again!

## What is an Intelligent Agent?

Any discussion of an intelligent agent invariably begins with defining what it is. Definitions are as plentiful as the agents' projects themselves. Some definitions concentrate on the *intelligence* aspect, while others concentrate on the *agent* aspect. But the generally accepted definitions of intelligent agents draw from one or more of the following attributes:

- Demonstrates beliefs, desires, intents
- Is artificially intelligent in some knowledge domain
- Learns from its environment
- Adapts to a user's skill level, personality, or technique
- Cooperates or interacts with other agents
- Automates tasks according to a flexible set of rules
- Acts autonomously

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<sup>1</sup> Atkinson, B., Brady, S., Gilbert, D., Levine, D., O'Connor, P., Osisek, D., Spagna, S., Wilson, L. (1995). IBM Intelligent Agents, UNICOM Seminar Proceedings.

The less a product description draws from this list, the weaker its tie to mainstream intelligent agent work. The more it draws (especially from the top of the list), the stronger the tie and, in general, the greater the sophistication and footprint.

Intelligent agents may do such varied things as:

- Personalize user interfaces and application behavior
- Delegate and automate tasks that currently require direct user involvement
- Filter and manage the rising flood of electronic information
- Hide the complexity of the diverse systems that are the sources of the electronic information
- Forage through the worldwide network (e.g., the Internet) to accomplish a desired task
- Serve as proxies for mobile, intermittently connected users
- Help remote users collaborate

A useful tool in sorting out the plethora of agent work is the two-dimensional mapping developed by the IBM Intelligent Agent Task Force. To quote from one of their white papers:<sup>1</sup>

*"The mapping, shown in the figure below (Figure 1), defines a space in which intelligent software can be plotted and gauged relative to each other, described in terms of a space defined by these two dimensions of agency and intelligence.*

*"Agency is the degree of autonomy and authority vested in the agent, and can be measured at least qualitatively by the nature of the interaction between the agent and other entities in the system. At a minimum, an agent must run asynchronously. The degree of agency is*



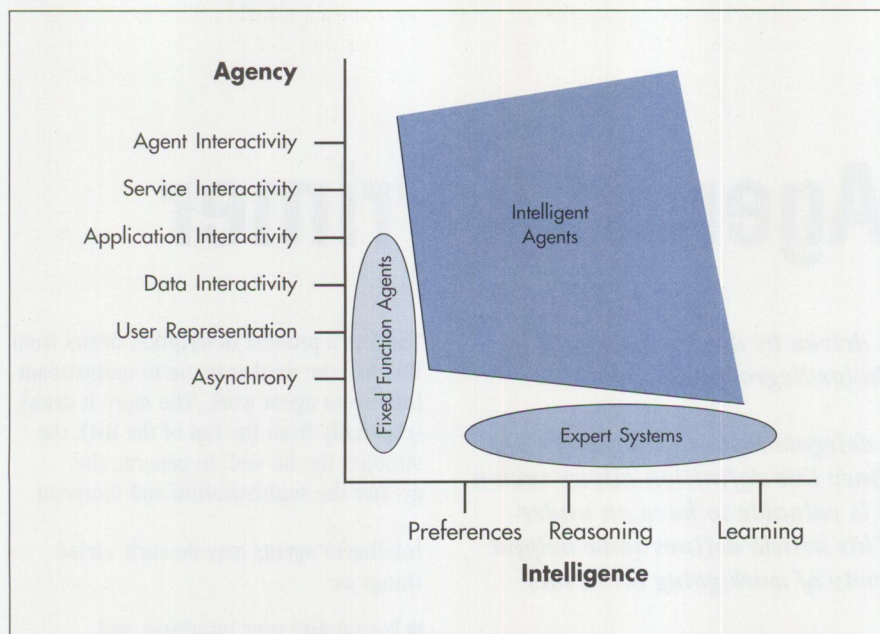


Figure 1. Mapping of Agency Versus Intelligence

enhanced if an agent represents a user in some way. This is one of the key values of agents. A more advanced agent can interact with other entities such as data, applications, or services. Furthermore, advanced agents collaborate and negotiate with other agents.

"Intelligence is the degree of reasoning and learned behavior: the agent's ability to accept the user's statement of goals and carry out the task delegated to it. At a minimum, there can be some statement of preferences, perhaps in the form of rules, with an inference engine or some other mechanism to act on these preferences. Higher levels of intelligence include a user model or some other form of understanding and reasoning about what a user wants done. Further out on the intelligence scale are systems that learn and adapt to their environment, both in terms of the user's objectives, and in terms of the resources available to the agent. Such a system might, like a human assistant, discover new relationships, connections, or concepts independently from the human user, and exploit these in anticipating and satisfying user needs.

"If a piece of software falls above and to the right of the threshold of intelligent agency, then it is an intelligent agent under this definition. For example, expert systems which are not agents may fall below the threshold, and

fixed-function agents such as traditional systems management agents may fall to the left of the threshold. This graph may be used to draw approximate qualitative comparisons among pieces of software. Note that the threshold for intelligent agents not being a right angle allows an extreme in one dimension to compensate for the lack in the other."

### Categories of Intelligent Software

With so many types of software referred to as agents, it is difficult to distinguish between *intelligent software* and *intelligent agents*. After surveying the landscape of intelligent agent software and their implementations, the following basic categories emerge:

- Wizards
- User interface agents/advisory agents/coaches
- Personal assistant agents
- Fixed autonomous agents
- Mobile (itinerant) agents

### Wizards

Wizards are, in essence, application-specific ordered sequences of prompts to help the user perform a specific task. The sequence is typically designed to gather information and settings that the application then uses to generate data and events internal to the

application. Technically speaking, wizards are hardcoded and do not employ any forms of artificial intelligence. However, because they are task-specific, they portray a certain "knowledge" about the application, and are thus perceived as intelligent.

### User Interface Agents

Commonly referred to as user *coaches*, *angels*, *guides*, *advisory agents*, or *user interface agents* (UI agents), these packages covertly monitor and use the user event stream to trigger the presentation of advice about the human-computer interaction currently in progress. An advisory agent depends on the system or application to notify it of suitably coarse-grained events so that it can "understand" which interactions are taking place. Once it understands an interaction or failure, an advisory agent then uses pop-up windows, balloons, cue cards, animation, speech, etc. to communicate things like:

- What is about to happen or which options are available
- Tips for doing things better
- How to correctly perform an action

The more sophisticated advisory agent implementations use artificial intelligence to infer which user interactions are being attempted. Adaptive techniques can be used in UI agent packages. Adaptive agents basically attempt to track, store, and analyze user interactions to develop an internal model of user behavior. In turn, subsequent actions, advice, or system or agent behavior is then modified to correspond to a user's skill level, personality, etc.

When adaptive techniques are used in UI agents, fast response dictates simple, straightforward user modeling techniques, such as counting the number of times an event occurs and time between failures. When used in non-time-critical applications, other sources of information can be accessed and analyzed during idle periods. The results from analyzing databases, activity logs, and so on can then be used to revise the user model. Examples of offline user attributes are reading interests, frequently used services, frequently visited Web sites, and electronic purchasing habits.



## Personal Assistant Agents

Also called *softbots*, this category of agents embodies the most easily understood applications for intelligent agent technology. MIT Researcher Patty Maes accurately sets the expectations for this category of agents when she describes them as "trainable ants." Within this category, three basic types of personal agents can be found:

- **Conversational agents**, which accept and respond with natural language. These are highly interactive agents that try to mimic the metaphor of a human assistant. Their typical behavior is similar to that of a pet dog; that is, they "hear" a command, interpret it, charge off to do something, then return, panting for more work.
- **Automation agents**, which perform tasks delegated by a user. These are independent agents that provide a way for users to describe jobs to be done and the conditions under which they should be done.
- **Application agents** are those that perform some kind of intelligent application-specific function. Examples of this type of agent are mail filters, meeting schedulers, and database worms.

Leveraging the familiarity of human-to-human relationships, personal assistant agents put the personal computer in the role of performing specific work on behalf of the user. Examples of this type of intelligent software are those that automate repetitive non-critical activities, filter large quantities of information, notify the user of events, plus maintain and manage complex systems. While some implementations of this type use typical graphical user interfaces (GUIs), the human-likeness of these packages begs the use of digital actors, animated characters, voice output, and natural language processing.

## Autonomous Agents (Fixed and Mobile)

Weighing in at the heavyweight end of the intelligence spectrum, these agents are generally separate processes performing specific work with little or no user interaction. They can take the form of either a stationary (fixed) agent or mobile (itinerant) agent. As separate and invisible entities, their user interface is usually provided by an application or a systemwide agent user interface such as

an avatar or digital actor. Examples of fixed agents include:

- **Information agents** that connect and search for information across heterogeneous information services and databases.
- **Service agents** that serve as front ends to complex databases for services such as travel, financial, and electronic commerce.

Itinerant agents can take on one of two forms. Self-contained itinerant agents are small enough to physically move their data and executable forms from machine to machine and can perform specific tasks in each machine they "visit."

A variant of this type of itinerant agent is one that just "carries" information pertinent to its task and depends on the environment at each machine to provide intelligence and other related services. For example, a meeting scheduling agent can carry information about windows of availability, but it uses the calendar functions at each host.

## Clouds on the Horizon

The emergence of agents presents technical, social, and ethical problems. Technical problems such as security and inter-agent communication are, in many respects, just new twists on well-understood problems. However, as the ability of agents improves to provide services closer to human counterparts, some forecasters predict that intelligent agents will displace many workers in "middleman" service-type jobs. This is referred to as *disintermediation*.

The mobility of agents presents new ethical problems, too. For instance, who should be allowed to know all the places an agent has visited? How can an agent be protected from mischievous agents? How can I protect information on my machine from visiting agents? And, do agents have rights?

## Intelligent Agent Projects in IBM

For information about agent projects within IBM, I recommend reading the white paper *IBM Intelligent Agents*, available by request from [dgilbert@vnet.ibm.com](mailto:dgilbert@vnet.ibm.com).

Here's a little to whet your appetite:

- **Workgroup Agent**—This is a personal assistant-type agent that is part of the IBM Workgroup product. This product

provides a visual builder for creating duties that its automation engine will perform.

- **Intelligent Communication System (ICS)**—This is a service being provided by IBM Network Services to handle all of a subscriber's incoming calls and information needs. Services include voice mail, fax, company e-mail, public e-mail, and data from private electronic files.
- **Conversational Agents**—This is a set of agents available on the PowerPC that use speech recognition and speech synthesis for accepting and responding to natural language directions from a user.
- **Neural Network Utility**—This is a product developed by IBM in Rochester, Minnesota, that is used to create neural network-based systems.
- **Coach**—This is a user interface agent prototype built by IBM's Almaden, California, research laboratory.
- **Knowledge Utility**—KnU, "noise filter for distributed information systems," is a general-purpose hypermedia system that allows groups of users to weave together all forms of data.

## Deja Vu

For most people, agents promise new and exciting applications in the information industry. Furthermore, the industry is clearly gearing up to give agents a wide range of uses. However, at the core of fulfilling the promise of agents is the dependency on the AI community for suitable intelligence technology. Here we go again!



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# CID Installation of OS/2 and Its Platform Applications

*This article provides a step-by-step procedure for building an OS/2 remote installation code server. The procedure includes configuration/installation/distribution (CID) of OS/2 Warp (with WIN-OS2 support), Multi-Protocol Transport Services (MPTS), Transmission Control Protocol/Internet Protocol (TCP/IP) 2.0, LAN Server 4.0, and Communications Manager/2 1.11, plus a redirected installation method for OS/2 Warp. The software distribution manager (SDM) used for this procedure is the LAN CID Utility (LCU).*

Using the procedure below, a network administrator or an end user can build an OS/2 remote installation code server. The procedure enables you to incorporate previous, current, and future versions of OS/2 and its platform applications (LAN Requester, Communications Manager/2, etc.) into one structured directory tree on a single computer.

The hardware and software requirements used for this procedure are listed below.

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## Server Hardware/Software Requirements:

- Intel 80486 processor
- 16 MB of RAM
- 1.44 MB, 3.5-inch diskette drive, configured as drive A:
- Token-Ring network
- 16/4 Token-Ring adapter (industry standard architecture [ISA] or Micro Channel)
- 400 MB of hard-disk space
- OS/2 Warp (with WIN-OS2 support)
- MPTS, release level WR0800
- Use Authorized Program Analysis Report (APAR) fix IC09119 (This is required when using CID to install MPTS with TCP/IP. Or, for a workaround, see "Installation Notes" in Step 2-3.)
- OS/2 TCP/IP 2.0
- OS/2 LAN Server 4.0
- Communications Manager/2

## Client Hardware/Software Requirements:

- Intel 80386SX or greater
- 8 MB of RAM
- 1.44 MB, 3.5-inch diskette drive, configured as drive A:
- 16/4 Token-Ring adapter (ISA or Micro Channel)
- 160 MB of hard-disk space (recommended)

The procedure is divided into seven sections:

1. Server setup
2. OS/2 Warp setup
3. MPTS setup
4. TCP/IP setup
5. LAN Server 4.0 setup
6. Communications Manager/2 1.11 setup
7. Creating LAN Transport (LT) client diskettes

Each of these sections is now described in detail.

## Section 1. Server Setup

**Step 1-1.** Install OS/2 Warp. Create a 100 MB primary partition (on drive C:) for OS/2 Warp, and use the remainder of your disk drive as an extended logical partition (drive D:) for your code server. I suggest using the File Allocation Table (FAT) format for drive C: and High-Performance File System (HPFS) format for drive D:.

**Step 1-2.** Install MPTS on your primary partition. When you configure MPTS, choose the following LAN adapter and protocols:



■ **Network adapter**—IBM Token-Ring Network Adapter

■ **Protocols**—IBM IEEE 802.2, IBM OS/2 NetBIOS, and IBM TCP/IP

**Step 1-3.** On drive D:, create the directory structure shown in Figure 1.

**Step 1-4.** This step copies MPTS disk 3 (Utilities) to a working directory (d:\cid\scratch) on your code server, then unpacks the files necessary to set up your code server.

First, insert MPTS disk 1 into drive A: and type `copy a:\pkunzip2.exe d:\cid\scratch`. Next, insert MPTS disk 3 into drive A: and type `xcopy a:d:\cid\scratch /s`. Now, type the lines shown in Figure 2.

**Step 1-5.** This step builds your SRVIFS configuration file. You can find a description of the parameters below in *NTS/2's Redirected Installation and Configuration Guide* (order number S96F-8488), Chapter 6. Refer to this manual to tune your SRVIFS configuration file for your environment.

Use an ASCII editor to edit `d:\server\service.ini` to reflect the statements in Figure 3. *Note:* Make sure there are no blank spaces or blank lines at the end of this file!

**Step 1-6.** In this step, `thinsrv.exe` accomplishes three tasks: (1) it creates or modifies your `STARTUP.COM` file with statements necessary to start your code server; (2) it appends path information in your `CONFIG.SYS` file; and (3) it adds `ifsdel.exe` to `d:\server`. Type:

```
cd\cid\img\srvifs
thinsrv /r:d:\server\service.ini
/s:d:\cid\img\srvifs
/t:d:\server /tu:c:
```

**Step 1-7.** This step compiles your LCU command file. Use the following lines as an example for building a default LCU command file:

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

**Step 1-8.** Shut down and reboot. Figure 4 displays the message you see when your SRVIFS code server has successfully started.

```
d:\cid
d:\cid\client
d:\cid\compile
d:\cid\dll
d:\cid\exe
d:\cid\img
d:\cid\img\lcu
d:\cid\img\srvifs
d:\cid\log
d:\cid\log\lcu
d:\cid\log\srvifs
d:\cid\rsp
d:\cid\scratch
d:\server
```

Figure 1. Directory Structure on Drive D: for Code Server

```
cd d:\cid\scratch
pkunzip2 applets\mptsaplt.zip applets
pkunzip2 lcu\lcu.zip lcu
pkunzip2 sample\sample.zip sample
pkunzip2 srvifs\srvifs.zip srvifs
copy srvifs d:\cid\img\srvifs
copy sample\service.* d:\server
copy d:\cid\img\srvifs\*.* d:\server
copy d:\cid\img\srvifs\service.exe d:\server
copy lcu d:\cid\img\lcu
copy applets\cas*.* d:\cid\compile
```

Figure 2. Unpacking MPTS Utility Files

```
# SRVIFS Configuration file
Adapter = 0
MaxClients = 5
MaxFiles = 102
Name = IMAGESRV
GroupName = No
ClientWorkers = 6
# Authlist = d:\server\service.lst
;
Path = d:\cid
PerClient = No
PermitWrite = No
;
alias=readonly,single,cid,d:\cid
alias=readonly,single,exe,d:\cid\exe
alias=readwrite,single,log,d:\cid\log
alias=readonly,single,rsp,d:\cid\rsp
```

Figure 3. Editing `d:\server\service.ini`

## Section 2. OS/2 Warp Setup

This section sets up your code server to install OS/2 Warp.

**Step 2-1.** On drive D:, create the following directory structure:

```
d:\cid\client\os2v30
d:\cid\dll\os2v30
```



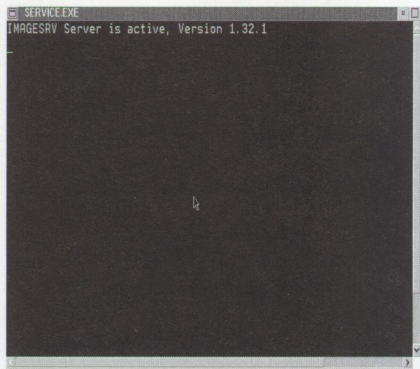


Figure 4. Successful Server Startup

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

**Step 2-2.** This step, detailed in Figure 5, unpacks some files necessary to set up your code server for OS/2 Warp.

**Step 2-3.** This step edits a response file with the minimum changes needed for a CID installation. Edit `d:\cid\rsp\os2v30\default.rsp` and change the keyword `exitonerror` to `exitonerror=1`. Then type `copy d:\cid\rsp\os2v30\default.rsp d:\cid\rsp\os2v30\johndoe.rsp`.

### Installation Notes

If you do not have the APAR fix IC09119, you can use the workaround shown in Figure 6. Step A copies the necessary TCP/IP device drivers to the scratch directory, and step B edits `d:\cid\rsp\os2v30\johndoe.rsp` and adds the `userexit` keyword responses.

**Step 2-4.** This step installs the OS/2 images on your code server. Type:

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

### Section 3. MPTS Setup

This section sets up your code server to install MPTS.

**Step 3-1.** On drive D:, create the following directory structure:

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

Insert OS/2 Warp disk 2 into drive A:, and type (on one line):

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

Insert disk 3 into drive A:, and type (on one line):

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

Insert disk 4 into drive A:, and type (on one line):

```
unpack2 a:\rexx d:\cid\d11\os2v30
```

Insert disk 7 into drive A:, and type the following lines:

```
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
copy d:\cid\client\default.cmd
      d:\cid\client\os2v30\johndoe.cmd
```

*Note:* The name `johndoe.rsp` is used as the example response file for all of the applications discussed in this procedure.

Figure 5. CID Support for OS/2 Warp

#### Step A:

```
copy c:\mptn\protocol\ifndis.sys d:\cid\scratch
copy c:\mptn\protocol\inet.sys d:\cid\scratch
```

#### Step B:

```
userexit=md c:\libmcom
userexit=md c:\libmcom\protocol
userexit=copy x:\scratch\ifndis.sys c:\libmcom\protocol
userexit=copy x:\scratch\inet.sys c:\libmcom\protocol
```

Figure 6. IC09119 Workaround

**Step 3-2.** This step copies the MPTS diskettes to your code server. Insert MPTS disk 1 into drive A: and type `a:\lapsdisk a: d:\cid\img\laps`.

**Step 3-3.** The LAPSRSP utility creates a response file based on your local machine's `PROTOCOL.INI` for a CID installation of MPTS. Type:

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

**Step 3-4.** Use an ASCII line editor to edit the file `d:\cid\client\os2v301\johndoe.cmd`. Figures 7 and 8 describe, by line number, the individual changes that must be made to `johndoe.cmd`.

Complete the changes in Figure 7 first, then the changes in Figure 8.

### Section 4. TCP/IP Setup

Section 4 sets up your code server to install TCP/IP.

**Step 4-1.** On drive D:, create the following directory structure:

```
d:\cid\img\tcpip20
d:\cid\log\tcpip20
d:\cid\rsp\tcpip20
```

**Step 4-2.** Copy the TCP/IP diskettes to your code server. Insert each TCP/IP diskette (excluding the LAPS and Library Reader diskettes) into drive A:, and for each diskette you insert, type `xcopy a:\*.* d:\cid\img\tcpip20`.



**Step 4-3.** This step copies the default TCP/IP response file to the proper directory. Type the lines shown in Figure 9.

**Step 4-4.** Edit `d:\cid\rsp\tcpip20\johndoe.rsp` to match the example shown in Figure 10. In this example, only the base kit and feature applications are being installed. Keywords have been added for the TCP/IP values. These response-file keywords can be found in the TCP/IP references listed at the end of this article.

**Step 4-5.** Use an ASCII line editor and refer to Figure 11 for additions and changes to the file `d:\cid\client\os2v30\johndoe.cmd`. The TCP/IP 2.0 installation is being added to the LCU example of OS/2 Warp and MPTS.

## Section 5. LAN Server 4.0 Setup

This section sets up your code server to install LAN Server/Requester.

*Note:* Currently, an unknown problem occurs with the 802.2 protocol when users CID install TCP/IP and LAN Requester 4.0. The Austin Support Center is working to correct this problem (Problem Management Report [PMR] number 6X899 BPSR).

**Step 5-1.** On drive D:, create the following directory structure:

```
d:\cid\img\lse40
d:\cid\log\lse40
d:\cid\rsp\lse40
```

Here, LSE40 = LAN Server 4.0 Entry and (later) LSA40 = LAN Server 4.0 Advanced.

**Step 5-2.** Copy the OS/2 LAN Server diskettes to your code server. Insert LAN Server disk 1 into drive A:, and type `a:\laninst`.

Next, choose the "tailored" installation method from the menu you see.

From the next menu (Figure 12), choose "Copy product diskettes for remote installation," then from the next menu, choose the "LAN Services" option.

Next, type path: `d:\cid\img\lse40`. You will be prompted for the LAN Server diskettes.

```
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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 41. server = "\\image\serv"
line 51. DELETE THIS LINE
line 52. DELETE THIS LINE
line 55. x.1.name = "os/2 WARP Fullpak"
line 57. x.1.instprog = %sepath%\seinst /b:"bootdrive" /s:"img_dir"\os2v30 /t:c:",
line 58. change os2v21 to os2v30
line 59. change os2v21 to os2v30
line 60. change default to johndoe
line 115. x.8.instprog = img_dir\lou\casinst1 /cmd:"d1\client\os2v30 /tu:"bootdrive,
line 130. add two blank line
line 131. For ease, copy lines 96 - 103, paste three separate times starting at line 131, each
time adding a blank line to separate the queues. Edit the three queues to reflect the
changes shown below. Or, you can manually add these statements starting at line 131.
BE VERY CAREFUL OF THE SYNTAX!!)

x.thinifs1 = 10
x.10.name = "SERVIFS Requester1"
x.10.statevar = ""
x.10.instprog = img_dir\servifs\thinifs /s:"img_dir"\servifs /t:"ifs_dir" /tu:"bootdrive"\,
"/ll:"log_dir"\servifs\client".log",
"/req:"client" /srv:"server"\cid /d:"d1

x.10.rspdir = ""
x.10.default = ""

x.thinifs2 = 11
x.11.name = "SERVIFS Requester2"
x.11.statevar = ""
x.11.instprog = img_dir\servifs\thinifs /s:"d1\img\servifs /t:"ifs_dir" /tu:"bootdrive"\,
"/ll:"log_dir"\servifs\client".log",
"/req:"client" /srv:"server"\rsp /d:"d2

x.11.rspdir = ""
x.11.default = ""

x.thinifs3 = 12
x.12.name = "SERVIFS Requester3"
x.12.statevar = ""
x.12.instprog = img_dir\servifs\thinifs /s:"d1\img\servifs /t:"ifs_dir" /tu:"bootdrive"\,
"/ll:"log_dir"\servifs\client".log",
"/req:"client" /srv:"server"\log /d:"d3

x.12.rspdir = ""
x.12.default = ""

NUM_INSTALL_PROGS = 12
```

Figure 7. Additions/Changes to JOHNDOE LCU Command File, Part 1

```
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f:\os2\wpos2\faxes\fig_6 - unmodified

/* After completing the changes from Figure 5., continue editing JOHNDOE.CMD
around line 170 beginning with the "Do Forever" statement. This section
should reflect the changes shown below. */

Do Forever
Select
  when OVERALL_STATE = 0 then do
    if RunInstall(x.SEINST) == BAD_RC then exit
    if RunInstall(x.LAPS) == BAD_RC then exit
    if RunInstall(x.THINIFS1) == BAD_RC then exit
    if RunInstall(x.THINIFS2) == BAD_RC then exit
    if RunInstall(x.THINIFS3) == BAD_RC then exit
    if RunInstall(x.CASINSTL) == BAD_RC then exit
    Call CheckBoot
  end
  when OVERALL_STATE = 1 then do
    if RunInstall(x.IFSDDEL) == BAD_RC then exit
    if RunInstall(x.CASDELETE) == BAD_RC then exit
    Call Reboot
  end
end
end
exit
```

Figure 8. Additions/Changes to JOHNDOE LCU Command File, Part 2

```
copy d:\cid\img\tcpip20\default.rsp d:\cid\rsp\tcpip20
copy d:\cid\img\tcpip20\default.rsp d:\cid\rsp\tcpip20\johndoe.rsp
```

Figure 9. TCP/IP Response File



```

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File Edit View Layout Tools Font Graphics Macro Window Help

// Default response file for PRODUCT DISK install
INSTALL_NAME = BASE 7.55 1 4 "Base Kit" Base TCP/IP for OS/2
INSTALL_NAME = EPLS 1.38 5 5 "Base Kit" Pubs for Base TCP/IP for OS/2
// INSTALL_NAME = LANMAIL 1.90 6 6 "Base Kit" LanMail
// 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 TCP/IP CID Install
// INSTALL_NAME = DBOX 0.56 1 1 "DOS/Windows Access Kit" DOS Box Kit
// INSTALL_NAME = WSOX 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 = KCLI 2.68 1 2 "X Window System Client Kit" X-Client Runtime Services
// INSTALL_NAME = KCFR 1.40 1 1 "X Window System Client Kit" X-Client Programmer's Toolkit
// INSTALL_NAME = MOTIF 1.79 1 1 "OSF/Motif Kit" OSF/Motif Runtime Services
// INSTALL_NAME = MFR 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 MFTN_INSTALLED NTS2_DIR HOSTNAME IP_ADDR NETMASK
ROUTE DNSDOMAIN NAMESERVER STARTUP_FOLDER TCP_SERVICES
// EXEC = NFS call nfext BOOT_DRIVE TARGET_PATH
// EXEC = DBOX call dboxxt BOOT_DRIVE TARGET_PATH
// EXEC = PMX call pmxxt BOOT_DRIVE TARGET_PATH
// EXEC = PGMG call pgmxt BOOT_DRIVE TARGET_PATH
// EXEC = KCFR call kcfprt BOOT_DRIVE TARGET_PATH
// EXEC = KCLI call kclixt BOOT_DRIVE TARGET_PATH ETC_PATH
// EXEC = MOTIF call motixt 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
//
// HFILES_NEEDED = KCFR
// the values supplied below for the keyword responses are made up for this example only
IPADDR=9.88.20.99
NETMASK=255.255.224.0
HOSTNAME=johndoe
NTS2_DIR=C:\IBMCOM
LAPS_EXE_PATH=X:\IMG\MPTS
TARGET_PATH=C:\TCP20
LOG_PATH=X:\TCP20
HFILES_NEEDED=N
BOOT_DRIVE=C:
CONFIGURE=Y
CONFIGSYS=Y
INSTALL_LAPS=N
ROUTE=9.85.3.40
NAMESERVER=9.85.11.2

```

Figure 10. Additions/Changes to TCP/IP Response File

```

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f:\os2\wpos2\axes\fig_8

/* Add this product definition and change NUM_INSTALL_PROGS as shown below
in JOHNDOE.CMD */

x.tcpip20 = 13
x.13.name = "TCP/IP 2.0"
x.13.statevar = "CAS" || x.13.name
x.13.instprog = "x:\img\tcpip20\tcpinst /s:x:\img\tcpip20 /t:c:\tcpip tu:c:",
"/11;z:\tcpip20\client.12 /12;z:\tcpip20\client.12 /x:"
x.13.rspdir = rsp_dir"\tcpip20"
x.13.default = "johndoe.rsp"

NUM_INSTALL_PROGS = 13

/* add the TCP20 queue shown below and increase the overall_state=2 for
IFSDEL and CASDELET in JOHNDOE.CMD */

when OVERALL_STATE = 1 then do
  if RunInstall(x.TCPIP20) == BAD_RC then exit
  Call CheckBoot
end

```

Figure 11. Additions/Changes to JOHNDOE LCU Command File, Part 3

**Step 5-3.** After you copy the product diskettes to the code server, the installation tasks menu appears.

1. Choose "Create a requester response file for remote installation."
2. Specify as file name and path:  
d:\cid\rsp\lse30\johndoe.rsp.

3. Follow the menus and choose the options you want installed.

4. When your response file has been created, choose exit from the server installation/configuration.

**Step 5-4.** Use an ASCII line editor to edit  
d:\cid\client\os2v30\johndoe.cmd.

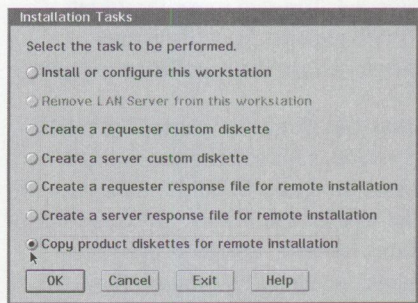


Figure 12. LAN Server Installation Tasks Menu

The LAN Services product definition is already defined in the LCU example (johndoe.cmd). Match the LAN Services product definition (line 87 in the johndoe.cmd file) and other changes with those found in Figure 13. The LAN Requester installation is being added to the LCU example of OS/2 Warp, MPTS, and TCP/IP.

## Section 6. Communications Manager/2 1.11 Setup

This section sets up your code server to install CM/2.

**Step 6-1.** On drive D:, create the following directory structure:

```

d:\cid\img\cm2111
d:\cid\log\cm2111
d:\cid\rsp\cm2111

```

**Step 6-2.** Copy the CM/2 diskettes to your code server. Insert CM/2 disk 1 into drive A:, and type a:\cmimage a:  
d:\cid\img\cm2111.

**Step 6-3.** Use either of these two ways to obtain a CM/2 response file:

A. The preferred method to obtain a CM/2 response file is to install CM/2 on a local machine with a configuration similar to the client's desired configuration. Once a CM/2 configuration has been created, follow these steps:

- A1. Type cd x:\cmlib (where x: is the drive on which CM/2 was installed on your local machine).
- A2. Type cmrecord x:\cmlib\client.cfg /o:d:\cid\rsp\cm2111\johndoe.rsp (where client.cfg is the name of the file used to configure CM/2 on your local machine).



- A3. Edit d:\cid\rsp\cm2111\ johndoe.rsp, adding the following keywords and supplying the necessary responses to the keywords for your environment:

```
cmupdatetype = 1
cmsource = x:\img\cm2111
cmusercfg = johndoe
```

- B. The other way to obtain a CM/2 response file is to use the example response files provided with CM/2 (prime.rsp, reinstl.rsp, and upgrade.rsp). These three files are in the d:\cid\img\cm2111 directory.

**Step 6-4.** After completing the steps above, use an ASCII line editor and refer to Figure 14 for additions and changes to the d:\cid\client\os2v30\JOHNDOE.COMD file. The CM/2 installation is being added to the LCU example of OS/2 Warp, MPTS, TCP/IP, and LAN Requester installation.

Figure 15 displays a complete look at the LCU queues for the products described in this procedure.

## Section 7. Creating LAN Transport Client Diskettes

This section gives a step-by-step procedure for building your client's remote installation diskettes for a CID or redirected installation.

There are two types of redirected installations: (1) a dialog-driven method where the client answers the dialogs, similar to a diskette installation; and (2) a response-file installation where a response file is used to configure the client's workstation.

Note that a redirected installation is not a CID installation and will install only the base operating system—nothing else. However, a redirected installation is a very efficient and handy method for installing OS/2 Warp alone.

**Step 7.** This step, detailed in Figure 16, creates your LAN Transport (LT) client boot diskettes.

In Figure 16, step 1 is the only step that CID, dialog-driven, and response-file-driven methods have in common. To build a set of CID LT boot diskettes, follow steps 1 and 2. To build a set of dialog-driven

```
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/* Add this product definition as seen below in JOHNDOE.COMD */

x.laninstr = 5
x.5.name = "LAN Services 4.0"
x.5.statevar = "CAS_" || x.5.name
x.5.instprog = img_dir"\lse40\laninstr /req",
               "/11:"log_dir"\lse40\client".11",
               "/12:"log_dir"\lse40\client".12 /r:"
x.5.rspdir = rsp_dir"\lse40"
x.5.default = "johndoe.rsp"

/* add the LAN Server queue shown below and increase the overall_state=3 for
IFSDEL and CASDELETE in JOHNDOE.COMD */

when OVERALL_STATE = 2 then do
  if RunInstall(x.LANINSTR) == BAD_RC then exit
  Call CheckBoot
end

Font: Courier Outline (Medium) 12 pt Pg 1 Ln 4.4* Pos 1*
```

Figure 13. Additions/Changes to JOHNDOE LCU Command File, Part 4

```
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/* Add the product definition and increase NUM_INSTALL_PROGS as seen
below in JOHNDOE.COMD */

x.cmsetup = 14
x.14.name = "CM/2 v1.11"
x.14.statevar = "CAS_" || x.14.name
x.14.instprog = img_dir"\cm2111\cmsetup /s:x:\img\cm2111",
               "/11:"log_dir"\cm2111\client".11 /r:"
x.14.rspdir = rsp_dir"\cm2111"
x.14.default = "johndoe.rsp"

NUM_INSTALL_PROGS = 14

/* add the CM/2 queue shown below and increase the overall_state=4 for IFSDEL
and CASDELETE in JOHNDOE.COMD */

when OVERALL_STATE = 3 then do
  if RunInstall(x.CMSETUP) == BAD_RC then exit
  Call CheckBoot
end

Font: Courier Outline (Medium) 12 pt Pg 1 Ln 4.98* Pos 1*
```

Figure 14. Additions/Changes to JOHNDOE LCU Command File, Part 5.

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

Do Forever
  Select
  when OVERALL_STATE = 0 then do
    if RunInstall(x.seinst) == BAD_RC then exit
    if RunInstall(x.laps) == BAD_RC then exit
    if RunInstall(x.thinifs1) == BAD_RC then exit
    if RunInstall(x.thinifs2) == BAD_RC then exit
    if RunInstall(x.thinifs3) == BAD_RC then exit
    if RunInstall(x.casinst1) == BAD_RC then exit
    Call CheckBoot
  end
  when OVERALL_STATE = 1 then do
    if RunInstall(x.tcpip20) == BAD_RC then exit
    Call Checkboot
  end
  when OVERALL_STATE = 2 then do
    if RunInstall(x.laninstr) == BAD_RC then exit
    Call Checkboot
  end
  when OVERALL_STATE = 3 then do
    if RunInstall(x.cmsetup) == BAD_RC then exit
    Call Checkboot
  end
  when OVERALL_STATE = 4 then do
    if RunInstall(x.ifsdel) == BAD_RC then exit
    if RunInstall(x.casdelete) == BAD_RC then exit
    Call Reboot
  end
end
end
exit

Font: Courier Outline (Medium) 12 pt Pg 1 Ln 5.31* Pos 1.33*
```

Figure 15. All the LCU Queues



## FREE Product Information Index

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20	Cawthon Software	3
7	Cirrus Technology	8
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21	ColoradOS/2	7
10	Eicon Technology	8
22	Indelible Blue, Inc.	9
18	Infrastructure Inc.	Cover 4
19	Lieberman and Associates	1
6	MicroEdge, Inc.	8
3	ObjectSpace, Inc.	6
24	On-Line Data	15
8	PCX	8
23	Piper Research, Inc.	12
15	PowerQuest	Cover 2
1	Prominare Inc.	6
2	Scientific Endeavors	6
14	SofTouch Systems	13
9	Solution Technology, Inc.	8
11	WarpSpeed Computers	9
4	Watcom International Corp.	7

# STOP!

Have you used the reader service card to request fast, free information about the products and services advertised in *Personal Systems*?

**NO?** With the heavy traffic of new technology to choose from in the personal computer market, you need to know about all the most recent developments.  
**Caution.**

1. Use the advertiser's index to get the reader service numbers of the products and services for which you want to receive literature.
2. Circle the same numbers on the reader service card and fill out the necessary information.
3. Drop it in the mail (at no charge!), and we'll give your request the green light!

**YES.**  
Smart move.



### Step 1. For all methods:

Type `cd\cid\exe\os2v30`

Type `sedisk /s:d:\cid\img\os2v30 /t:a:`

You will be prompted for two formatted diskettes. Label the first diskette "install disk" and the second diskette "disk 1."

Place disk 1 into drive A:.

Type `cd/cid/img/laps`

Type `thinlaps d:\cid\img\laps a: ibmtok.nif`

### Step 2. For CID:

Insert disk 1 from step 1 into drive A:.

Type `cd\cid\img\srvfis`

Type `thinifs /t:a: /s:d:\cid\img\srvfis /tu:a: /req:johndoe /d:x: /srv:\imagesrv\cid /w`

Type `thinifs /t:a: /s:d:\cid\img\srvfis /tu:a: /req:johndoe /d:y: /srv:\imagesrv\rsp /w`

Type `thinifs /t:a: /s:d:\cid\img\srvfis /tu:a: /req:johndoe /d:z: /srv:\imagesrv\log /w`

Type `cd\cid\img\lcu`

Type `casinst1 /tu:a: /cmd:x:\client\os2v30 /pa:x:\img\lcu /d /pl:x:\dll\os2v30;x:\img\lcu /ll:z:\os2v30\johndoe.log`

Edit the CONFIG.SYS file on disk 1 and add `set sourcepath=x:\img\os2v30` at the bottom of the CONFIG.SYS file.

### Step 3. For dialog-driven:

Insert disk 1 from step 1 into drive A:.

Type `cd\cid\img\srvfis`

Type `thinifs /t:a: /s:d:\cid\img\srvfis /tu:a: /req:* /d:x: /srv:\imagesrv\cid /w`

Edit the CONFIG.SYS file on disk 1. Change the statement `set os2_shell=cmd.exe` to `set os2_shell=x:\img\os2v30\disk_1\sysinst2.exe`. Add the statement `set sourcepath=x:\img\os2v30`.

### Step 4. For response-file-driven:

Insert disk 1 from step 1 into drive A:.

Type `cd\cid\img\srvfis`

Type `thinifs /t:a: /s:d:\cid\img\srvfis /tu:a: /req:* /d:x: /srv:\imagesrv\cid /w`

Type `thinifs /t:a: /s:d:\cid\img\srvfis /tu:a: /req:* /d:y: /srv:\imagesrv\exe /w`

Type `thinifs /t:a: /s:d:\cid\img\srvfis /tu:a: /req:* /d:z: /srv:\imagesrv\rsp /w`

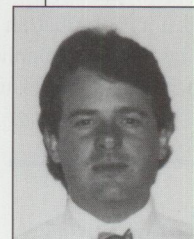
Edit the CONFIG.SYS file on disk 1. Change the statement `set os2_shell=cmd.exe` to `set os2_shell=y:\os2v30\rspinst.exe z:\os2v30\johndoe.rsp`. Add the statement `set sourcepath=x:\img\os2v30`.

diskettes, follow steps 1 and 3. To build a set of response-file-driven diskettes, follow steps 1 and 4.

## References

The following documents were used to create this procedure:

- *OS/2 Installation Techniques: The CID Guide*, GG24-5295
- *MPTS Configuration Guide*, S10H-9693
- *NTS/2, Redirected Installation and Configuration Guide*, S96F-8488
- README.CID, on OS/2 Warp (with WIN-OS2) disk 0
- *IBM Transmission Control Protocol/Internet Protocol Version 2.0 for OS/2: Installation and Configuration*, SC31-6075
- *Communications Manager/2 Network Administration and Subsystem Management Guide*, SC31-6168
- *Communications Manager/2 Workstation Installation and Configuration Guide*, SC31-7169



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Figure 16. Steps to Create LAN Transport Client Boot Diskettes



# Creating Your Own INF Hyperlinked Files

*If you have used OS/2 for any length of time, you have no doubt run across stand-alone hypertext INF (information) files such as the online OS/2 Command Reference. This article overviews the INF hyperlinked file creation process, as well as provides tips and tricks for getting the job done as quickly as possible. It also examines some of the tools used to make creating hyperlinked files easier.*

**C**reating your own hypertext files requires significant planning on your part. Planning translates into an understanding of the features and limitations of what can be done with the OS/2 VIEW utility (a hyperlink viewer of INF files) as well as the IPF tag language. Once you understand the language, setting up your documents so that they can be smoothly translated is a fairly straightforward process.

## IPFC Compiler

Generating your hypertext INF documents involves creating an ordinary ASCII file called an Information Presentation Facility (IPF) file. The IPF file is translated by the IPFC compiler to create either an INF file (for use with VIEW.EXE) or an HLP file (for use with OS/2 application programs).

---

**Philip Lieberman**  
**Lieberman & Associates, Inc.**  
**Beverly Hills, California**

---

The IPFC compiler can be obtained from the OS/2 Toolkit for OS/2 2.1 or OS/2 Warp. The toolkit comes with the IBM Developer Connection CD as well as with the IBM C Set compiler. The toolkit can also be found with many non-IBM OS/2 compilers, including Borland's.

## Program Help (HLP) Files

There are a few extra steps for creating help tables (used for context-sensitive help) and adding references within your program to the panel ID numbers within the generated HLP file.

If you currently have Microsoft Windows programs that already have help files, you can translate them for use with OS/2 programs by using the SMART Help tool included on the IBM Developer Connection CD. This tool converts the rich text format (RTF) input file used by the Windows Help Compiler into an OS/2 IPF file.

## The IPF File Creation Tools

The simplest way to create an IPF file is to enter your text using a plain-text editor. Next, add special formatting tags, called IPF tags, and run the file through the IPFC compiler. For simple documents with relatively few hyper-text linkages, this is the simplest and least-cost approach.

But what do you do if you already have existing documents (probably of substantial size) that you want to transform into IPF files? The answer is to use tools like IBM's Hyperwise, Perez Computing Services' IPF Editor, or other third-party tools. These programs take the output of your existing word processor and transform it into a form that can be directly used by the IPFC compiler.

Be careful, though—what you see on your word processor's screen may not translate easily or directly to the IPF format. IPF editors vary greatly in their ability to translate word processing files to IPF format. Just because a package says it can take an input format (e.g., RTF) does not necessarily mean it will work with your files!

## Designing Your Document for IPF

You can take normal text and feed it into the IPF compiler with almost no changes. But there are two problems with feeding in raw text. First, there is a limit of 16,000 words to any panel (section), and you will not see any breaks between the paragraphs. A second problem is the destruction of certain key characters such as ampersands (&) and colons (:) by the IPFC compiler, because "&" and ":" are reserved tag characters used by the compiler. So getting your data into a usable and readable format without being damaged by the compiler requires a little (although not much) forethought.

## Tag Format

The format of most tags is to begin with a colon and end with a period. For example, :p. is the tag to begin a new paragraph.



Some tags, such as the paragraph tag, require only one tag to accomplish their task. But other tags require both a starting tag and ending tag to mark a section of text. Unfortunately there is no simple way of knowing which tags require an ending tag and which don't. Lists, tables, and the overall contents IPF file all require specific matched starting and ending tags.

You can identify an ending tag because it is the same as the starting tag, except that the letter "e" is added to the beginning of the tag. For example, the `:caution.` tag requires a matching `:ecaution.` tag at the end of the cautionary text, as shown in Figure 1.

In Figure 1, notice that even the `:userdoc.` tag has a matching ending tag but that the heading tag `:h1.` does not have a matching tag (confusing, isn't it?). After you start using the tags, you will soon memorize which ones require ends and which do not.

*Note:* The output of the tagged text in Figures 1, 3, 4, 5, 6, 7, and 8 is shown in the screen capture accompanying each figure.

Figure 14 (at the end of this article) summarizes the different tags provided in the IPF markup language.

## The Actual IPF File Creation Process

Organizing your data to use with IPF usually involves the following eight steps (assuming you will be using an ordinary text editor).

### Step 1: Replace Reserved IPF

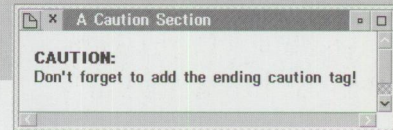
**Symbols**—Replace characters like ampersand (&), colon (:), and period (.) with their corresponding IPF symbols. For example:

- & becomes &amp;.
- : becomes &colon.
- . becomes &per.

Figure 15 (at the end of this article) gives the complete list of reserved IPF character symbols. The IPF compiler reserves certain symbols for its own use (control) and also operates in a code-page-independent fashion requiring the replacement of

```
:userdoc.
:title.Remember to add an ending to some sections
:h1.A Caution Section
:caution.Don't forget to add the ending caution tag!
:ecaution.
:euserdoc.
```

Figure 1. `:caution.` and `:ecaution.` Tags

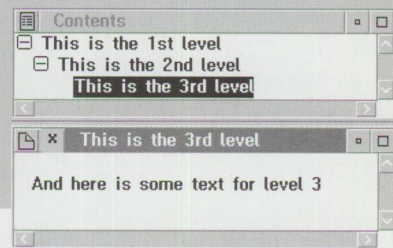


```
:userdoc.
:title.A BIG Online Document
:p.
.im file1.ipf
.im file2.ipf
.im file3.ipf
:euserdoc.
```

Figure 2. Imbedding Files

```
:userdoc.
:title.Multilevel Outline
:h1.This is the 1st level
:p.And here is some text for level 1
:h2.This is the 2nd level
:p.And here is some text for level 2
:h3.This is the 3rd level
:p.And here is some text for level 3
:euserdoc.
```

Figure 3. Multi-Level Outline



reserved characters and international characters.

A freeware program called TEXT2IPF, available on the Hobbes Internet site, translates all of the reserved IPF special characters in your source file into their character tag replacements. You will still need to tag the rest of your file, but at least this part of the translation can be done painlessly.

**Step 2: Break Project into Small IPF Files**—Imbedding allows an IPF authoring project to be broken up into smaller projects. A single IPF file calls out all of the other IPF files that are to be included in the master document. The files are imbedded with the `.im` tag. For example, you could imbed three files using the IPF file shown in Figure 2.

**Step 3: Add Outline Levels and Table of Contents**—Organize the document into a multi-level outline, and add heading-level tags (`:h1.` through `:h6.`).

Your outline can be up to six levels deep; however, you should try to keep it to four levels if possible, because hypertext linking is only possible to the first four levels. Outline headings must be sequential; that is, you cannot skip a level (for example, you cannot have an `:h1.` and then an `:h3.`). You must have at least one level 1 heading (`:h1.`) at the start of your document.

Figure 3 shows a multi-level outline. When its contents are compiled and the levels are expanded, you would see the result shown in the screen capture (I double-clicked on the third level).

**Step 4: Tag Paragraphs, Tables, Lists, Definitions**—Add paragraph, table, list, and definition tags to existing text so that the material displays properly. This is the most labor-intensive portion of the IPF creation process and an area where IPF editors become handy.

If your text consisted only of paragraphs, life would be simple. But, because data



```

.* These are
.* comment lines!
.*
:userdoc.
:title.Difference between paragraphs and examples
:h1.Example
:p.This is a paragraph
on multiple lines
that will be formatted
as needed.
:xmp.
But, this text will appear
EXACTLY as typed
:exmp.
:euserdoc.

```

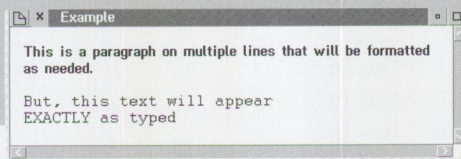


Figure 4. Paragraph and Example Tags

```

:title.Lists, Lists, Lists
:h1.Example
:p.Ordered List
:ol.
:li.Item 1
:li.Item 2
:eol.
:p.Unordered List (bullets)
:ul compact.
:li.Item 1
:li.Item 2
:eul.
:p.Simple List
:sl compact.
:li.Item 1
:li.Item 2
:esl.
:euserdoc.

```

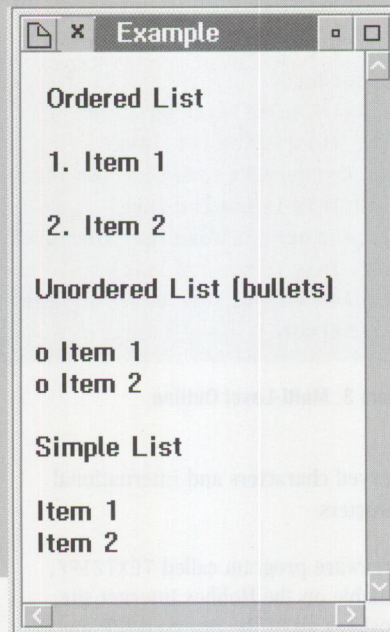


Figure 5. List Tags

must be formatted as lists and tables, special IPF tags are provided to retain the proper relative position of information within the document, regardless of window size and screen resolution.

When you type in normal paragraphs of text, the line breaks that you enter are ignored when compiled. The only time you will see a line break is when an IPF tag has been inserted to cause one. For example, the paragraph tag `:p.` is necessary to force a break between paragraphs and allow your text to flow into the available window size.

When displaying program listings, you certainly want the line breaks to stay

where they are. In IPF, you can use the “example” tag `:xmp.` to force the ensuing text to be formatted as fixed-pitch (monospace) text with line breaks as typed, until the `:exmp.` tag is encountered.

Figure 4 shows the use of paragraph and example tags. Notice that the example in Figure 4 also has comment lines. Comment lines are created by prefacing the comment line with the `.*` tag. This and other control tags are contained in Figure 13 (at the end of this article).

In addition to paragraph tags, there are also list tags. The three types of lists are:

- *Simple lists*—Each item is on a line by itself

- *Ordered lists*—Each item is either numbered or lettered

- *Unordered lists*—Each item has a bullet preceding it

A compact option is available to tighten up the vertical space between list items.

Figure 5 gives an example of the three types of lists, with the last two lists using the compact option.

Tables are the last major kind of text that is formatted by IPF tags. For a table, as you might expect, you must specify the number of columns, width of each column, column headings, and the data itself. Tables must be formatted using the same font throughout. It is best to use the default font, because it is guaranteed to be scaled to the proper size, no matter what the resolution of the display.

In Figure 6, we define three columns of 11 characters each. Each new row is identified by the `:row.` tag, while each column's information is called out with the `:c.` tag.

If you use tables in your IPF documents, there are a few “gotchas.” Make sure that you use the same font throughout the table. Never use a bold font for the column heading and a normal font for the rest of the table, because it will cause the lines around the table to be distorted. Arbitrary underlining works fine—just use `:hp5.` tagging.

### Step 5: Prepare Indexes and

**Synonyms**—Indexes are tags that are added to help users find sections of your document based on keywords or phrases. An index associates a keyword or phrase with a panel that has been given an identification number or symbol. You can also provide synonyms that allow any number of words to be associated with an existing index entry. This enables you to find the same section of a document using different words.

The syntax for creating indexes and synonyms is best left for automated tools. Hyperwise allows you to drag and drop words into an index list or synonym list for fast additions. Unfortunately, you have to search your document for all of these occurrences. The IPF



Editor product allows you to specify the terms, and it will search for the occurrences and automatically prepare a complete cross-referenced index table.

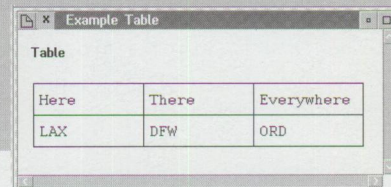
**Step 6: Add Bitmaps**—You can add bitmaps to your documents by using the :artwork. tag. The IPF editors also make this part of the IPF source file very easy. Note that none of the IPF editors retain graphics from their source word processor formats. This means that you will need to transfer the graphics from within your source word processing files into individual OS/2 bitmap (BMP) files. Once the files are in BMP format, you can manually insert them via the :artwork. tag or by using an IPF editor (they all do a good job attaching the graphics).

The lines in Figure 7, when compiled and run, display a small flamingo on the panel.

**Step 7: Create Hyperlinks**—There are two types of hyperlinks: hypertext and hypergraphic links. Hypertext links are triggered by clicking on a linked word or phrase. Hypergraphic links are triggered by clicking on a section of a bitmap.

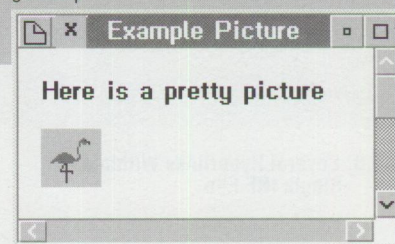
```
:userdoc.
:title.Table
:h1.Example Table
:p.Table
:table cols='11 11 11'.
:row.
:c.Here
:c.There
:c.Everywhere
:row.
:c.LAX
:c.DFW
:c.ORD
:etable.
:euserdoc.
```

Figure 6. Table Tags



```
:userdoc.
:title.Pictures!
:h1.Example Picture
:p.Here is a pretty picture
:artwork name='c:\os2\bitmap\flamingo.bmp'.
:euserdoc.
```

Figure 7. :artwork. Tag



## IPF Tools

Following is information on where to get some of the IPF tools mentioned in this article:

### IPF Editor:

Perez Computing Services  
4725 Monte Vista Place  
Mount Vernon WA 98273  
Phone: (800) IPF-7622  
Phone and fax: (360) 428-5025  
CompuServe: 70410,2416

### Hyperwise 2.0:

IBM Corporation as part  
#P30H1731

### Hyperwise support:

Fax: (407) 443-5771  
CompuServe: 73423,2767  
Internet: hyperwise@  
bocaraton.ibm.com

### SMART Toolset (on Developer

Connection CD-ROM)  
Call (800) 6DEVCON (800-633-8266)

### TEXT2IPF:

(Freeware that converts reserved IPF characters into their replacements) Internet via anonymous ftp to hobbess.nmsu.edu in the subdirectory /os2/dev32 as the file text2ipf.zip

### WP2IPF/2:

(Freeware that converts WordPerfect 5.1 files into IPF files) Internet via anonymous ftp to hobbess.nmsu.edu in the subdirectory /os2/dev32 as the file wp2ipf2.zip

### HLPDK/PA compiler:

HyperAct, Inc.  
P.O. Box 5517  
Coralville IA 52241  
Phone and Fax: (319) 351-8413  
CompuServe: 76350,333  
Internet: rloewy@panix.com

Hyperlinking makes it easy for users to follow threads of information in your document. Again, this is an area where an IPF editor can be very useful. Most IPF editors allow you to highlight a keyword or phrase and tag it as a hyperlink. When a hyperlink is activated, a specific panel can be brought into view, or an audio and/or video clip can be played.

To produce sound or video from within an IPF file, you will need to install Multimedia for Presentation Manager/2 (MMPM/2). You will also have to include a DLL file that links the IPF file to the MMPM/2 subsystem. In Hyperwise, audio and video support is provided by the SUPEROBJ.DLL file, while in IPF Editor, audio support is provided via the IPFE\_VCP.DLL file. IPF Editor plays AVI video clips by launching the video player as an application program.

Hyperlinking also allows you to run any application you wish—any special program that is useful for your IPF file. You



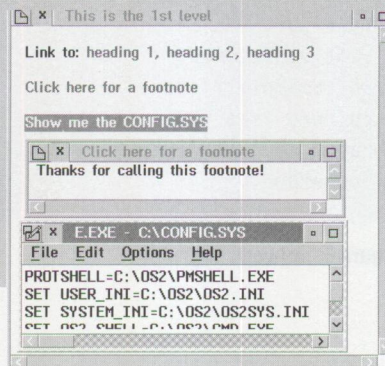
```

:userdoc.
:title.Multilevel Outline
:h1 res=100.This is the 1st level
.* Show the list of potential links next....
:p.Link to:
:link reftype=hd res=100.heading 1,:elink.
:link reftype=hd res=105.heading 2,:elink.
:link reftype=hd res=110.heading 3:elink.
.* Bring up a footnote
:p.
:link reftype=fn refid=Howdy.Click here for a footnote:elink.

.* Show how to start a program with parameters from link
:p.
:link reftype=launch
      object='c:\os2\e.exe'
      data='c:\config.sys'.
Show me the CONFIG.SYS
:elink.
:h2 res=105.This is the 2nd level
:p.And here is some text for level 2
:h3 res=110.This is the 3rd level
:p.And here is some text for level 3
.* Definition of a footnote
:fn id=Howdy.
Thanks for calling this footnote!
:efn.
:euserdoc.

```

Figure 8. Several Hyperlinks Within a Single INF File



```

:userdoc.
:title.An Online Document
:h1.First Heading Level
:p.
This window is defined by a first-level heading tag.
:euserdoc.

```

Figure 9. Minimal Lines for Compilation

can also bring up a pop-up window from a hyperlink using the “footnote” capability.

Here are the gory details of hyperlinking:

Hyperlinking is a two-step process. First, you must identify the panels or applications to be activated (in other words, to be linked to). In the case of panels, the IPF document designer must uniquely identify each panel by defining a unique number via the `res=` parameter in a heading (`:h1.`, ..., `:h6.`) parameter. An example of such an identifier is:

```
:h1 res=100.This is the 1st level
```

The number given in the `res=` parameter can range up to 64,000. It is a good idea to use numbers in increments of 5 or 10, so that there are extra numbers in case you need to add more panels.

To reference a heading that has a `res` number, you must use the `:link.` command. Insert the link where you want to reference the heading. You need to specify the linkage type (`reftype=`), panel identification (`res=`), and the text to display for the linkage. To link to our previous example of a heading, you would insert the following text:

```
:link reftype=hd
      res=100.Link to heading 1
:elink.
```

The parameter specified after `reftype` can be:

- `hd`—Link to a heading
- `fn`—Link to a footnote
- `launch`—Start a PM program
- `inform`—Send a message to an application (used when an application calls a HLP file)

Figure 8 contains an example of an application that links to headings and footnotes, plus launches an application, all from a single INF file.

When run, you should open the first-level heading. There, you will see each of the links in a light green color. Clicking on each entry will cause the appropriate heading, application, or footnote to appear.

### Step 8: Add Required Document

**Identifiers**—In all IPF files, a common set of lines must be included so that the file can compile. The IPF file in Figure 9 contains the minimum lines for compilation.

As shown in Figure 9, the `:userdoc.` tag must be the first tag (other than a comment) in the IPF file. The `:title.` tag defines the title that appears on the title bar of the IPF window. An `:h1.` tag is required to define the first heading of the file. The paragraph tag `:p.` signals the start of the contents of the “First Heading Level” panel. The information you want to present to your users is placed between the first heading and the `:euserdoc.` tag.

### Advanced Features

Several tricks let you customize your INF and HLP files to do special things. For example, you can place more than one panel of information on the same window, as well as control any panel's relative size and placement. This is all accomplished by defining panel group numbers and panel style attributes.

Starting with Hyperwise 2.0, IBM has included Tutor/2. This normally separate product has been integrated with Hyperwise to allow live interaction with external programs via HLP and INF files.



Tutor/2 provides "show me" and "stop me" controls to monitor user interactions.

A macro capability allows you to define symbols like &col on. that can be replaced with whatever you wish at compile time. This lets you create custom files without a lot of search-and-replace. The symbol feature permits you to define the value of a symbol and then use it, as defined, within the entire document.

Version control allows you to control what is displayed for a user based on an environment variable called IPF\_KEYS. The IPF\_KEYS variable is picked up by the VIEW.EXE program and is used to determine which panels will be visible.

## Hyperwise

IBM's Hyperwise 2.0 editor is a full-function IPF editor with import and export capabilities. It can import and export the following file formats:

### Import:

- IPF
- RTF
- BKM (BookMaster)

### Export:

- INF (stand-alone OS/2 help files)
- HLP (program-accessed help files)
- HTML (hypertext markup language for Internet Web browsers)
- BKM

Hyperwise has a very powerful graphical tagging capability that lets you highlight text and tag its format. Because this is done graphically, you can quickly see and set your hypertext document's format. Another strength of this package is its ability to make hypertext linking fast and easy to set up. This includes linking not only to different panels but also to external programs and multimedia sources.

Hyperwise lets you create hypertext documents without needing to understand the IPF tag language syntax (however, I would not recommend it!). Hiding the details of the tagging language is accomplished by organizing the information of your document into:

- Table of contents

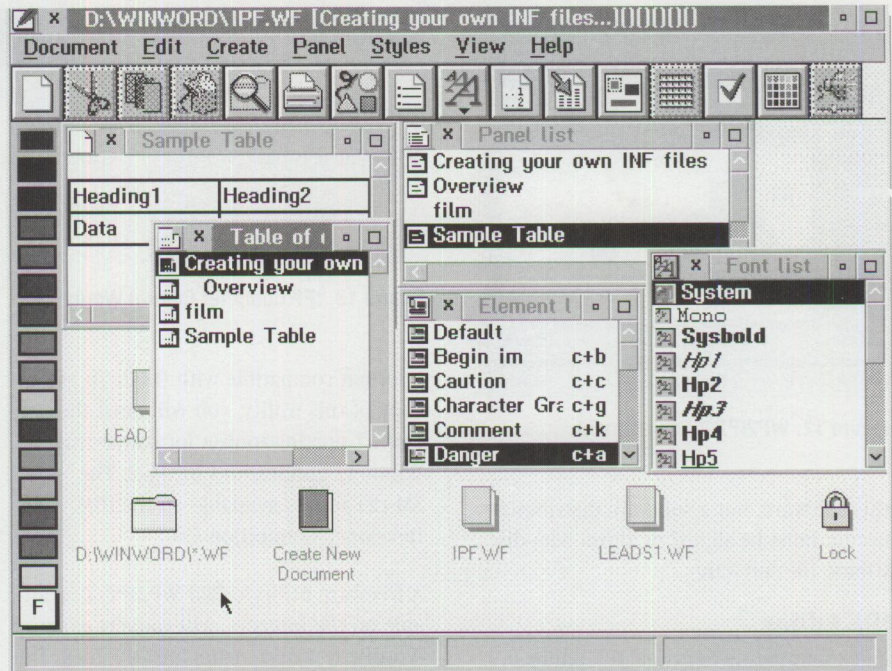


Figure 10. Hyperwise 2.0 Primary Editing Screen

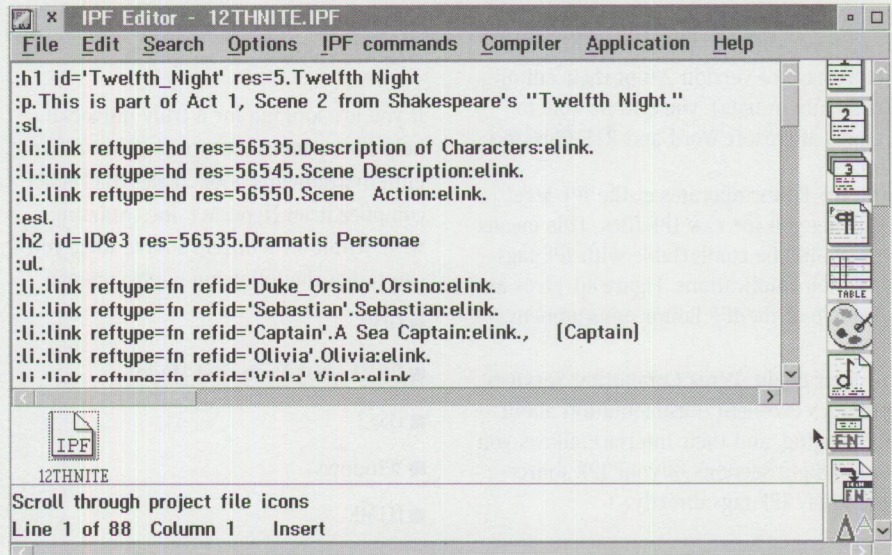


Figure 11. IPF Editor Environment

- Panels
- Index list
- Synonyms
- Symbols
- Bitmaps
- Pushbuttons
- Document properties and preferences

Hyperwise keeps all of the information about a document in a proprietary Hyperwise format known as a workfile

(WF) format. The Hyperwise workfile file format is designed to create not only IPF but also other formats such as the Internet's HTML format for Web pages.

Figure 10 shows Hyperwise's primary editing screen. A Hyperwise project's source data as well as tagging is contained in a \*.WF file. All editing is done in this file.

One of Hyperwise's advantages is an extra tool called IPF for Windows. This software allows you to display OS/2 IPF files in Windows. There is no cost for obtaining



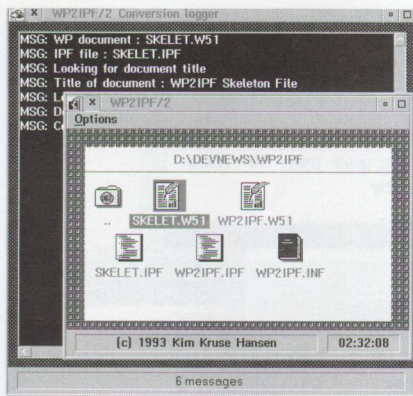


Figure 12. WP2IPF/2 Environment

this software, but a software distribution license must be signed by those who distribute the software.

### IPF Editor

Perez Computing Services' IPF Editor is similar in function to IBM's Hyperwise but has a completely different set of strengths. If you have existing documents in WordPerfect format, you can directly translate them into IPF documents. With the release of version 2.0 of their editor (currently in beta), you will be able to import Microsoft Word and RTF files, too.

The IPF Editor operates at the IPF level, showing you the raw IPF files. This means you should be comfortable with IPF tags and their implications. Figure 11 gives an example of the IPF Editor environment.

To their credit, Perez Computing Services provides excellent documentation about IPF tagging, and their interface allows you to highlight sections of your IPF source and apply IPF tags directly.

Programmers will appreciate the automatic generation of resource ID numbers in IPF Editor. There is also a cross-reference facility that automatically builds hypertext links, including index entries. This feature alone makes this product a great time-saver.

### Other Tools

If you already have complete help files for Windows applications, a tool called SMART Help takes an RTF file (RTF is the standard input for the Windows help compiler) and translates it into an IPF file directly usable by OS/2. Although Hyperwise, IPF Editor, and others can take RTF files as input, only SMART Help translates all of the Windows-specific tags into

Control Word	Description
.br (Break)	Causes a break in a line of text.
.* (Comment)	Places a comment into a file.
.im (Imbed)	Specifies text or artwork files that are to be included at process time.

Figure 13. IPF Compiler Control Words

a format compatible with OS/2. To get a copy of this utility, you will need the SMART porting toolset for converting Windows applications to OS/2. The SMART tool is available on the IBM Developer Connection CD.

A freeware utility called WP2IPF/2, available on the Internet, will convert existing WordPerfect documents into IPF files. This clever GUI utility comes with a nice help system that explains how to tag your WordPerfect files for use with the utility. Figure 12 shows a screen shot of the WP2IPF/2 utility.

If you are looking for a truly universal help file system that targets many different environments, look at the HLPDK/PA compiler from HyperAct, Inc. Starting with Windows WinHelp source files, you can target the following environments:

- DOS
- DPMS (DOS Protected Mode)
- OS/2
- Windows
- HTML
- ASCII and RTF document files
- DESQview/X
- Sony MM Player

This product consists of a database-centered hypertext editor and a series of support utilities for presenting help information on multiple platforms.

### Summary

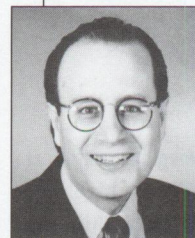
Creating IPF documents can be done relatively painlessly depending on the type of documentation you start with. Although tools like IPF Editor and Hyperwise take the sting out of IPF file editing, you still need to learn the basics of IPF tagging. Fortunately, all you have to do is learn a

few of the most common tags to be off and running.

If you already have existing documents that you want to convert, there are plenty of tools to help you with the conversion process. Some are in the public domain, and others you will need to purchase. The bottom line is that there is a way to get those INF files done in a flash!

### Acknowledgments

The author would like to thank Mario Perez of Perez Computing Services and Cathy Longenberger of IBM for their assistance in preparing this article.



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 IBMMAIL: USMVHLVH  
 Internet: lanicu@ibm.net or  
 76426.363@compuserve.com  
 (preferred)



IPF Tag	Description
:acviewport. (Application-Controlled Window)	Enables an application to dynamically control what is displayed in an IPF window.
:artlink. (Art Link) *	Identifies link definitions for hypergraphic areas of a bitmap.
:artwork. (Artwork)	Identifies a bitmap to be placed into the user's file.
:caution. (Caution) *	Alerts the user to a risk.
:cgraphic. (Character Graphic)*	Defines a character graphic. Used for syntax diagrams made from lines and arrows using fixed-pitch text characters.
:color. (Color)	Changes the colors of the text and text background.
:ctrl.	Defines the contents of the control area of a window. Allows the inclusion of IPF control pushbuttons such as Search, Print, Index, Contents, Esc, Back, Forward. The cover page can also be customized.
:ctrldef. *	Defines a control area of a window. Used with the :ctrl. definition to set the optional IPF pushbuttons.
:ddf. (Dynamic Data Formatting)	Displays dynamically formatted text in an application-controlled window.
:dl. (Definition List) *	Identifies a list of terms and definitions.
:docprof. (Document Profile)	Specifies the heading-level entries to be displayed in the Contents window.
:fig. (Figure) *	Identifies a figure.
:figcap. (Figure Caption)	Specifies a figure title.
:font. (Font)	Changes the font to the specified typeface, size, and code page.
:fn. (Footnote) *	Identifies a pop-up window.
:h1. through :h6. (Headings)	Defines window characteristics.
:hide. (Hide) *	Controls display of IPF text and graphics to meet conditions set by the IPF_KEYS= environment variable.
:hpl. through :hp9. (Highlighted Phrase)*	Emphasizes text by changing the font style or foreground color.
:i1. and :i2. (Index)	Places topics into the index.
:icmd. (Index Command)	Identifies the help window that describes a command.
:isyn. (Index Synonym)	Identifies synonyms and word variations for the help keywords.
:li. (List Item)	Identifies an item within a list.
:lines. (Lines) *	Turns formatting off.
:link. (Link) *	Activates a link to additional information.
:lm. (Left Margin)	Sets the left margin of the text.
:lp. (List Part)	Identifies an explanation within a list.
:note. (Note)	Starts a note.
:nt. (Note) *	Starts a note that can have multiple paragraphs.
:ol. (Ordered List) *	Starts a sequential list of items or steps. Items are numbered or lettered.
:p. (Paragraph)	Starts a new paragraph.
:parml. (Parameter List) *	Starts a two-column list of parameter terms and descriptions. Uses :pd. and :pt. entries.
:pbutton. (Pushbutton)	Defines author-controlled pushbuttons.
:pd. (Parameter Description)	Starts the description for a parameter term in a parameter list.
:pt. (Parameter Term)	Identifies a term in a parameter list.
:rm. (Right Margin)	Sets the right margin of the text.
:sl. (Simple List) *	Starts a nonsequential list of items. No bullets or numbers on items.
:table. (Table) *	Formats information as a table.
:title. (Title)	Provides a name (up to 47 characters) for the online document. Appears on the title bar.
:ul. (Unordered List) *	Starts a list of nonsequential items. Bullets are appended to each item.
:userdoc. (User Document) *	Identifies the source file that is to be compiled.
:warning. (Warning) *	Alerts the user to a risk or possible error condition. Creates bold <b>Warning:</b> followed by supplied text.
:xmp. (Example) *	Turns formatting off. Use for program listings or when data is displayed as typed, including carriage returns and line feeds (uses fixed-pitch fonts).

\* Requires matching ending tag (:tag. / :etag.)

Figure 14. Summary of IPF Tags



Code	Character	Symbol	Code	Character	Symbol	Code	Character	Symbol
&aa.	a acute	á	&acdqf.	close French double quote	»	&numsign.	number sign	#
&ac.	a circumflex	â	&acsq.	close single quote	'	&oa.	o acute	ó
&ae.	a umlaut	ä	&comma.	comma	,	&oc.	o circumflex	ô
&Ae.	A umlaut	Ä	&colon.	colon	:	&og.	o grave	ò
&ag.	a grave	à	&dash.	dash	-	&oe.	o umlaut	ö
&aelig.	ae ligature	æ	&degree.	degree	°	&Oe.	O umlaut	Ö
&AElig.	AE ligature	Æ	&deg.	degree	°	&frac14.	one fourth	¼
&Alpha.	Alpha	Α	&divide.	divide	÷	&frac12.	one half	½
&amp.	ampersand	&	&dollar.	dollar sign	\$	&odq.	open double quote	“
&and.	and	^	&dot.	dot	.	&odqf.	open French double quote	«
&angstrom.	angstrom	Å	&darrow.	down arrow	↓	&osq.	open single quote	'
&ao.	a overcircle	â	&ea.	e acute	é	&percent.	percent	%
&Ao.	A overcircle	Ä	&Ea.	E acute	É	&per.	period	.
&apos.	apostrophe	'	&ec.	e circumflex	ê	&plus.	plus sign	+
&bx2022.	ASCII code 185	␣	&ee.	e umlaut	ë	&plusmin.	plusminus	±
&bx2020.	ASCII code 186	␣	&eg.	e grave	è	&pm.	pound sterling	£
&bx0022.	ASCII code 187	␣	&emdash.	em dash	—	&Lsterling.	pound sterling	£
&bx2002.	ASCII code 188	␣	&endash.	en dash	-	&rb1.	required blank	
&bx2200.	ASCII code 200	␣	&eq.	equal sign	=	&rbrace.	right brace	}
&bx0220.	ASCII code 201	␣	&equals.	equal sign	=	&rbracket.	right bracket	]
&bx2202.	ASCII code 202	␣	&exclam.	exclamation point	!	&rbracket.	right bracket	]
&bx0222.	ASCII code 203	␣	&exclam.	exclamation point	!	&rbracket.	right bracket	]
&bx2220.	ASCII code 204	␣	&fnof.	function of	f	&rpar.	right parenthesis	)
&bx0202.	ASCII code 205	␣	&gt;.	greater than	>	&rparen.	right parenthesis	)
&bx2222.	ASCII code 206	␣	&gt;.	greater than	>	&semi.	semicolon	;
&asterisk.	asterisk	*	&house.	house	☰	&box14.	shaded box 1/4 dots	■
&atsign.	at sign	@	&hyphen.	hyphen	-	&box12.	shaded box 1/2 dots	■
&bslash.	backslash	\	&ia.	i acute	í	&box34.	shaded box 3/4 dots	■
&bsl.	backslash	\	&ic.	i circumflex	î	&slash.	slash	/
&Beta.	Beta	β	&ie.	i umlaut	ï	&slr.	slash	/
&bxas.	box ascender	␣	&ig.	i grave	ì	&box.	solid box	■
&bxbj.	box ascender	␣	&inve.	inverted exclamation	¡	&boxbot.	solid box bottom half	■
&bxcr.	box cross	␣	&invq.	inverted question mark	¿	&splitvbar.	split vertical bar (piping symbol)	
&bxcj.	box cross	␣	&larrow.	left arrow	◀	&sqbul.	square bullet	■
&bxde.	box descender	␣	&lbrace.	left brace	{	&sup2.	superscript 2	²
&bxdtj.	box descender	␣	&lbracket.	left bracket	[	&tilde.	tilde	~
&bxh.	box horizontal	—	&lbracket.	left bracket	[	&ua.	u acute	ú
&bxll.	box lower-left	␣	&lbracket.	left bracket	[	&uc.	u circumflex	û
&bxlr.	box lower-right	␣	&lbracket.	left bracket	[	&ug.	u grave	ù
&bxri.	box right junction	␣	&lbracket.	left bracket	[	&ue.	u umlaut	ü
&bxrj.	box right junction	␣	&lbracket.	left bracket	[	&Ue.	U umlaut	Û
&bxul.	box upper-left	␣	&lbracket.	left bracket	[	&us.	underscore	_
&bxur.	box upper-right	␣	&lbracket.	left bracket	[	&aus.	underscored a	Ⓐ
&bxv.	box vertical		&lbracket.	left bracket	[	&ous.	underscored o	⓪
&cc.	c cedilla	ç	&lbracket.	left bracket	[	&ye.	y umlaut	ÿ
&Cc.	C cedilla	Ç	&lbracket.	left bracket	[			
&caret.	caret	^	&Ndash.	N dash	-			
&cdq.	close double quote	”	&ndash.	N dash	-			
			&nt.	n tilde	ñ			
			&Nt.	N tilde	Ñ			
			&not.	not symbol	¬			
			&notsym.	not symbol	¬			



# Remote Installation of OS/2 Warp Connect

*This Little Solution discusses the remote installation utility included with OS/2 Warp Connect. It covers the products included with OS/2 Warp Connect, installation methods, remote installation server setup, the client boot diskettes, and remote client installation.*

IBM's most recent release of its award-winning 32-bit operating system is OS/2 Warp Connect. Like OS/2 Warp, this package comes in two versions: one without WIN-OS2 support (the red-spine product box) and one with WIN-OS2 support (the blue-spine box).

OS/2 Warp Connect installs on top of DOS and Windows systems meeting the minimum requirements (see "Server and Client Requirements" below), as well as on top of OS/2 2.1 or 2.11. If you currently use OS/2 for Windows 2.1, we recommend that you use the OS/2 Warp Connect product with the red spine, which uses your existing DOS and Windows.

## Products Included in OS/2 Warp Connect

Delivered on CD-ROM only, OS/2 Warp Connect includes the following products:

- Base product:
  - OS/2 Warp 3.0 (with WIN-OS2 support)
  - IBM Peer for OS/2
  - IBM LAN Requester 4.0
  - NetWare Client for OS/2
  - LAN Distance Remote 1.1
  - Network SignON Coordinator
  - TCP/IP for OS/2 3.0 (including the Internet Access Kit)
- Utilities:
  - AskPSP
  - Diskette images for OS/2 Warp and Networking Products Single-Component Installations for Connectivity Products
  - View/print publications
- BonusPak for OS/2 Warp (on a separate CD-ROM):

- Internet Connection
- CompuServe Information Manager for OS/2
- HyperACCESS Lite for OS/2
- Person to Person for OS/2
- Multimedia Viewer
- Video IN for OS/2
- IBM Works
- FaxWorks for OS/2
- System Information Tool

- Lotus Notes Express (on a separate CD-ROM)

## Two Installation Methods

OS/2 Warp Connect includes two installation methods: (1) local, where you install directly from the CD-ROM, or (2) remote, where you install across a local area network (LAN) from a workstation set up as a remote installation server.

## Remote Installation Server

One of the best features of OS/2 Warp Connect is its ability to set up a workstation equipped with a CD-ROM as a remote installation server. This remote installation capability allows a client machine to attach across a LAN to an OS/2 Warp Connect server workstation and then install all of the products contained in OS/2 Warp Connect.

## Server and Client Requirements

Below are the hardware and software requirements for both the server and client machines.

- Server:
  - 16 MB of RAM
  - OS/2-compatible CD-ROM drive
  - LAN adapter card supported by OS/2 LAN Server
  - OS/2 Warp Version 3 or later
- Client:
  - Intel 80386SX processor or greater
  - 8 MB to 12 MB of RAM
  - 1.44 MB, 3.5-inch diskette drive configured as drive A:
  - VGA video support
  - IBM-compatible mouse

- LAN adapter card supported by OS/2 LAN Server

## Remote Installation Server Setup

Your remote installation server must meet the hardware requirements listed previously under "Server and Client Requirements." Its software requirements are OS/2 Warp and native NetBIOS.

Begin the OS/2 Warp Connect installation by booting the installation diskettes provided with the package. Install only OS/2 Warp, without any networking options (unless required). It does not matter which drive you use to install OS/2 Warp.

Once OS/2 Warp is configured, installed, and running on your server, you must install LAN adapter and protocol support. Multi-Protocol Transport Support (MPTS), included with OS/2 Warp Connect, provides these LAN adapter device drivers and protocols.

To install MPTS, type `x:\cid\img\laps\mpts` where x: is the drive letter of the CD-ROM drive on your remote installation server.

Choose the appropriate device driver for your LAN adapter card, and choose the NetBIOS protocol (see Figure 1). When MPTS has been successfully installed and configured, shut down and reboot your machine.

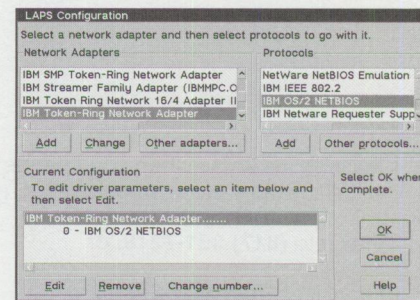


Figure 1. LAN Adapter and Protocol Support Installation



Note: If you are installing OS/2 Peer or LAN Requester, remember two things:

- Native NetBIOS is required for remote installations.
- Skip installing MPTS for LAN Adapter and Protocol Support.

## Client Boot Diskettes

Open the OS/2 System object, then the OS/2 Warp Connect Install/Remove object, then the OS/2 Warp Connect Remote Install object (see Figure 2). This last object guides you through building a set of client boot diskettes based on the client workstation's LAN adapter card (see Figures 3 and 4).

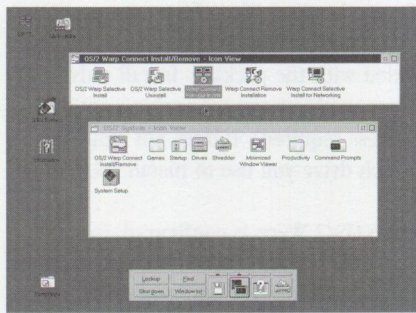


Figure 2. OS/2 Warp Connect Remote Install Object

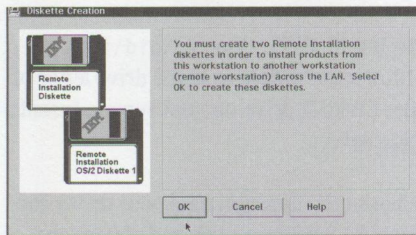


Figure 3. Building Client's Remote Installation Diskettes, Diskette Creation

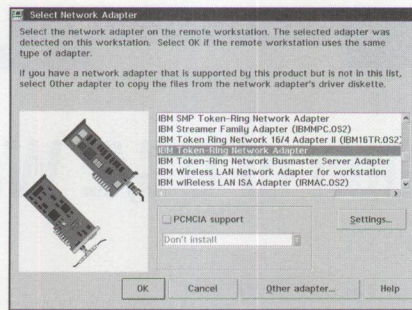


Figure 4. Building Client's Remote Installation Diskettes, Network Adapter Selection

## Remote Installation Server Startup

After you build your client boot diskettes, you can start your remote installation server (see Figure 5).

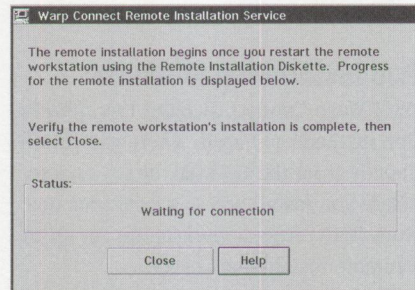


Figure 5. Remote Installation Server Startup

## Client Installation

When a client connects to the remote installation server via the LAN installation diskettes, the status bar at the server shows "Installation in progress" (see Figure 6).

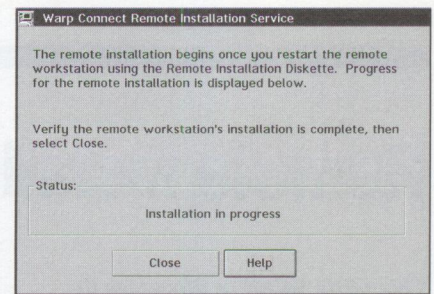


Figure 6. Remote Installation Server Status

If the client machine does not have OS/2 Warp already installed, the client's user can choose between the Easy or Advanced installation options. But if OS/2 Warp is already installed and running on the client machine, the installation is flexible enough to give the client's user two other choices: install networking only or reinstall OS/2 Warp with networking.

When the client completes the installation, the status bar at the server shows "Installation complete."

## References

The following documents were used to create this article:

- *Up and Running*, included with OS/2 Warp Connect, page 24
- *User's Guide to OS/2 Warp*, included with OS/2 Warp Connect

—Erik Mintz, IBM Corporation  
Boca Raton, Florida

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(Please include old mailing label if possible.)



# Corrective Service Information

Figure 1 shows maintenance release levels for the listed products. This information is effective as of August 8, 1995. 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.raleigh.ibm.com at OS2\V20.

—Arnie Johnson, 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.
OS/2 Extended Services Database Manager ServicePak	1.0	WR06035	WR06035	11-18-93	Supersedes WR06001, WR06002, WR06003, WR06004, WR06014, and WR06015.
DB2/2 SelectPak	1.0	WR07030	WR07030	02-26-95	
DDCS/2 ServicePak	2.0	WR07031	WR07031	02-06-95	
Database Manager DB2/2	1.2	WR07047	WR07047	06-06-95	
DDCS/2	2.0	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	
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	
LAN Distance ServicePak	1.1	IP07050	IP07050	10-18-94	
OS/2 Network Transport Services/2 SelectPak	2.00	WR07060	WR07060	05-10-95	Must be LAPS 2.11 or above. If not, order WR07045 first.

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



Product/Component	Release	CSD Level	PTF Number	Change Date	Comments
OS/2 LAN Adapter and Protocol Support SelectPak	2.20.2	WR07060	WR07060	05-10-95	Must be LAPS 2.11 or above. If not, order WR07045 first.
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	CIL0007	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	UN59347	UN59374	08-24-94	

Figure 1. Maintenance Release Levels

#### TRADEMARKS

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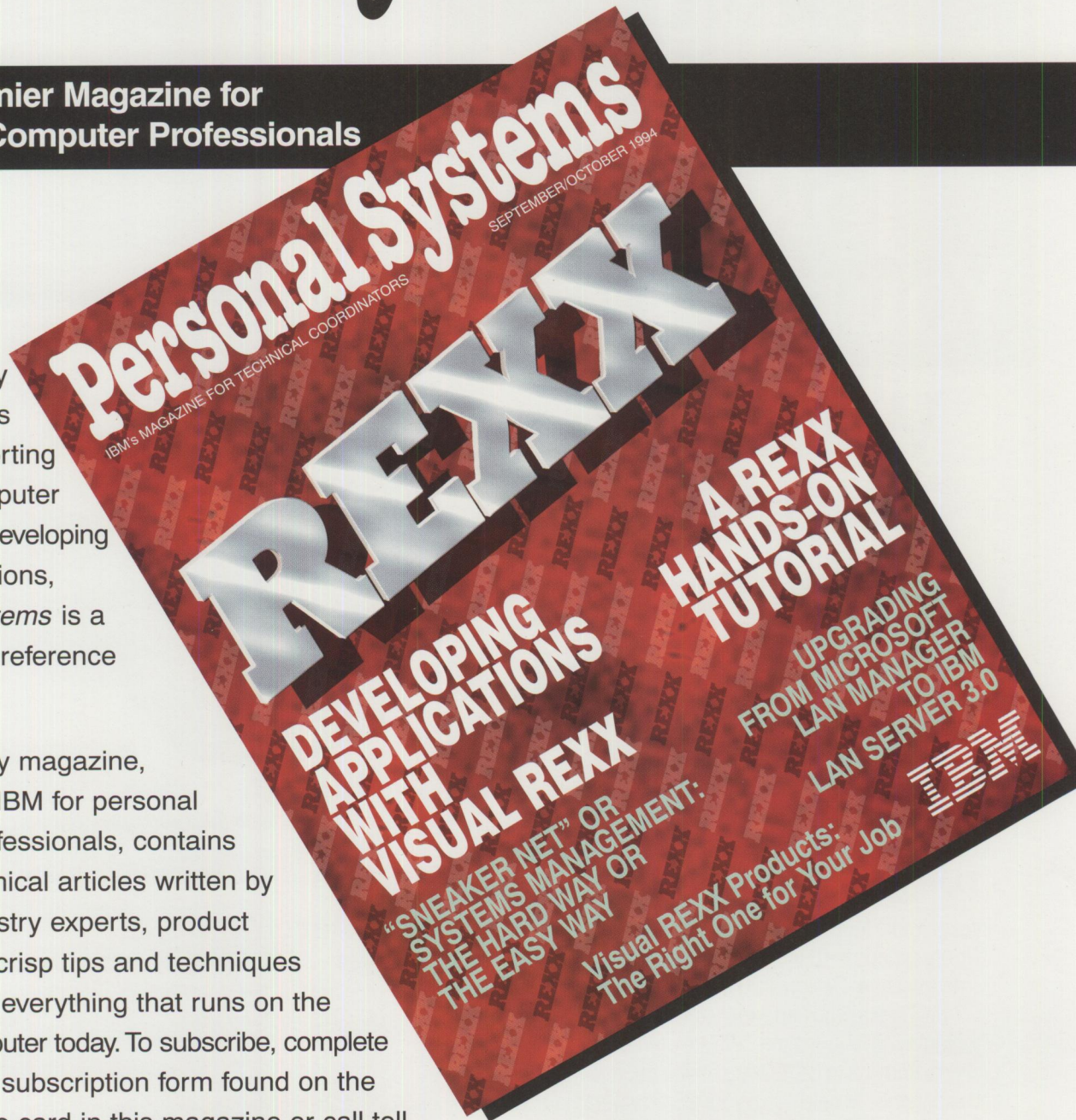


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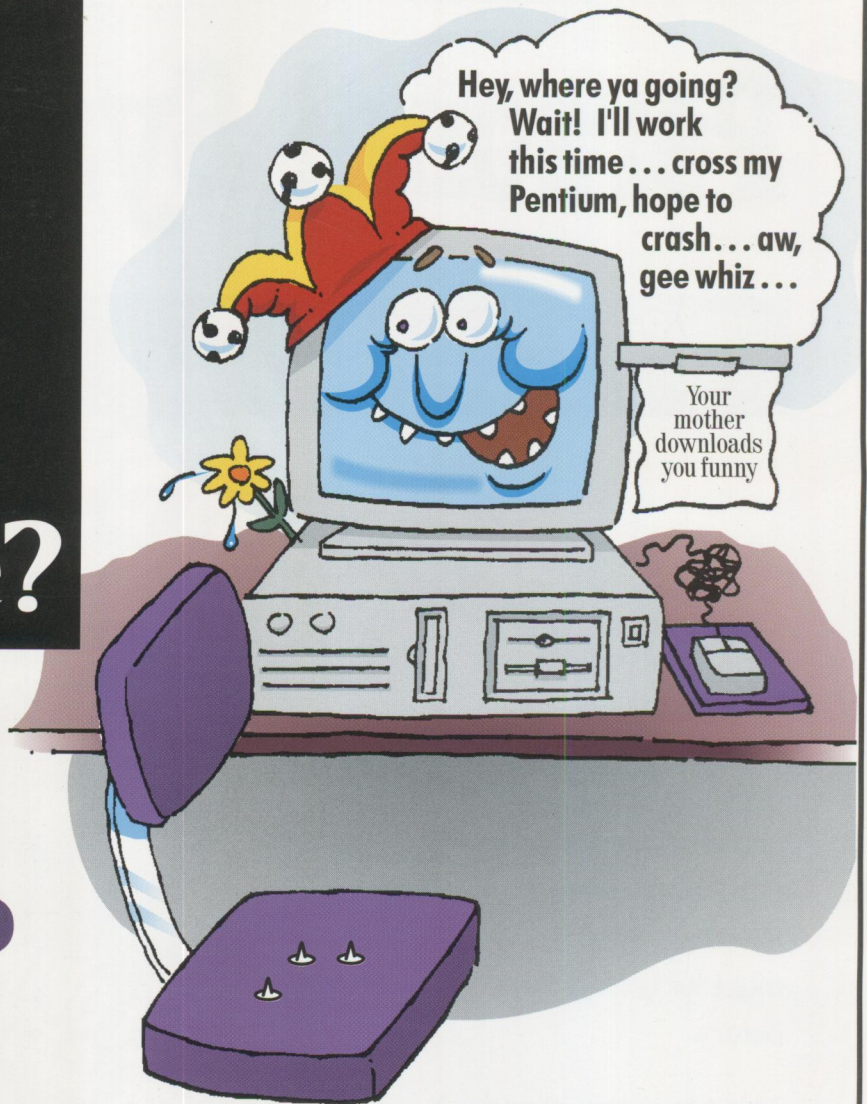
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