

Personal Systems

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NOVEMBER/DECEMBER 1996

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Flying Time



You may not have realized it, but in only a few short weeks, all of 1996 will be gone! Last month I passed a milestone birthday, and time (specifically, the passing thereof) has begun to take on a new meaning for me. I'm on the leading edge of the great Baby Boomer wave; one of a bezzillion people who are turning the half-century mark this year.

Many are always praising the by-gone time, for it is natural that the old should extol the days of their youth.
—Caleb Bingham

In our business, the past, the old, the outdated, the forgotten innovations and products were the shiny new inventions of just yesterday. Java, the revolutionary programming language that we use so widely today, was developed just a little over a year ago. The reality of voice-operated computers—we've had that for only a few years. Personal computers—just 20 years. Computers of any type—they turned 50 this year. (Can we call ENIAC the Computer Baby Boomer?)

Always hold fast to the present. Every situation, indeed every moment, is of infinite value, for it is the representative of a whole eternity.
—Johann Wolfgang von Goethe

Sounds like Mr. Goethe knew about the computer industry! The present is what we know we have right now. We don't have to worry if we can't remember what happened in the past, and predicting the future has never been an exact science. We must celebrate the new and the exciting every day.

This issue of *Personal Systems* is celebrating the new and exciting OS/2 Warp 4, with its dazzling new colors, sounds, innovations, and advanced technology. Written by OS/2's developers, these articles will take you on a tour of the new networking capabilities and the enhanced Workplace Shell; they'll unravel the mysteries of Java; and they'll reveal the expanded compatibility with your host applications, as well as with your native DOS/Windows programs. Yesterday's futuristic operating system is here today.

My interest is in the future because I am going to spend the rest of my life there.
—Charles F. Kettering

Didn't you think the year 2000 was several lifetimes away? (I know there are lots of computer programmers who believed it was several application lifetimes away!) Well, it will be here in just three years. And I am so excited about what the future holds for all of us that I want to run there as fast as I can. So I'm going to remember "the by-gone time," "hold fast to the present," and anticipate the future, because "I am going to spend the rest of my life there." Join me!

Betty Hawkins, Editor

Code Update

Figure 18 in Mark Fisher's "Creating Applications with VisualAge C++'s NMAKE Facility" article in *Personal Systems*' July/August 1996 issue was inadvertently printed with an incorrect character. The "defaultStyle() |" line should end with a vertical bar—not a bracket. Please note the following correct code sample.

```

/*****
 * x4_b.cpp - object definition
 *****/
#include "x4_b.hpp"
#include "x4.h"
// constructor
myWindow::myWindow(unsigned long Id)
: IFrameWindow("Sample program",
               Id,
               defaultStyle() |
               menuBar)
, myMLE(ID_MLE,
        this,
        this)
{
// Make the MLE control the client area.
setClient(&myMLE);
show();
myMLE.setFocus();
}
    
```

Figure 18. x4_b.cpp

Personal Systems

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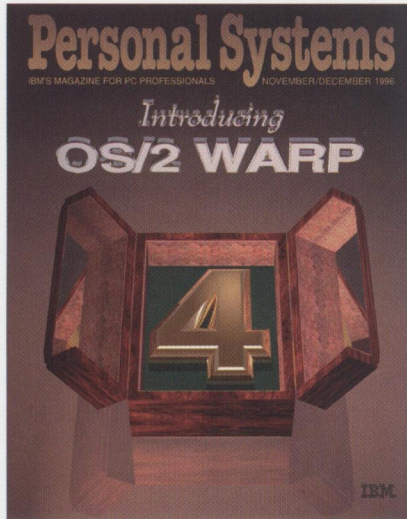
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About the cover:
OS/2 Warp 4 is here! This issue's cover illustration by noted Dallas artist Bill Carr proudly announces the latest release of OS/2.

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Today's Help Desk: Providing "Hands-On" Support Remotely

In this article, find out how Remote Services Management (R.S.M.) can link your users to remote support professionals, giving them ready access to help when they need it. The article describes R.S.M.'s features and shows how it can help your company save valuable time and money.

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Developing with Java and OS/2 Warp 4

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The Dedicated DOS/Windows Session in OS/2 Warp 4

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The Personals in OS/2 Warp 4

No, this article isn't about lonely people in search of the perfect mate. It's about the Personals—the IBM Personal Communications Entry (PCOMM-E) products, particularly PCOMM-E's TCP/IP version. Learn to use PCOMM-E(TCP/IP) to easily access your S/390 or AS/400 computer system from the OS/2 Warp 4 desktop.

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OS/2 Warp 4: Best on the Planet

By Edward Duhe, Rene Gracia, Kathy Hutchison, and Tony White

OS/2 Warp 4 is the most technically advanced, complete, open personal computer operating system on the planet. This article provides an overview of all OS/2 Warp 4's new features, which are discussed in detail in this issue's Technical section.

The next generation of OS/2 Warp is here! Sporting a terrific new desktop, it comes loaded with universal connectivity that lets you connect to any server operating system, even mainframes. It has a built-in Web browser, object-oriented technology, Java native support, systems management capabilities, security controls, and APIs. And it comes with the most powerful voice dictation engine and desktop voice navigation system on the market; you can now navigate the Internet, dictate notes, and execute commands—all with your voice.

Let's take a tour through OS/2 Warp 4.

System Navigation and User Interaction

Like a good wine that gets better with age, so does OS/2 Warp. The newest version, OS/2 Warp 4, is better, simpler, and much easier to use than before. Enhancements begin with its installation.

Integrated Installation

OS/2 Warp 4's installation process is similar to the one in OS/2 Warp Server. Installation procedures are easy to follow and understand and are available in two methods: Easy Install and Advanced Install. You can use either method from a CD or from the network. Both install OS/2 Warp 4 on computers running any version of DOS, or DOS plus Windows 3.1, Windows 3.11, Windows for Workgroups 3.1, or Windows for Workgroups 3.11. OS/2 Warp 4 will also install on systems with OS/2 2.1 with WIN-OS/2, OS/2 2.1 for Windows, OS/2 Warp Connect 3.0, and any intermediate releases.

Easy Install is simple to follow. You may need to supply some information (such as

information about your service provider if you want to connect to the Internet), but that's all! OS/2 Warp 4 then installs onto your C: drive. Easy Install detects your hardware and makes decisions based upon your processor speed, available memory, and file system.

Use the Advanced Install method if you want to control the way OS/2 Warp 4 is installed. For instance, Advanced Install lets you specify the installation drive, partitions, system components, and network components. You will have to furnish details to the Advanced Install process.

Regardless of the installation method you choose, you can install OS/2 Warp 4 onto your computer through a network, parallel port, or infrared port, eliminating the need to have a CD drive available on the client machine.

Workplace Shell

In OS/2 Warp 4, the Workplace Shell takes another stride in maturity. In addition to being highly functional and intuitive, it is now more visually appealing. New object controls, 3-D icons, and intelligent help called WarpGuides further enhance its user interface.

Highlights of the new Workplace Shell are given below. For more details about the Workplace Shell enhancements, see "The New Workplace Shell in OS/2 Warp 4" in this issue.

New Look and Feel

In OS/2 Warp 4, the desktop (shown in Figure 1) is rearranged to reduce clutter and is more visually appealing through the following enhancements:

- New background bitmaps have texture and color schemes.
- Visuals use more colors and give you a 3-D experience, using texture, shadowing, and curved edges.

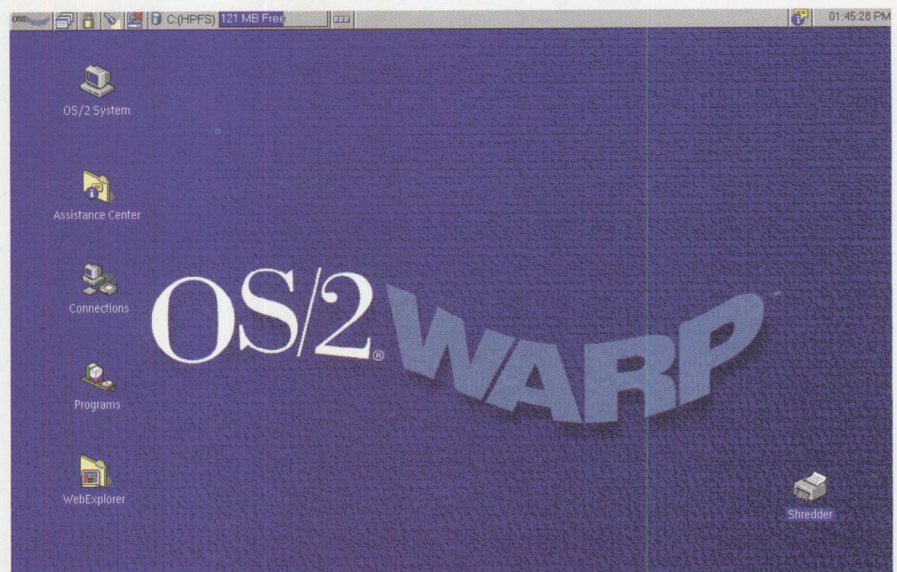


Figure 1. OS/2 Warp 4 Workplace Shell Desktop

- A new condensed font style uses less space on the desktop while improving legibility.
- File Open and Close dialogs provide tree views of directories and allow selection of file type.
- Notebook settings now have a horizontal tab option, which enables more concise presentation of information in less space.
- A Close button lets you close an application with a single click.
- Common operations within a folder are now accessible with menu bars. The context menu (accessible by clicking mouse button 2) can be used for these operations.

VoiceType Navigation and Dictation

Integrated into OS/2 Warp 4 is the latest IBM VoiceType speech navigation and dictation technology. VoiceType technology is the result of almost 25 years of IBM research. In OS/2 Warp 4, it brings the ease-of-use concept to a whole new level. VoiceType's user interface is one that everyone is "talking" about!

The VoiceType speech recognition engine in OS/2 Warp 4 has two primary capabilities: navigation and dictation.

Voice navigation lets you navigate most OS/2 Warp and Windows applications by simply talking to your computer. For example, you can open the OS/2 System folder by saying "Jump to OS/2 system," or you can access the IBM home page on the World-Wide Web by telling your computer "Jump to IBM home page." How can it get any easier? OS/2 Warp 4 comes with a navigation vocabulary with common desktop navigation words and a macro capability to simplify repetitive tasks. And, with voice navigation, you use normal continuous speech, as though you are speaking to another person.

Voice dictation lets you dictate text, then paste it into (for example) word processing and e-mail applications. With this technology, you can dictate directly into an editable document rather than dictating into a tape recorder, then transcribing. A base dictation vocabulary of 22,000 words, expandable to 42,000, is provided. Also available are vocabularies for professions such as healthcare and law.

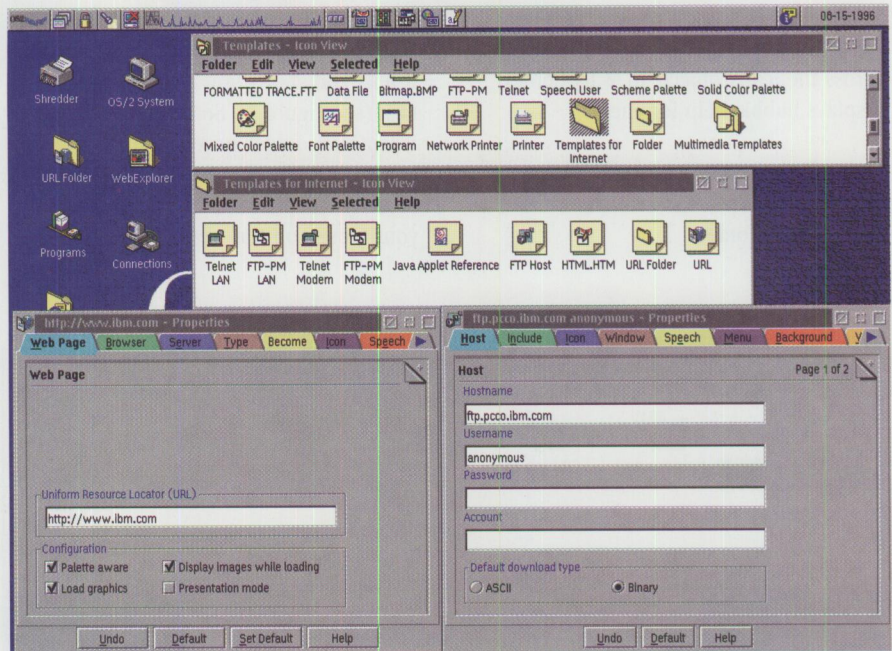


Figure 2. URL and FTP Objects

OS/2 Warp 4 provides this incredible voice interface to your computer without requiring special hardware other than a Pentium processor plus a supported sound card and microphone.

Internet-Aware Desktop

OS/2 Warp 4 includes new desktop objects for FTP, URL, and HTML. (See Figure 2.)

The FTP object provides a folder view of an FTP directory. It lets you access and use a remote FTP site the same way you work with local folders, including transferring files by dragging and dropping them between the FTP site and your local computer.

The URL object lets you save your favorite Web sites as objects in your system. When you are ready to go to one of those sites, just double-click on the object, and OS/2 Warp 4 automatically launches its integrated browser and brings up the Web page. If the browser is already running, simply drag the URL object and drop it on the browser window to connect to the site. Surfing made easy!

The HTML object lets you easily create HTML files. By dragging and dropping this template, you create a basic HTML file that you can edit using the OS/2 System Editor. See "The Internet-Enabled Desktop in OS/2 Warp 4" in this issue's Technical

section for a detailed description of this capability.

WarpCenter

OS/2's WarpCenter is a customizable, object-based status bar where you can store and launch frequently used applications. WarpCenter displays a narrow bar across the top of your desktop, as shown in Figure 1. You can also configure it to appear at the bottom of your desktop.

With WarpCenter, you can use cascading menus to explore the desktop and other folders rather than opening each folder one by one. You can also display a menu of all running applications simply by clicking mouse button 1 on the cascading window icon in WarpCenter. WarpCenter includes the Find Objects facility that was in OS/2 Warp 3.0, plus a "tray" to which you can drag and drop any object (such as the OS/2 Window command prompt) for easy access.

WarpCenter also lets you toggle among time/date/timers and monitors of battery usage, system activity, and available disk space. You can also choose whether or not to have the confirmation message appear when you lock up or shut down your OS/2 Warp 4 system.

WarpCenter can remain visible at the top of your maximized applications, or you can make it appear only when you move

your mouse cursor over the area where it normally displays. And moving the mouse across the icons/objects in WarpCenter displays bubble help for each.

Now called the Toolbar, the Launchpad from OS/2 Warp 3.0 is available in the OS/2 System folder.

WarpGuide

WarpGuide is a mentor. Using cue cards, it tells and shows you how to complete a task (see Figure 3). Some objects in the WarpGuide folder have cue cards to assist you with each step of the task. Others actually complete the task as you click your mouse on the screen.

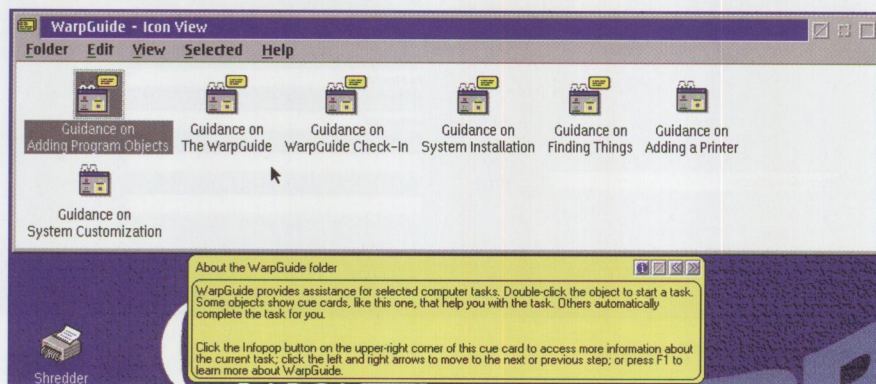


Figure 3. WarpGuide Folder and Cue Card

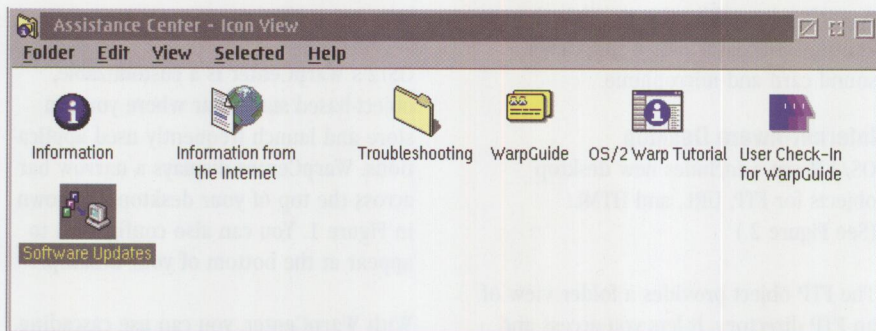


Figure 4. Assistance Center Folder

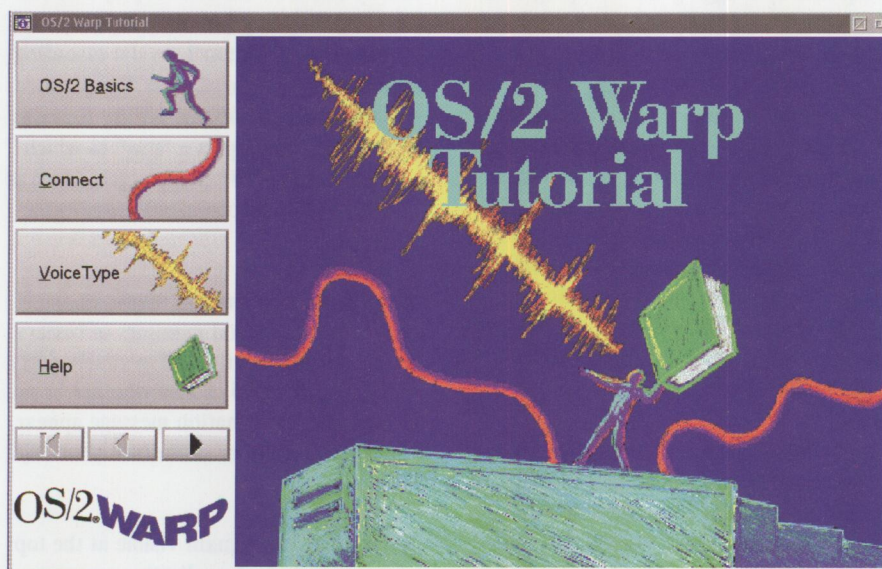


Figure 5. OS/2 Warp Tutorial

Any time you open an object (i.e., start a task) that WarpGuide knows about, a WarpGuide button appears on the title bar of that task's window. To ask for help from WarpGuide, simply click on that button.

The first time you use WarpGuide, it asks you to check in by indicating your experience level with computers and with OS/2 Warp. WarpGuide saves your response and uses it to tailor the information it gives you:

- If you indicate you are a novice for the current task, WarpGuide automatically shows you cue cards, and it shades unneeded parts of the window. The shading does not change the way a window works; you can still click on the areas under the shading.
- If your skill level is intermediate, WarpGuide shows only cue cards.
- If you are an expert, cue cards are not shown, but you can access a cue card for the current task by clicking on the WarpGuide button.

You can turn cue cards on or off, either temporarily or permanently.

Assistance Center

All online documentation is located in the Assistance Center folder, shown in Figure 4. This folder, located on your desktop, contains documentation for both OS/2 Warp and any networking components you install as part of OS/2 Warp. The Assistance Center folder also contains references to other information sources such as WarpGuide and the OS/2 Warp Tutorial.

Users accustomed to previous versions of OS/2 will find the familiar Help Index, Glossary, and Readme files in the Information folder within the Assistance Center folder. The Information folder is the primary reference for "how-to" questions.

System Tutorial

OS/2 Warp 4's tutorial (see Figure 5) is designed to help users get up to speed quickly. It has an improved user interface and makes use of new OS/2 features. The OS/2 Warp 4 tutorial has four sections:

- *OS/2 Basics* shows you how to perform basic OS/2 Warp 4 operations, run programs, customize your system, create new objects, and use multimedia objects.

- **Connect** introduces you to networking basics, file transfer, World-Wide Web connections, the File and Print Client, and Mobile Office Services.
- **VoiceType** shows you the basics of setting up and navigating with VoiceType.
- **Help** explains all the help facilities in OS/2 Warp, such as Readme files, F1 help, the Help Index, WarpGuide, and online books.

Within any of these sections, you can practice the function you are learning, see notes and tips for additional information, and look at an index of topics in the current section.

Migration Database

In previous versions of OS/2, at installation time you had the option to either add or migrate existing programs to your desktop. None of this has changed in OS/2 Warp 4; however, in OS/2 Warp 4, the migration database, which contains the optimal settings for the most popular DOS and Windows programs, now includes more than 500 programs.

Performance

OS/2 Warp 4 contains several performance enhancements:

- **Async Read-Ahead**—This file-system enhancement studies disk-read patterns, anticipates a disk read, and makes its contents available in memory before the read is requested. This reduces the amount of time that programs must wait for data before processing it.

While async read-ahead is not new in OS/2 Warp 4, improvements were made to the algorithm that determines how far ahead to read. The file system predicts the need for data by observing data access patterns. When it appears that additional data will be requested, the file system initiates a read to start the data moving in the background (in a separate thread) while the application is still processing previous data. The read-ahead algorithm now looks for different patterns of access, and it attempts to keep more data in memory by queuing up more and larger reads.

Async read-ahead provides two benefits: increased throughput (confirmed by Winbench and other benchmarks)

and reduced processor overhead required to obtain a level of throughput—other computing tasks can proceed in parallel, with less interference from the file system's use of processor resources.

- **Page Tuning**—Frequently used functions are grouped together so they can be loaded with the fewest I/O operations.

In OS/2 Warp 4, additional page tuning has been done for Presentation Manager DLLs, speech, and multimedia. The effect of these page tuning enhancements is a reduction in overall memory requirements for various scenarios. That is, with a given memory configuration, you should be able to do more things before paging activity slows down processing.

- **High-Performance File System (HPFS)**—HPFS has been updated to permit multiple lazywrites. This enhancement optimizes cache handling by allowing multiple lazywrites to systems that have multiple physical disk drives.
- **Crash Protection**—Crash Protection implies that applications are isolated so that errant programs cannot corrupt and overwrite memory of other, well-behaved programs.

In OS/2 Warp 4, crash protection has been improved in the way it processes focus changes. *Focus* refers to the window or program that is situated on top of all other windows or programs and is currently receiving mouse and keyboard input.

You can implement this improvement by using the "User interface" tab in the System object (found in the System Setup folder within the OS/2 System folder). Select "Asynchronous focus change" to tell your OS/2 Warp 4 system to remove the focus from a window that fails to respond in a timely manner to a request to change focus. (If you do not select "Asynchronous focus change," then an application may cause your system to wait indefinitely for a response to a focus-change request.) Also, specify the time limit for an application to respond to focus-change requests by entering a number (in tenths of a second) into the "Focus change sensitivity" field. If the application fails to respond within the specified time, the focus change proceeds.

- **Disk Cache**—For OS/2 Warp 4 systems with a system partition formatted as File Allocation Table (FAT) and with at least 32 MB of RAM, the default disk cache size has been changed to 5 percent of the installed memory. If the OS/2 Warp 4 installation program does not detect any FAT partitions in your system, it does not allocate a FAT cache. This saves memory in all-HPFS configurations.

Connectivity

In this era of network connectivity, you need a strong network client. OS/2 Warp 4 is the strongest network client available, with extensive, integrated connectivity features. A single requester accesses OS/2 Warp Server and other compatible networks. This requester combines the previously separate IBM LAN Requester and Peer Requester found in OS/2 Warp Connect. This single requester lets you use and share peer resources, access servers, and administer OS/2 Warp Server and IBM LAN Server domains. As in OS/2 Warp Connect, objects on the desktop inherit peer functionality in their context menus, making the entire Workplace Shell network-aware.

The NetWare Client for OS/2 2.11 comes with OS/2 Warp 4 and provides maintenance, as well as OS/2 global administration capabilities for NetWare Directory Services.

TCP/IP 3.5, also included in OS/2 Warp 4, has many new features, including:

- **Dynamic IP Client** enables the client to pick up an IP address from a Dynamic Host Configuration Protocol (DHCP) server, simplifying administration of IP addresses and enabling reuse of IP addresses. Dynamic Domain Name Services (DDNS) offers dynamic name resolution, simplifying network access, operation, and IP address changes.
- **Socks Security** enables TCP/IP applications to access the Internet through many standard firewalls, as well as permits users to seamlessly access both intranet and Internet resources.
- **WinSock 1.1 Open32 Support** ports your Windows 3.x and Windows 95 TCP/IP applications.

New for OS/2 Warp 4: IBM Certified OS/2 Engineer

Along with the exciting announcement of OS/2 Warp 4, IBM has announced the availability of a new certification in the Professional Certification Program: the IBM Certified OS/2 Engineer for OS/2 Warp 4. This new certification verifies your skills for installing, supporting, and maintaining OS/2 Warp 4.

Earning certification in this program means you have the knowledge to provide solutions for the OS/2 platform. Your certification can give your employer and colleagues confidence that your skills have been tested and that you are keeping up with today's rapidly changing technology.

You can be certified by passing just three tests (if you are already an IBM Certified OS/2 Engineer for OS/2 2.1 or OS/2 Warp, you need to pass only one test). These certification tests are administered by IBM-authorized testing

providers all over the world. Although classroom education is not required, IBM Certified OS/2 Engineer candidates who attend training will obtain hands-on experience with the software.

To find out about test availability and the testing locations nearest you:

- Call (800) 959-EXAM (959-3926) for Sylvan Prometric test center locations in the U.S. Ask for *Your Roadmap to Success*, a catalog providing information about testing, education, and the benefits of IBM's Professional Certification Program.
- Call (800) IBM-TEACH (426-8322) for IBM Education and Training testing locations in the U.S.
- Visit the Web site for Sylvan Prometric and IBM Education and Training test locations worldwide at www.austin.ibm.com/pspsinfo/profesnl.html.

- **Variable Subnet Routing** allows a system with multiple LAN adapters to function as an IP router.
- **IP Alias Support** allows multiple IP addresses to be associated with a single LAN adapter. This is useful, for example, when you want a single Web server to serve as multiple Web sites while using only one LAN adapter.
- **Multicast** allows packet transmissions to multiple users and takes advantage of different transmission size packets for multimedia, telephone, and video conferencing.
- **Personal Communications TCP/IP Entry 4.1** provides 3270 and 5250 emulation based on the full-function product available from IBM. For more details about the functions supported, see "The Personals in OS/2 Warp 4" article later in this issue.

- **Retrieve Software Updates**, a Web browser-based process, retrieves software and installs fixes and upgrades from an IBM Web site.

Along with these enhancements to TCP/IP, the suite of TCP/IP applications in OS/2 Warp Connect—Telnet, LPD, FTP, Ping, Finger, Talk, and others—is also included in your OS/2 Warp 4 TCP/IP connected environment.

One of the most popular ways to get connected today is through the World-Wide Web using a Web browser. OS/2 Warp 4 comes with WebExplorer 1.2, which includes support for HTML 2.0 and contains several fixes and updates.

Speaking of today's popular Internet topics, let's talk Java! OS/2 Warp 4 provides full native support for programs written in the Java Programming Language. This Java capability lets you run Java applications

or Internet applets right on your OS/2 Internet-aware desktop, independent of your browser. If you want to develop your own Java applications, OS/2 Warp 4 comes with a built-in Java Developers Kit, as well as the runtime code necessary to run Java applications. For more information on Java, see the "Java in OS/2 Warp 4" and "Developing with Java and OS/2 Warp 4" articles in this issue.

Many people today require the same network connections while they are on the road as they have back in the office. The OS/2 Warp 4 Remote Access Client gives remote users access to all LAN resources through a dial-up connection made using a LAN Distance server or OS/2 Warp Server.

Another excellent connectivity feature for remote users is the ability to locally cache remote files. With OS/2 Warp 4's Mobile Office Services, files being accessed on the server are cached locally and remain accessible even if the connection is broken. When the connection is re-established, Mobile Office Services detects file differences and prompts you for resolution.

Application Compatibility

OS/2 Warp 4 provides Security Enabling Services, a set of common application programming interfaces (APIs) that allows third-party vendors to produce security solutions for file, print, and process activities to meet the functions described within the C2 evaluation criteria.

OS/2 Warp 4 continues to provide astonishing support for your DOS and Windows application programs. Unlike the previous version, OS/2 Warp 4 comes in only one flavor—with Win-OS/2 support. Your Windows programs will run better than ever, because the Windows support has been tuned to run with OS/2 Warp 4. OS/2 Warp 4 also supports Win32s APIs at the 1.25 level. You can even launch a dedicated DOS, DOS/Windows, or Windows 95 session from your OS/2 Desktop by hibernating OS/2 (for details, see "The Dedicated DOS/Windows Session in OS/2 Warp 4" later in this issue).

In the past, a document produced with TrueType fonts, then used under OS/2 with Adobe type fonts, didn't look right. But now it will—the OS/2 Warp 4 Presentation Manager supports TrueType fonts.

OS/2 Warp 4 support goes far beyond simple programming applications. There is runtime support for cross-platform compound documents with OpenDoc. If you are porting Win32 applications, OS/2 Warp 4 comes with Open32 (formerly known as the Developer API Extensions). OpenGL APIs are also now available to support highly precise 3-D rendering applications for CAD, entertainment, industrial design, modeling, biochemistry, and scientific visualization.

OS/2 Warp 4 also includes:

- Support for EMS and XMS, the older memory specifications.
- Enhanced DOS protected mode interface (DPMI) to improve support for DOS and Windows applications.
- Support for language-independent, cross-platform architecture for sharing objects from SOM/DSOM 2.11.
- REXX and Object REXX, easy-to-use scripting languages for the OS/2 Workplace Shell and OpenDoc based on the System Object Model (SOM).

Hardware Support

The OS/2 Warp 4 package includes the Device Driver Pak CD, a new, as-is offering. This collection of hundreds of OS/2 device drivers is conveniently accessible in one place. The CD also contains information about how to download and install device drivers on your OS/2 Warp system.

The Device Driver Pak is organized as a series of Web pages. It helps you find information about the Device Driver Pak CD and, if you are connected to the Internet when using the Device Driver Pak CD, it also provides information about the World-Wide Web.

Beyond the new Device Driver Pak CD, OS/2 Warp 4 has enhanced hardware support in many areas, including:

- Support for more than 50 new printers, including the popular HP DeskJet and Canon BubbleJet printers.
- Enhanced plug and play (PnP) support, which automatically detects and installs enabled drivers for legacy ISA devices and PnP devices. The Hardware Manager (located in the BonusPak) lets you view system information about the

physical devices, device drivers, and the system resources in use.

- Support for Display Data Channel (DDC2) adapter/monitor specification. With this support, your system automatically recognizes enabled monitors and sets the highest refresh rate, thus reducing screen flicker.
- An enhanced Self-Monitoring Analysis and Reporting Technology (S.M.A.R.T.) specification for IDE drivers, which includes a user interface that warns you about impending hard-drive failure.
- A new 32-bit graphics device driver model that improves Presentation Manager performance.
- PCMCIA enhancements that include card and socket services, cardbus and multifunction card support, as well as an enhanced user interface.
- An updated Advanced Power Management (APM) to support suspend, resume, and device management control.
- Support for warm plug and warm docking and the swapping of diskette and CD-ROM drives in specific IBM ThinkPad 755 and 760 models.
- Infrared support, including the ability to print from OS/2 and Windows applications through the infrared port to wireless printers that support the Infrared Developers Association (IRDA) interface.
- A framework and API for delivering quality, 32-bit MIDI applications (available for IDE only).

OS/2 Warp 4 also has many new, powerful printing capabilities:

- Connect to a variety of printers via the parallel port, serial port, infrared port, or a network address for a network-attached printer on the LAN.
- Use a single window to display and manage all printer objects defined on the desktop.
- Automatically select printer drivers for plug-and-play printers when creating printer objects for printers attached to your desktop. You can also automatically download printer drivers to your desktop for local and network printer objects, as well as maintain printer

drivers and printer properties on your desktop for network printer objects.

- Fully exploit intelligent network-attached printers to:
 - Display the status of print jobs in the printer
 - Receive true end-of-job notification
 - Cancel jobs in the printer
 - Display the status of a printer in a printer object
 - Set a printer object's properties to the actual configuration of a printer
 - View printer capabilities
 - Remotely manage and configure the printer from your desktop
- Display the progress of print jobs:
 - Percentage of a print job that has been spooled for printing
 - Percentage of a print job that has been sent to a printer
 - Page number of a print job that is being sent to a printer
 - Page number of a print job that is being printed on a printer
 - Total size of a print job in either pages or bytes
- Use drag-and-drop to move and copy jobs between printer objects on the same desktop or on the same peer server.
- Use drag-and-drop to re-prioritize jobs in a printer object.
- Define a default print priority for each printer object.
- Specify formatting options to print text files.
- Select the information to be displayed for each print job in a printer object.

Systems Management Client

OS/2 Warp integrates smoothly into heterogeneous network environments through its Systems Management Agent.

The OS/2 Warp Systems Management Client provides many functions to assist you in managing workstation resources. When you use remote management tools over a network, the Systems Management Client lets you choose from several industry-standard interfaces and protocols: Desktop Management Interface (DMI), SNMP Distributed Protocol Interface (DPI), and Tivoli TME 10 NetFinity Client interface. Support for these protocols allows you to control OS/2 Warp from a wide

variety of systems management tools that support these protocols.

The following features come with the OS/2 Warp Systems Management Client:

- **System Dump Formatter**—To assist in diagnosing problems in an OS/2 Warp system, this function allows the OS/2 kernel to generate system dump information, which is then formatted by a generic report generator.
- **System Anchor Block**—Serviceability is improved by providing pointers to a server's key data structures, minimizing the need for OS/2 symbol files.
- **FFST Probes**—First Failure Support Technology (FFST) captures all data about an error when the error occurs.
- **Desktop Management Interface (DMI)**—DMI is a server layer that masks the complexity of managing the desktop environment for both the user and component developer. It offers a standard way to enable and manage desktop systems. DMI enables vendors to easily add remote manageability to their products. DMI processes information about FFST probes as well as the system's hardware and software. A local browser to view this database of hardware and software information is provided in TME 10 NetFinity.
- **SystemView Agents**—A common agent framework is provided to support the management of DMTP Desktop Management Interface (DMI) 1.1-compliant components and IETF SNMP Distributed Protocol Interface (DPI) 2.0-compliant subagents.
- **Single CID Response File**—All configuration information is stored in a single configuration/installation/distribution (CID) response file for the entire product.
- **Automatic Registration Tool (ART)**—This online registration tool lets you register software electronically through a modem, the Internet, FAX, mail, or phone. You are periodically reminded (up to five times) until you complete your registration.
- **TME 10 NetFinity Services 4.0 Features**—TME 10 NetFinity Services is a highly flexible hardware and software management program with general systems management functions.

When TME 10 NetFinity Services is on a client system, it allows that system to be managed by any TME 10 NetFinity Manager.

It also enables you to use NetFinity's valuable monitors, software inventory, and hardware information to easily manage and monitor your workstation and to set alerts when critical events occur. Therefore, even if you're not LAN-connected, you can monitor your system's resources. If you are connected to a LAN, TME 10 NetFinity Services supports multiple protocols allowing the client to be managed by any NetFinity manager or SystemView for OS/2 manager.

Additional TME 10 NetFinity Services functions include remote session management, resource and performance monitoring, extensive alert management, software inventory, and event scheduling.

- **Remote session management** allows a manager system to execute commands remotely on an OS/2 Warp 4 client. This means the system administrator doesn't have to go to the client computer to determine and solve problems.
- **Resource and performance monitoring** includes CPU, DASD, swapper files, memory, video, SCSI subsystems, power management, peripheral devices, security features, vital product data, TCP/IP network protocols, system processes, IBM OS/2 LAN Server (if installed), and print job characteristics. Historical monitor data can be saved as ASCII text, SQL, DB/2, or Lotus Notes database files. Voltage and temperature monitors are included for selected systems, as well as peripheral component interconnect (PCI) support for reporting about the types and settings of PCI devices installed on the system.
- **Built-in alert generation and logging** lets you set conditions and thresholds on the client system. When these thresholds are exceeded, an alert is generated. These alerts can be visual alerts or can be forwarded to vendor independent messaging (VIM) compliant e-mail, TCP/IP Send-Mail, or alphanumeric pager.

- **Software configuration and inventory information** lets you detect the presence of non-standard application and executable files, in addition to standard libraries of common applications.
- **Event scheduling** can be used to schedule a particular event to execute on an hourly, daily, weekly, monthly, or yearly interval. This lets you easily schedule file transfers and inventory and even reboot systems during off-shift hours without being in attendance.
- **Systems management via intranet** lets you easily manage OS/2 Warp systems from virtually anywhere. With TME 10 NetFinity's industry-leading technology, all TME 10 NetFinity services can be accessed from a simple Web browser running on any platform.

BonusPak

If you use OS/2 Warp 3.0, you are already familiar with the BonusPak, a series of applications included with the OS/2 Warp package. In OS/2 Warp 4, some of these applications are merged into the OS/2 Warp operating environment itself, while others have been retained and enhanced. The BonusPak is now an integral part of the OS/2 Warp 4 installation; it is no longer on a separate CD.

BonusPak applications and their enhancements include:

- **IBM Works**, an integrated word processor, spreadsheet, database, charting, and reporting package. IBM Works now includes expanded toolbars, context menus for elements within documents, URL support in the word processor, built-in sort functions in the spreadsheet, and support for a wider variety of import and export file formats. IBM Works now supports Lotus cc:Mail—if you have cc:Mail installed in your system, you can send mail directly from IBM Works.
- **Personal Information Manager**, a calendar, scheduling, and contact-tracking tool. Personal Information Manager can now import and export data from and to other applications. Password protection is added to the Phone Book, Appointment Book, and To-Do List

modules, so that you can prevent unauthorized access to your information.

- **HyperACCESS Lite for OS/2**, an async communications program to access bulletin board services. Updates include user-defined modem strings and more colorful icons.
- **CompuServe Information Manager (CIM) for OS/2**, an application that provides access to the CompuServe online service. CIM 2.03 removes the OS/2 registration requirement. It now contains a new filing cabinet utility with a full-text search option, and it stores the records in a database format for easier search and retrieval. The initial CIM window is improved for easier use.
- **FaxWorks Lite**, a fax program that enables you to send and receive faxes using a fax modem attached to your OS/2 Warp system. The following new features are in FaxWorks Lite Version 3:
 - Class 2.0 fax modems and IBM Mwave adapters are supported.
 - Voice answering-machine functions are added for use with supported voice/fax modems (Rockwell chipset) and IBM Mwave adapters. When these functions are enabled, you can use the same telephone line to record voice messages and receive faxes. This feature is fully integrated with OS/2 Warp's multimedia audio support, so you can use your OS/2 Warp system to play voice messages on your speakers and record your greeting message with your microphone.
 - In addition to the standard cover sheets that allow you to select a bitmap image, you can also select from several additional cover sheets.
 - The FMD.SYS driver is no longer required. FaxWorks Lite now uses the standard COM device drivers.
 - The ability to accept "hot hand-off" calls from data programs for data/fax line-sharing is now supported. Data programs that use this feature can pass the call to the fax program after they have answered the phone and determined that it is a fax (rather than data) call.
- **Network Printer Administration**, a set of tools for network-attached

Hewlett-Packard and Lexmark printers. This new utility in the OS/2 Warp BonusPak includes Hewlett-Packard's JetAdmin package and Lexmark's MarkVision for OS/2. These tools allow you to install, query, manage, and troubleshoot network-attached printers from your Workplace Shell desktop.

- **Hardware Manager**, a replacement for the System Information Tool in previous versions of OS/2 Warp. The Hardware Manager lets you view the configuration and status of the devices installed in your computer, such as your processor, memory, hard-disk drives, and adapters.
- **Changes in packaging:** VideoIN and AskPSP are still part of the BonusPak. The Internet Access Kit and Multimedia Viewer are now integrated into OS/2 Warp 4. Person to Person has been removed.

Complementary Product CDs

Packaged with OS/2 Warp are several CDs containing products or samples from other software vendors.

Application Sampler

The Application Sampler CD contains a collection of sample OS/2 Warp applications. Most sample applications are subsets, demonstrations, or limited-use products. You can contact the vendor for keys to unlock the product or to order the full (unlimited) version. The applications are provided as-is, and you are referred to the supplier for questions and support.

Applications are suited for a broad range of users and fall into five categories: personal productivity, communications, utilities and tools, education and reference, and entertainment.

The applications are provided on a single CD with a convenient installation program. A folder on the OS/2 desktop lets you review the applications, view system highlights and requirements, and install and/or execute the applications of interest.

Lotus Notes Mail 4.1

OS/2 Warp 4 includes Lotus Notes Mail, the Lotus Notes Release 4 messaging client, which provides state-of-the-art electronic mail support. Lotus Notes Mail

offers several ease-of-use enhancements that help improve personal productivity, including:

- **A simple-to-use mailbox**—Lotus Notes Mail includes Post Office Protocol 3 (POP3) and Multipurpose Internet Mail Extensions (MIME). POP3 lets you receive all your e-mail (Internet or interoffice mail) in one place, eliminating the hassle of checking multiple places for messages. MIME lets you send and receive messages containing graphics, charts, images, and video.
- **A full-featured word processing editor**—This editor embeds graphics and charts, and it supports multiple fonts, colors, tables, and a wide variety of formatting options.
- **Robust mobile support**—More and more users need to access e-mail while on the road or at home. Lotus Notes Mail provides excellent support for mobile users. If you frequently switch between a laptop and a desktop PC, you no longer have to remember which computer holds which e-mail. Lotus Notes Mail and OS/2 Warp 4 provide a mailbox replication tool that automatically synchronizes the mail stored on each system.
- **Speech commands**—Using Lotus Notes Mail with OS/2 Warp 4's built-in speech recognition software, you can simply tell your computer to forward, reply, cut, and paste—commands that you would normally have to type or use a mouse to execute.

IBM Developer's Toolkit for OS/2 Warp 4

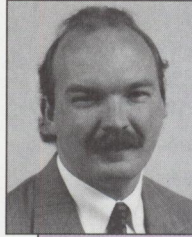
If you write OS/2 code either for fun or a living, you'll appreciate the new IBM Developer's Toolkit for OS/2 Warp 4. This toolkit is not included with the base operating system; it is available on CD as part of The Developer Connection and includes:

- Tools for building programs, including SOM, OpenDoc for OS/2, Systems Management, UniCode Language support, and TCP/IP and LAN programming
- Headers and import libraries for defining and resolving OS/2 API calls
- API reference information

- Online documentation
- Sample programs to demonstrate API coding
- Application debugging tools and aids

Best on the Planet

The OS/2 Warp 4 operating system brings together, in a single product, a vast collection of leading-edge capabilities, features, functions, and applications. It has been tested and certified to run on personal computers and workstations marketed by a long list of hardware vendors. Its reasonable price makes it affordable for anyone seriously interested in improving personal productivity on a computer. With all these things going for it, OS/2 Warp 4 is truly the best PC operating system on the planet.



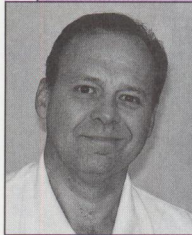
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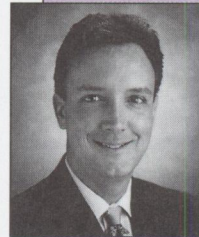
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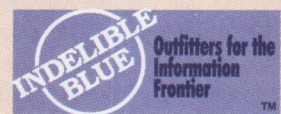
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Circle #13 on reader service card

What's New



CD-ROM and Audio Mastering Package

Cirrus Technology recently released its latest version of **Unite CD•Maker**, V2.1a. This new release of the innovative CD-ROM and audio CD mastering package for OS/2 supports the following:

- Sony CDU-924S CD-recordable device
- Ricoh RS-1420C CD-recordable device
- Smart & Friendly CD-R 2004 CD-recordable device
- Copying hidden files to a CD-ROM

Demo Version Included with OS/2 Warp 4

A fully functional demonstration version of **Unite CD•Maker** V2.1 is included on the device driver CD-ROM shipping with OS/2 Warp 4.

The demonstration version allows users who already own CD-R drives to create CDs right from their desktops but will only permit 100 MB of data or 11 minutes of music to be recorded on a CD. The demo includes a simulation option for users who don't have a CD-R drive. Users can upgrade their demonstration versions of **Unite CD•Maker** to the full retail version, which can record up to 650 MB of data or 74 minutes of music on each CD.

For more information, circle 1 on the reader service card.

Commercial OS/2 Video Poker Game

CFS Nevada, Inc. recently released a new commercial OS/2 video poker game called **CFSPoker**, which replicates all of the functions (except the payout hopper) of

actual gaming machines. **CFSPoker**'s many unique attributes include its design and operation (which resembles the current, generally available International Game Technology, Sigma Games, and Ballys gaming machines) and its distribution method.

The game is distributed free of charge with 1,000 game credits. It runs with no restrictions as long as you maintain a positive credit balance. If you deplete the credits, you must register the game to re-enable it. Winning credits that you accumulate while playing the game are added to the available credits. Therefore, if you can keep a positive credit balance, you need never register the program.

If necessary, you can register the game by phone, fax, or e-mail for a one-time fee of \$34.95, which provides you with an electronic key that permits unlimited use.

CFSPoker is available from electronic repositories worldwide for free download. Obtain a copy from the WWW at <http://www.cfsrexx.com> or via anonymous FTP from <ftp.cfsrexx.com/pub/CFSPoker.zip> (case-specific). **CFSPoker** is also distributed on the IBM OS/2 Family Sampler CD-ROM accompanying OS/2 Warp 4.

For more information, circle 2 on the reader service card.

Notes-Enabled Imaging Product

Computer Clearing House, Inc., a Lotus Development Business Partner and qualified Professional Developer, announced its new flagship imaging product, **ImageSuite/DESKTOP**. The first Notes-enabled imaging product from the **ImageSuite** product line, **ImageSuite/DESKTOP** offers companies increased productivity, efficiency, and communication.

This product is designed for use in developing customized document management applications. Now you can easily capture,

access, and share important business source information with suppliers, customers, and other areas of your company. **ImageSuite/DESKTOP**'s design demonstrates superior integration and flexibility by program control from Notes applications and by its use in open environments.

Suited for an organization of any size, **ImageSuite/DESKTOP** lets you access source documents online. You can create images through document scanners or electronic cameras and also retrieve stored image files while in Notes as well as non-Notes environments. You can create and store up to five layers of redlining and annotations with images, then attach them to Lotus Notes documents for replication or e-mail.

For more information, circle 3 on the reader service card.

Word Processor for OS/2

Sundial Systems Corporation offers version 1.7 of the **Clearlook** word processor for OS/2. Formerly developed and published by Clearlook Corporation, the word processor is now a Sundial Systems Corporation product. Sundial and Clearlook continue to work together to enhance the **Clearlook** word processor.

Version 1.7 includes new options and code enhancements to provide a more stable and robust product. This version provides enhanced tab support for greater formatting control and a window clip and import option to import a picture of any window on the desktop as a bitmap. Additionally, the complete user's guide and supplement are provided as **Clearlook** documents, serving as both examples and references.

Sundial is expanding customer options and offers users easy access to support. **Clearlook** owners are entitled to free technical support. The version 1.7 update is free to all licensed **Clearlook** users and

can be downloaded from the Sundial Web site at <http://www.sundialsystems.com>. If you are interested in sampling the product, a Clearlook working model is available.

For more information, circle 4 on the reader service card.

Manage Your Desktop Files

SoftTouch Systems released **UniMaint 5.0 for OS/2**, a native, 32-bit application that repairs damaged OS/2 desktop files and uninstalls OS/2, DOS, and WinOS2 applications. UniMaint backs up and transports desktops across versions of OS/2 or onto other machines. In addition, it lets you view and edit Extended Attributes files and view, edit, and repair INI files.

UniMaint automatically moves application directories and files to other drives and directories, updates the system INI file entries and OS/2's CONFIG.SYS file, and deregisters classes. Before UniMaint 5.0, if you wanted to move an application from one drive and directory to another, you had to delete it, re-install it, then re-customize it.

The automatic backup facility lets you specify when to back up your desktop based upon the number of modifications made since the last backup. You can back up your desktop only when the designated number of modifications are made, instead of performing backups at a specified time interval.

UniMaint's ease-of-use is demonstrated with its introduction of specialized "function wizards," which guide you through desktop management. These wizards help you repair desktops, remove applications, and manage system INI files.

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

Stardock Systems Supports OS/2 Warp 4

Stardock Systems, an independent software vendor for OS/2, has announced its intention to support OS/2 Warp 4, IBM's latest version of OS/2. Stardock has been working with IBM to ensure that all of its business offerings work seamlessly, whether running on OS/2

2.11, OS/2 Warp, or OS/2 Warp 4. Companies upgrading to the latest version of OS/2 will be able to move their Stardock products without worry.

Stardock also plans to release seven new OS/2 products for corporate users, as well as the connected consumer:

- **Object Desktop Professional 1.5**—Targeted at corporate users and power users, Object Desktop Professional contains all the features of Object Desktop plus advanced features.
- **Process Commander**—This program prevents a badly behaving application from hanging the system.
- **PlusPak for OS/2**—Targeted specifically for OS/2 Warp 4.
- **Avarice: The Final Saga**—This virtual reality adventure game is of the same genre as *Myst* and *7th Guest*.
- **Master of the Empire**—In this military strategy/conquest game, players compete to control the world's resources.
- **Trials of Battle**—Similar to *Mech Warrior*, *Wing Commander*, and *DOOM*.
- **Entrepreneur**—In this game, players start a company, choose a market, and conquer the world by building and marketing the best products.

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

Graphical Library for Visual Basic Programmers

Scientific Endeavors Corporation offers its **GraphiC** software package for Visual Basic programmers. **GraphiC/VB** is a graphical library that can be embedded into a Visual Basic program. It contains a Windows shell with menu options such as zooming and printing.

GraphiC is a complete graphical library that lets you write scientific graphing programs. **GraphiC** produces high-quality vector graphics that you can incorporate into a custom program. Highlights of these vector graphics include linear and logarithmic X-Y plots, 3-D surfaces, polar, pie, bar, and Smith charts, as well as a variety of post processing and output features. Three-dimensional surfaces are shaded to allow color changes at contours

of constant height or in colored ribbons along grid lines. Contour plots may be color-filled between contour levels.

GraphiC offers clear, crisp colors and easy to read graphs. It includes nine curve types with varied curve thickness, 16 different curve markers, and a palette of 248 colors and patterns for polygon fills.

The program is available on a variety of PC platforms including OS/2, DOS, Windows, and Windows NT. Its interface remains constant regardless of the application or platform. The platform-independent approach lets you easily port from one platform to another.

Scientific Endeavors also offers a version of **GraphiC** for Fortran programmers, **GraphiC/FOR**, which offers the same features and benefits provided by **GraphiC**.

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



Specialty Papers and Waterproof Ink for Inkjet Printers

Lexmark International, Inc. now offers an expanded line of enhanced specialty paper designed to give color inkjet printer users a wide array of quality applications for home and office. These applications enhance inkjet printing of photos, greeting cards, labels, stickers, and garment transfers. They support Lexmark's family of inkjet printers, as well as printers from other manufacturers.

Lexmark also offers a waterproof black ink that dries quickly on both plain paper and special media, producing clearer, sharper text that doesn't fade when exposed to water or sunlight. Lexmark's patented pigmented ink spreads less than dye-based inks when it contacts the paper, resulting in crisper images. This new black-ink cartridge can be used in the Lexmark Color Jetprinter 2050, the Lexmark Color Jetprinter 1020, the WinWriter 150c, the ExecJet IIc, and all three models of the Medley multifunction product.

Lexmark packages a sample selection of specialty papers and the newly developed black cartridge with its new Color Jetprinter 2050. Also included in the box with the 2050 is the Lexmark Workshop, a CD-ROM that provides an array of full-function applications for business and family fun. With the Lexmark Workshop, you have the ability to print images with near-photographic quality, professional-looking certificates, greeting cards, labels, and even T-shirt transfers.

Lexmark's new specialty papers/imaging media products are:

- **Inkjet Photo Paper**
- **Inkjet Greeting Cards**
- **Inkjet Iron-On Transfers**
- **Inkjet Labels (in two sizes)**

Visit Lexmark on the World-Wide Web at <http://www.lexmark.com>, on Lexmark's bulletin board service at (606) 232-5238, or on Lexmark's CompuServe forum "Go Lexmark."

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

Family of Open Workgroup Printers

IBM has extended its printer offerings to the open workgroup market with a family of network-ready, low-cost printers that meet the needs of businesses that want user-friendly, reliable printing over networks. The four new **IBM Network Printers**—one color and three monochrome models—are designed to support the evolving demands of both users and network administrators in shared or workgroup environments.

The IBM Network Printer family consists of three monochrome printers running at speeds of 12, 17, and 24 pages per minute—the **IBM Network Printer 12**, the **IBM Network Printer 17**, and the **IBM Network Printer 24**—plus the IBM Network Color Printer, a high-quality, high-performance color printer.

IBM Network Printers offer high levels of flexibility and scalability to support the demands of all networking environments. Connectivity options, paper handling options, print features, and environmental

features are all designed with the network user and network administrator in mind.

IBM's Network Printers are a compelling solution for existing AS/400, RS/6000, System/390, and IBM PC Server customers. IBM offers fully integrated support for AFP/IPDS at 600 dots per inch, giving you the benefits of a cost-effective solution, combined with the print management capabilities expected in mission-critical production environments and the best error recovery in the industry. The IPDS data stream is supported over Ethernet and Token-Ring networks, as well as through traditional twinax and coax interfaces.

For more information, contact your local IBM representative.



Java Generic Library for Free Commercial Use

ObjectSpace, Inc., a supplier of object-oriented business solutions, offers the **Java Generic Library (JGL)** for free commercial use. The Java Generic Library is a comprehensive set of 14 reusable containers and 70 generic algorithms. It is designed specifically for performance and use in a distributed environment, and is completely compatible with Sun Microsystems' Java Developer's Kit (JDK).

JGL is a combination of multiple technologies that provides you with a core package for Java development. ObjectSpace has augmented the Java Developer's Kit by leveraging technology from ObjectSpace C++ toolkits and other vendors' libraries to form the Java Generic Library.

You can use the Java Generic Library algorithms independently of its containers and apply them to native Java arrays of objects, native Java arrays of primitives, all Java Generic Library containers, and `java.util.Vectors` from the existing Java Developer's Kit. This enables the Java Generic Library to remain small and efficient, vital to distributing applets and applications on the Web.

The standard Java Generic Library release includes full source code, online HTML documentation, comprehensive examples, a 100-page tutorial, and a suite of performance benchmarks. ObjectSpace is releasing the Java Generic Library product free of charge from the ObjectSpace Web site at <http://www.objectspace.com>.

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

Online Hotel Reservation System and Interactive Web Site

Pegasus Systems, Inc. offers **TravelWeb**, an Internet Web site where you can select and reserve a hotel room directly from your PC. With more than 25,000 Web pages of online lodging information, TravelWeb provides direct booking access to over 6,000 hotels and 1.7 million rooms worldwide.

From TravelWeb, located at <http://www.travelweb.com>, you can view color photographs of properties, as well as search for a hotel by geographic location, chain name, rate range, amenities, and facilities. Hotels that can be reserved via TravelWeb include Best Western, Days Inns, Hilton Hotels Corp., Hyatt, La Quinta, Ramada, and Westin Hotels and Resorts.

TravelWeb provides online help and links to other travel-related sites such as Southwest Airlines' home page and the Traveler's Bookshelf. If you make multiple bookings via TravelWeb, you can view reservations online, creating a "house-keeping list." You can also display your reservations for online verification of date, rate, or hotel name.

You can access TravelWeb through any Web browser, but you must use a secure browser for credit-guaranteed reservations. TravelWeb uses the Netscape Commerce Server, which has advanced Internet security features based on Secure Sockets Layer (SSL) encryption technology.

Plans are to expand TravelWeb to include airlines, rental cars, and links to additional Internet sites, giving you greater access to travel-related information. More than 4,300 sites currently link to TravelWeb.

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

New Antivirus Protection for the Internet

IBM announced a new enhanced version of its **IBM AntiVirus** software that provides safer, faster virus protection for the Internet, including the ability to scan Internet documents for viruses before they infect your computer.

IBM AntiVirus 2.5 provides protection from more than 8,000 strains of viruses, including the Concept virus and other Word macro viruses. Macro viruses, which infect macro programs embedded in documents, have emerged as a new and growing problem. The Concept virus, for instance, which infects Microsoft Word documents, was first seen less than a year ago and is now one of the most prevalent viruses in the world.

AntiVirus 2.5 contains industry-leading new technology to prevent, detect, verify, and disinfect Word macro viruses. It has also been designed to protect users from any future Word macro viruses, with free data file updates from IBM.

This new version's "check on access" technology scans a file for viruses whenever it is accessed, including when files are uploaded or downloaded from the Internet or received via e-mail, online services, bulletin board systems, or other sources.

In addition to "check on access," IBM AntiVirus scans memory, hard and floppy drives, and network servers for thousands of viruses, including polymorphic viruses that change to avoid detection. It has dramatically improved its detection rate for boot viruses. For Windows 3.X users, IBM AntiVirus now offers automated, scheduled scanning and uses a new VxD (virtual device driver), for active protection.

For more information, contact your local IBM marketing representative.

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IBM Client/Server Computing

Exploring IBM Client/Server Computing from Maximum Press comprehensively covers IBM's client/server strategy and describes how major product lines fit into that strategy. Written by IBM client/server expert David Bolthouse and edited by Jim Hoskins, this book explores the important role of client/server computing in today's networked world. This book is easy to understand and reviews IBM's client/server framework and the many IBM products, both hardware and software, that allow implementation of reliable client/server networking environments.

This 445-page book explains client/server computing basics and benefits from a business perspective. It clarifies IBM's client/server strategy, keeping business applications in mind, while examining a variety of IBM hardware and software products used to build and manage client/server environments. The book alerts you to common pitfalls in migrating to client/server computing through hypothetical case studies based on actual IBM field experience.

Whether you're using personal computers, AS/400 systems, RS/6000 systems, S/390 mainframes, or non-IBM computer systems, you'll learn how to plan, build, and run a flexible client/server computing environment. *Exploring IBM Client/Server Computing* provides a roadmap and comprehensive product information to help you successfully migrate to a structured client/server environment.

Exploring IBM Client/Server Computing—ISBN 1-885068-04-2

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

Network and Data Security

Osborne/McGraw-Hill presents the newest installment in the *LAN Times Guide* series, the *LAN Times Guide to Security and Data Integrity* by Marc Farley, Tom Stearns, and Jeffrey Hsu.

This team of data security experts gives system administrators and MIS managers valuable advice for maintaining the integrity and security of their companies' crucial data. Filled with many practical plans, ideas, and real-world examples, the guide shows readers how to shield network data from hackers, system failures, natural disasters, and other threats.

The *LAN Times Guide to Security and Data Integrity* begins with a discussion of the importance of data in today's organizations and continues with a variety of game plans for keeping that data secure and available to the right people. The guide offers an in-depth look at technologies that have been developed specifically to guard network data and discusses a wide range of related topics.

Learn How to Build High-Speed Networks

Another publication from Osborne/McGraw-Hill, *LAN Times Guide to Building High-Speed Networks*, is a comprehensive guide to speeding up local and wide area networks with ATM, ISDN, 100Base-TX, and other high-speed technologies currently maximizing networking potential.

This book examines each step to building a high-speed network, including what to build, where to begin, how to integrate into an existing network, and what kind of performance boost can realistically be expected from the network.

To help network managers intelligently assess their needs and options, this intuitive guide is organized not only by type of high-speed protocol, but also by its appropriate location. Each chapter discusses how a protocol works, as well as specific implementation issues surrounding it, along with strengths and weaknesses.

The LAN Times Guide to Building High-Speed Networks is designed to help network managers build powerful and more efficient LANs and WANs that can maintain peak performance.

LAN Times Guide to Security and Data Integrity—ISBN 0-07-882166-5

LAN Times Guide to Building High-Speed Networks—ISBN 0-07-882200-9

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

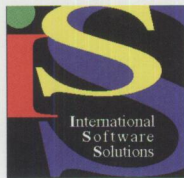
Today's Help Desk: Providing "Hands-On" Support Remotely

By Philippe-Charles Krug-Basse

Remote Services Management (R.S.M.) links your users to remote support professionals to give them ready access to help when they need it. This article describes R.S.M.'s features and shows how it can help your company save valuable time and money.

In a perfect world, each user would have a full-time support expert in the office next door, ready at a moment's notice to come over and help solve a problem, explain how to use a new software package, or install the latest upgrade. No office would be too remote for on-the-spot assistance.

But the world isn't perfect, and in spite of our best efforts to provide online tutorials, help text, CD-ROM training courses, and books for "dummies," some people and some situations require immediate, hands-on support. If it isn't available, work stops until someone can help.



International Software Solutions specializes in end-user support—particularly in ways to provide it more quickly and cost-effectively.

Our "expert next door" approach uses network and communication lines to link users with their help desks in a way that makes expert support close at hand. Our OS/2-based software solution, achieved after years of experience with hundreds of thousands of users, not only delivers hands-on support, but also enables everyday tasks such as automatic software distribution, data collection, and other administrative and maintenance functions.

This innovative approach is now available to OS/2 Warp 4 users.

Our product has been known by various names. Called PolyPM/2 in the early days of OS/2, it later became Remote Services Management (R.S.M.). In the OS/2 Warp 4 release, it is named IBM Remote Support for OS/2. But our approach has always remained the same: Allow a remote expert to give a user direct, online assistance by linking their computers. The help desk, or manager workstation, can reproduce the user (or client) screen, capture its keyboard, send and receive files, and communicate using on-screen drawings, chat sessions, and even voice messages.

An Example

Here's how it works. Let's say your company's help desk gets a call from a user in trouble. Since all authorized users are

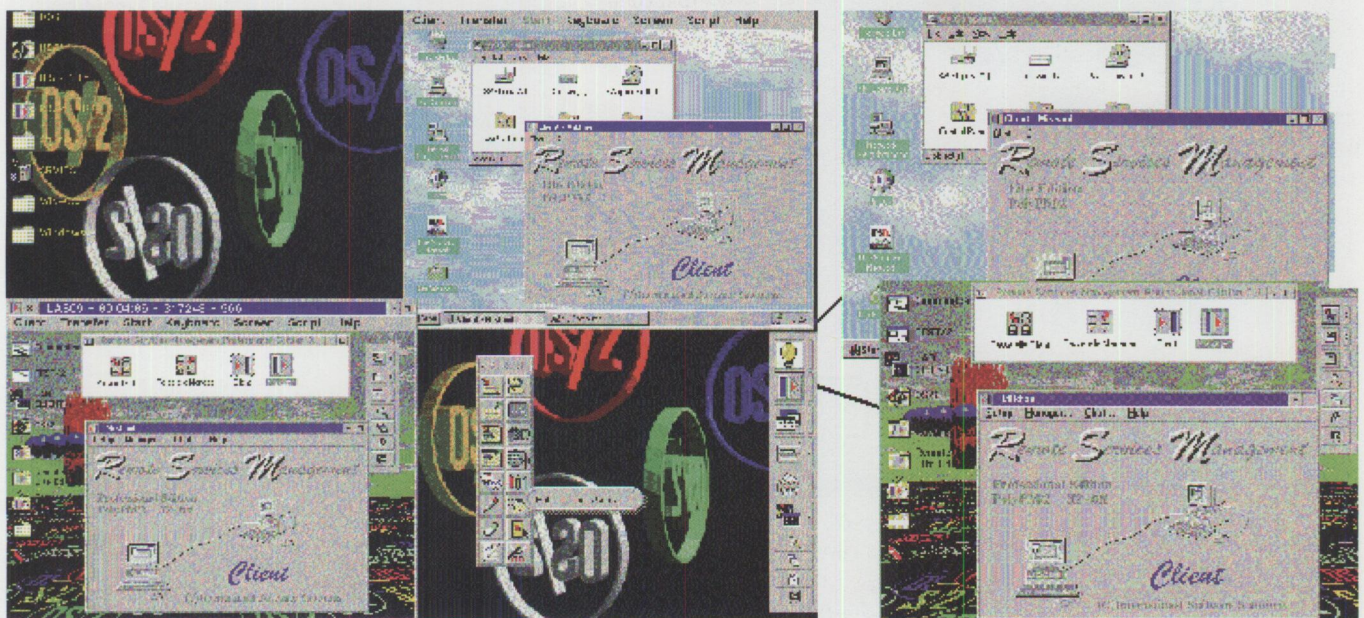


Figure 1. OS/2 Manager Simultaneously Controlling Windows 95 and OS/2 Clients

registered in R.S.M.'s client database, remote access can begin immediately. As the user reproduces the actions that caused the failure, a support person watches the session from an R.S.M. manager workstation. The support person suggests alternate sequences and circles selections on the user's menu screen to guide the process.

The support person then looks at the client workstation's directory and determines that the user's software package is a down-level version.

A listing of the configuration file (CONFIG.SYS) shows that it is also incorrect. Using the client's clipboard, the support person modifies the CONFIG.SYS file and saves it to the user's hard disk. A replacement .INI file from the software package is also transferred to the client to replace a corrupted copy. The user's workstation is remotely rebooted, and the CONFIG.SYS file change takes effect.

After verifying that the problem has been fixed, the help desk schedules an automatic overnight update of the full software package and documents the session in the client's journal.

Mission accomplished!

Multiple Platforms and Versions

While R.S.M.'s manager workstation runs on OS/2 Warp, the client workstations can run on any of several popular platforms: OS/2 1.X, OS/2 2.X, OS/2 Warp, OS/2 Warp 4, DOS, Windows 3.1, Windows 95, and Windows NT (see Figure 1). Three editions of R.S.M. are available to meet all needs and budgets: R.S.M. Lite, Advanced, and Professional.

Lite provides basic manager and client functions. Advanced includes the gateway support, and Professional includes the Programming Script Language for unattended sessions.

The OS/2 Warp 4 version, included with the BonusPak CD-ROM bundled with OS/2 Warp 4, provides client support for every OS/2 user, allowing an IBM support person to access a workstation for troubleshooting and software updates.

Performance

You're probably wondering what kind of performance to expect from a remote session. A demo of R.S.M. will surprise you. A networked manager client session is only a little slower than a dedicated machine. Over a telephone line, the screen transfer rate depends on the modem speed but is still faster than downloading a typical Internet Web page on the same system. To download a demonstration, visit our Web site at <http://www.iss2you.com>.

We've done several things to maximize R.S.M.'s performance. The client desktop and other graphical objects are saved to cache memory and to R.S.M.'s own swap file to enable a manager to "learn" a

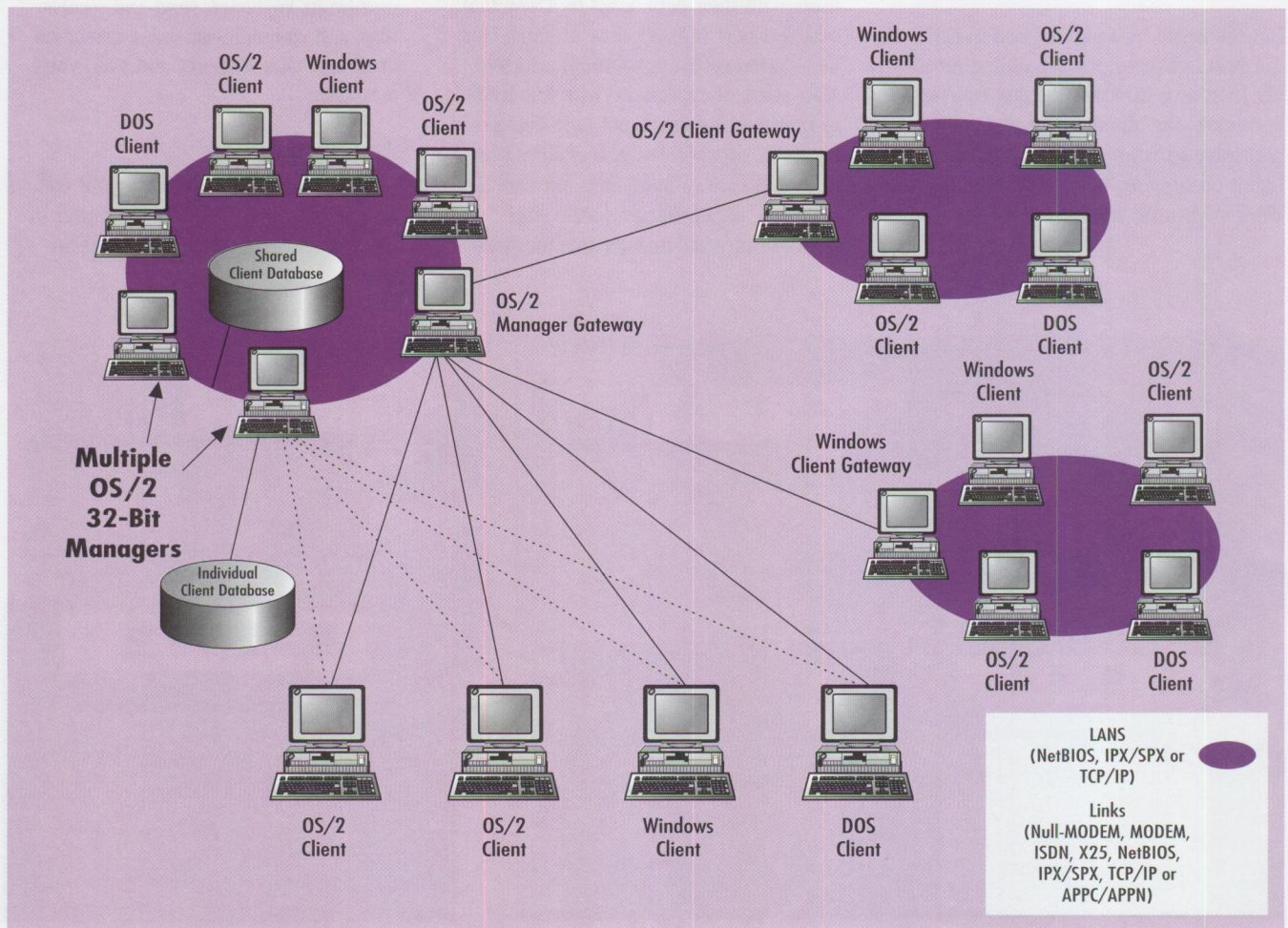


Figure 2. Complex LAN/WAN Architecture

client's screens and eliminate unnecessary client-to-manager screen transfers. To further increase a session's speed, reduce the number of colors on the client's remote screen or set it to monochrome.

To reduce transfer time, R.S.M. compresses files. Good display performance and compressed files mean not only shorter help desk sessions, but also lower long-distance connect charges.

Automatic Operation

Through its Programming Script Language, R.S.M. performs a variety of offline batch operations such as scheduled backups, database updates, software installations, and file transfers. In addition, automatic data collection can be done periodically. For example, one of our customers, the Total Oil Company, uses R.S.M. to poll its 450 convenience store/service stations each night for the day's transactions. And once a week, an updated database of products and prices is uploaded overnight to each station.

Connectivity

R.S.M. currently serves more than 375,000 licensed users worldwide in companies of all sizes—from the largest corporations to the smallest businesses, including home users. To support such a diverse customer set, we've implemented all of the common communication protocols, including serial cables (null modem), asynchronous modems, NetBIOS, TCP/IP, IPX/SPX, Native X.25 and ISDN, CAPI, and APPC/APPN. Our gateway support, another cost-saver, enables multiple clients to be supported through a single network workstation (see Figure 2).

We haven't limited our support to attended, end-user clients, either. Nor have we restricted our features solely to the help desk environment. Many IS managers and network administrators use R.S.M. to remotely manage client workstations. For example, an unattended Lotus Notes server loaded with the R.S.M. client software can be remotely tuned.

R.S.M. can be used to support remote access in other ways. While at home or on the road, R.S.M. gives an end user full, remote access to business software, data, networks, and communication services on an office workstation. This setup means lower-cost laptop configurations, since an office workstation's hardware and software doesn't have to be duplicated on a laptop (or home) PC for the user to have the same full range of applications available at the office.

Security and Client Management

R.S.M.'s security features prevent unauthorized access of a client or manager workstation. Security-conscious customers have installed R.S.M. on thousands of workstations. A full set of controls such as mandatory call-backs, multiple ID levels, protected data files, programs, directories and disks, data encryption, and audit trails are available to protect and document every event.

The hierarchical client database simplifies supporting user workstations in a large corporation. Clients can be listed in a logical arrangement, such as by department within division within company.

OS/2 Warp 4

IBM selected R.S.M. for Warp 4 after an exhaustive review of competing products. ISS custom designed the R.S.M. client for OS/2 Warp 4 to link users with IBM's help desk services. Even if an OS/2 Warp 4 client workstation gets corrupted so that the operating system won't start, the user can insert a utility disk, load the client program directly, and connect to the IBM help desk.

When your end users have IBM Remote Support for OS/2, the "expert next door" is only a phone call away. For more information about Remote Services Management, contact International Software Solution's North American sales office by phone (888) ISS-2YOU, fax (407) 820-0804, e-mail Sales@iss2you.com, or on the Web at <http://www.iss2you.com>.

Philippe-Charles Krug-Basse is president of International Software Solutions. Initially educated as a Top Gun in the French Navy, he started his business career in 1976 as a sales engineer with Olivetti. He later worked for ADP and SG2 prior to starting his first company, NIS International, specializing in software for microcomputers. He created International Software Solutions in 1987, initially developing products for Turbo C and Turbo BASIC, then for OS/2. PolyPM/2, now named Remote Services Management, has been available since 1990 and has more than 375,000 registered users worldwide. Philippe-Charles' e-mail ID is 100022.2237@compuserve.com.

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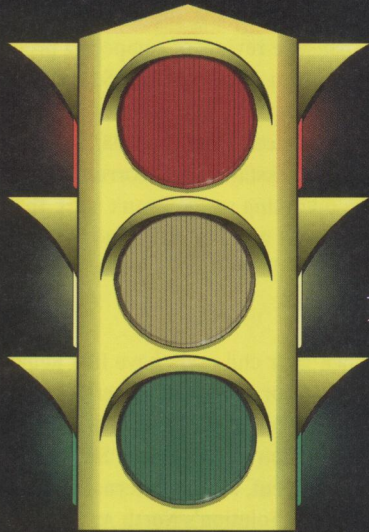
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The Internet-Enabled Desktop in OS/2 Warp 4

OS/2 Warp 4 has an array of features that enable you to access information on the Internet, the World-Wide Web, and your own company's intranet easily and seamlessly. This article covers OS/2 Warp 4's new features for accessing URLs, interacting with Web browsers, running Java applets, accessing FTP servers, and more.

The Internet and the World-Wide Web have woven their way into our everyday lives. Computer users are constantly hopping onto the information highway to retrieve or share information. So, it is fitting that IBM has equipped the latest version of its award-winning desktop operating system, OS/2 Warp 4, with many new features for accessing information on the Internet and the Web.

Sheila A. Harnett, Ph.D.
Edwin J. Hilpert, Jr.
Lanness Robinson
James Taylor
IBM Corporation
Austin, Texas

OS/2's object-oriented desktop user interface, the Workplace Shell, is the point of integration for these new features. OS/2 Warp 4's Workplace Shell lets you work with information stored either locally or on the other side of the world, via the Internet, in the same manner—by pointing and clicking on folders to open them and run programs, and by dragging and dropping files between local and remote

folders. You can configure these same features to best fit your company's unique desktop needs.

What Does "Internet-Enabled" Mean?

The term "Internet-enabled" may mean different things to different people. In this article, it refers to the cumulative result of enhancements and additions made to the already powerful OS/2 desktop that extend existing user-interface techniques and conventions for dealing with local data and applications to those that reside on the Internet.

In OS/2 Warp 4, you do not have to "drop down" to a lower level of tools to access resources on the Internet; those resources are brought to you through the Workplace Shell. In addition, you can use data files found on the Internet, such as images and sound files, to customize your desktop.



LANs, Intranets, and the Internet

OS/2 Warp 4 gives you an incredible set of network computing (NC) tools to choose from: IBM File and Print Client and Peer Services, TCP/IP 4.0, NetWare Client, Remote Access Client, Systems Management Client, and Mobile Office Services.

The Workplace Shell is the unifying user interface for accessing files, programs, and directories that reside on servers reached by these NC-oriented tools. Whether your system is configured to access an intranet inside a firewall, uses a combination of LAN and Internet access, or reaches the Internet via a modem—wherever information resides—OS/2 Warp 4 can connect to it, and the Workplace Shell can access it.

The Workplace Shell Object Model

Some user-interface techniques and conventions within the Workplace Shell can be applied with consistent results to any object you see on the desktop. New objects can be manipulated with these same techniques, blending into the rest of the

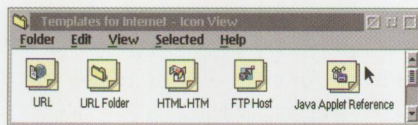


Figure 1. Templates for Internet Folder

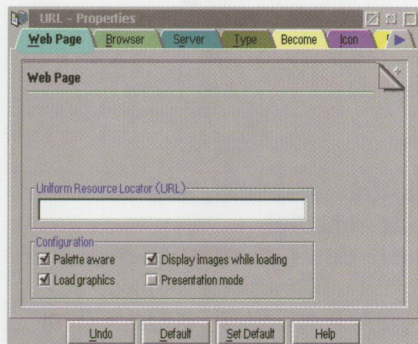


Figure 2. URL Object's Properties Notebook, Web Page Tab

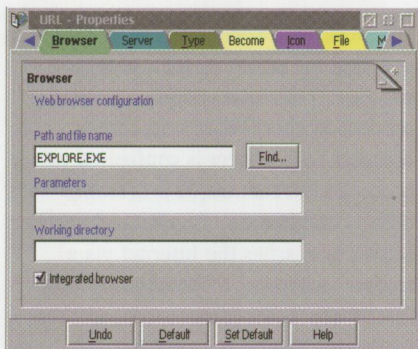


Figure 3. URL Object's Properties Notebook, Browser Tab

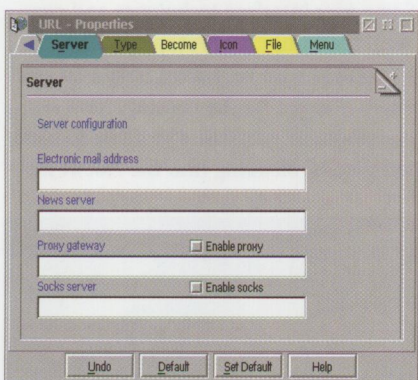


Figure 4. URL Object's Properties Notebook, Server Tab

desktop and extending its power (with little or no learning curve for the user).

Objects on the desktop represent items such as applications, data files, and folders. Double-clicking on an object opens it (whether it is a data file, application,

folder, etc.). Clicking mouse button 2 on an object brings up a popup menu showing which operations can be performed on that object. Dragging with mouse button 2 picks up the object and drops it where you release the mouse button (for example, over a printer, another folder, an application, etc.).

Every object has its own settings that you can view and customize via its own Properties notebook. The Internet-related features described below have been implemented as Workplace Shell objects that you can manipulate in the same consistent manner.

New Internet-Enabling Features

The Templates for Internet folder, shown in Figure 1, resides within the Templates folder on the OS/2 Warp 4 desktop. Inside are templates for the new Internet-related objects. As with any other template, you can create a new object by using mouse button 2 to drag a new copy from the template onto the desktop or any other folder.

The Templates for Internet folder contains the following new objects:

- **URL**—Represents a Universal Resource Locator (URL), e.g., `http://www.software.ibm.com`. Once you have pointed to a specific URL address, open the URL object to go to that address.
- **URL Folder**—A folder that organizes and displays URL objects in a sorted, details view.
- **HTML File (HTML.HTM)**—A type of data file to which HTML-aware editors and HTML viewers can associate, so that they are opened automatically when the HTML file is opened.
- **FTP Host**—Represents a remote FTP host. Once the remote FTP host is configured with hostname, username, and password, click on its object to open it. The FTP host then displays the file system contents of the remote host in a Workplace Shell folder view.
- **Java Applet Reference**—Represents a Java applet (whether that applet resides on the local machine or at a specific URL on the Web). Once a Java Applet Reference is configured, double-click on it to launch the applet.

URL Objects

URLs are the keys to the doors on the World-Wide Web. A new kind of object, a URL object, has been added to the Workplace Shell to represent a URL address.

You can create a URL object from its template, as previously described. You can also create one by selecting the "Create another" option from another URL object's popup menu. In each of these cases, the new URL object's Properties notebook opens to a page into which you can type its URL address and set any other specific information for viewing this URL.

Figures 2, 3, and 4 show three pages from the Properties notebook for a URL object—the Web Page, Browser, and Server pages.

In the Web Page properties page, type the address of the desired URL into the URL entry field. Next, use the Configuration checkboxes to set specific browser parameters for viewing Web pages at this URL (e.g., "Palette aware," "Load graphics," etc.). Note that only an integrated browser, such as IBM WebExplorer v1.2, can understand these Configuration parameters; other browsers may not accept such parameters. Therefore, if you do not select the "Integrated browser" checkbox on the Browser page of the URL object's Properties notebook, then these Configuration checkboxes on the Web Page properties page will be disabled.

In any URL object's Browser properties page, you can either change the browser that will be used to view this URL *only* or change the default browser that will be used to view all URL objects. To change the browser for a single URL, change the value in the "Path and file name" field, then close the notebook. To change the default for all URL objects, change the value in the "Path and file name" field, press the Set Default button at the bottom of the Browser page, then close the notebook.

IBM WebExplorer v1.2 (EXPLORE.EXE) is set to be the default browser for URL objects in OS/2 Warp 4, although an OS/2 version of Netscape Navigator will be available.

The default OS/2 Warp 4 desktop has a preconfigured URL object, "Get Netscape Navigator," to help you download the

most up-to-date version of Netscape Navigator for OS/2. Double-clicking on that URL object takes you to a Web page from which you can download Netscape Navigator for OS/2. The install program for Netscape Navigator for OS/2 will ask you if you want to change the default browser for all of your existing URL objects to NETSCAPE.EXE; if so, it makes that change.

The Internet-enabled features described in this article will work with the Netscape Navigator for OS/2 to complement and further enhance the browser's world-class functionality.

If you change the browser to something other than the default, and if your specified browser does not support command-line arguments for the settings on the Web Page properties page, then make sure you de-select the "Integrated browser" checkbox on the Browser properties page.

You can also specify in the Parameters field additional command-line arguments that will be passed to the specified browser's executable when the URL object is opened. If you want to set the information you enter on this page as the new default for all URL objects in your OS/2 Warp 4 system, then press the Set Default pushbutton at the bottom of this page.

Use the Server properties page to set the defaults for configuring the browser for e-mail and news and for getting past a firewall (if a proxy or socks server is available). After you enter the appropriate values in this page and press the Set Default pushbutton at the bottom of the page, all URL objects will pass this information to the specified browser when it is opened.

URL Objects Are Portable

Because URL objects are stored on your local system as data files, they are portable. You can copy an entire folder of URL objects onto a diskette to share with someone else. When that diskette is copied to another OS/2 Warp 4 system, its files show up as the identical URL objects.

Cut and Paste

Another nice feature in the OS/2 Warp 4 Workplace Shell is its ability to cut text from a document and paste it into a folder, thereby creating a datafile object containing the selected text. You can exploit this capability to create new URL objects

on the fly. For instance, if you are reading mail or browsing a document and you want to create a URL object for a URL that appears in the text, you can:

1. Select the text specifying the URL.
 2. Put it onto the clipboard.
 3. Go to a folder's popup menu and select Paste.
- This brings up a dialog box titled "Paste clipboard contents to folder." In that dialog box:
4. Type the title you want to give the new URL object.
 5. Change the Object class to WPUrL.
 6. Press the Paste pushbutton.

A new URL object now appears in the folder to which you pasted.

Other URL Address Prefixes

URL addresses have different prefixes for different protocols; `http:` is the most common. But several other forms of URLs can be specified, and some of those additional URL formats are very useful when combined with the built-in support provided in OS/2 Warp 4's URL objects.

A URL can also have a protocol prefix of `mailto:`. Using this protocol, you can create an object on your Workplace Shell desktop that allows you to send e-mail quickly to a designated person, using the `mailto:` support provided by your Web browser. For example, if Santa Claus were to accept online mail, you could create a URL object on your desktop and enter Santa's URL into the "Uniform Resource Locator (URL)" field on the Web Page page of your URL object's Properties notebook: `mailto:santaclaus@northpole.com`. After that, simply double-click on that URL object whenever you want to send more mail to that ID.

Another very useful protocol prefix for a URL is `news:`. Using this URL prefix, you can create a URL object and place it on your Workplace Shell desktop or into a folder for quick access to an Internet newsgroup. For example, if you create a URL object with the URL address `news:comp.os.os2.advocacy#Current_Article` and then open that URL object, the newsgroup `comp.os.os2.advocacy` is opened at the current article.

You can also use a URL object to access gopher sites by specifying the `gopher:` protocol. For example, to access the text of IBM Announcement Letters, create a URL object with this URL address: `gopher://gopher.ibmLink.ibm.com`.

Similarly, you can use a URL object to access an FTP site with your Web browser by specifying a URL with the `ftp:` protocol, e.g., `ftp://hobbes.nmsu.edu`. However, the new FTP Host Folder object (described later) provides an easier, more intuitive interface for accessing FTP servers.

Web Browser Integration

As mentioned previously, the WebExplorer v1.2 browser (`EXPLORE.EXE`) is an integrated browser. This means that when you start `EXPLORE.EXE` by opening a URL object, it accepts command-line arguments from the Workplace Shell.

WebExplorer v1.2 is integrated with the Workplace Shell in other ways as well. If you drop a URL object onto the WebExplorer program object in the WebExplorer folder or onto an open view of the WebExplorer, then WebExplorer loads that URL. In addition, if you use mouse button 2 to drag a Web page viewed in WebExplorer and drop it onto a Workplace Shell folder, you create a URL object pointing to that page.

If you drag an image on a Web page viewed in WebExplorer and drop it onto a Workplace Shell folder, you create an image file containing that image. You can then double-click on that image-file object on the desktop to launch the multimedia viewer associated with that type of image file. So, if you find a neat image on the Web that you want for your desktop's background image, you can drag it from the Web page onto the desktop; then, once the image file is created, you can drag it to the Background properties page of the desktop's Properties notebook. Voila! You have a new desktop background image.

The new Links menu item in the menu bar for WebExplorer v1.2 gives you the option to navigate a Web page by using the VoiceType speech and dictation features built into OS/2 Warp 4. The Links submenu displays the links that are present in the visible viewing area of

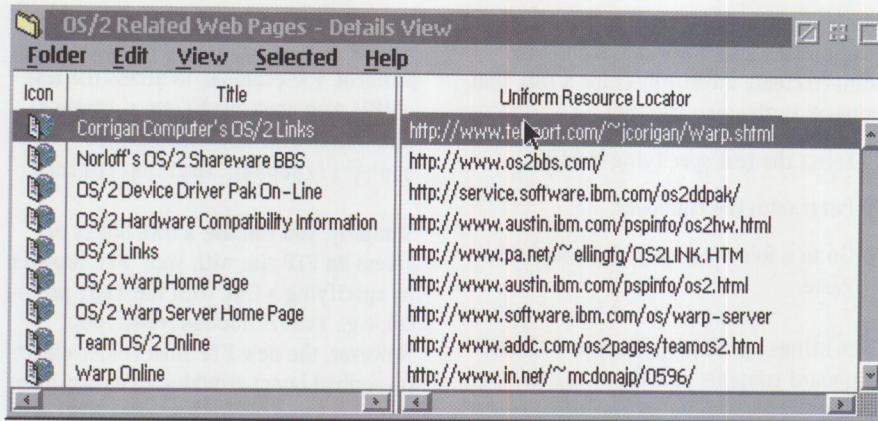


Figure 5. A URL Folder

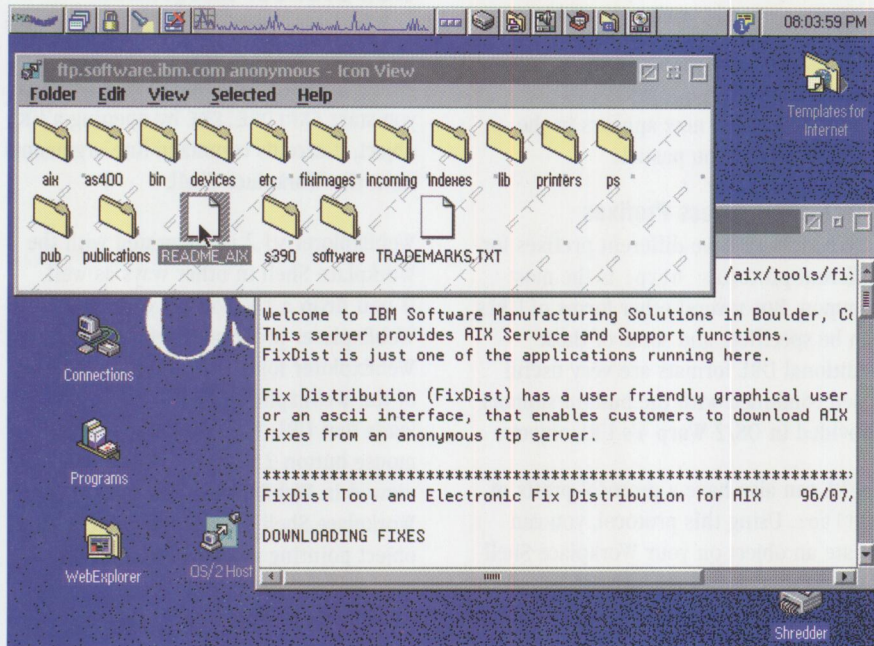


Figure 6. An FTP Host Folder

Web-Explorer v1.2 and can therefore be navigated with spoken commands (as well as with the mouse or keyboard).

URL Folders

URL objects can be placed on the desktop or in any folder; however, a special kind of folder, a URL folder, is preconfigured to display URLs in a sorted, details view. A URL folder affords a nice way to view your URL objects, because it shows both the title of a URL object and its address (URL) at the same time. You can find a template for a URL folder in the Templates for Internet folder. Figure 5 shows a URL folder containing several URL objects.

HTML Files

Any application that recognizes files with an .htm or .html filename extension or the file type HTML will automatically associate with HTML file objects and appear in their "Open as" submenu.

The default association for HTML files is the OS/2 System Editor. Drag an HTML file from the HTML file template in the Templates for Internet folder, drop it onto the desktop or any other folder, and open it to start editing a new HTML document.

An organization can design its own HTML file template, which can be used to create Web pages with a similar appearance. Simply create an HTML file with the contents you desire, open its Properties

notebook, go to its Icon page, and check the Template checkbox. Your users can then drag a new HTML file from this customized template, drop it on the desktop or any other folder, and edit it with their own information.

You can also use the "paste to folder" technique (described previously to create URL objects on the fly) to create a new HTML file object. Just select WPHtml as the Object Class in the "Paste clipboard contents to folder" dialog box.

FTP Host Folders

You can create an FTP Host folder and use it to access a remote FTP site, to view files at that FTP site, to navigate directories at that site, to transfer files between the local machine and the remote host, and to transfer files directly between two remote hosts. Operations such as login, cd, get, put, mget, mput, ASCII, binary, etc. are built into the predefined Workplace Shell folder behaviors.

An FTP Host folder's icon changes state when the folder is opened and closed. The title of the folder is initially set to its corresponding hostname and username but, once configured, can be renamed.

Open views of an FTP Host (or one of its subfolders) are presented as folder views, like any other Workplace Shell folder. To distinguish these views from those of folders that reside locally, a subtle background bitmap in the folder indicates that it is a view of an FTP Host directory.

Figure 6 shows an open FTP Host folder, with a view of one of the remote files opened in the local machine's OS/2 System Editor.

You can create an FTP Host folder by dragging an FTP Host Template object from the Templates for Internet folder and dropping it onto the desktop or any other folder. Or you can choose "Create another" from the context menu of another FTP Host folder. You can create a different FTP Host folder for each host to which you want to connect, or you can create a single FTP Host folder that you use to access different remote hosts each time. This flexibility is available in an FTP Host folder's Properties notebook. If any of these values are not specified when you open the FTP Host, you are prompted to enter the

missing value(s), for example, hostname, username, password.

Other Settings in an FTP Host Folder

Other settings that can be configured in an FTP Host folder's Properties notebook are:

- The initial remote directory to change to when the host is opened.
- Default transfer type (binary or ASCII). This value can also be toggled from the FTP Host folder's popup menu.
- The default local directory to which a remote file will be downloaded. This directory is used when no explicit target directory for a get operation is specified (e.g., when double-clicking on a remote file results in a get operation without an explicit target directory).
- A file pattern filter that can be used to specify which files you want included in a remote directory view.

Figures 7 and 8 show two of the Properties notebook pages for an FTP Host folder.

Using an FTP Host Folder

Like any other folder on the desktop, you can open an FTP Host folder by double-clicking on it with the mouse or by selecting "Open as" (in a tree view, icon view, or details view) from the FTP Host's popup menu. When the FTP Host is opened, it displays its remote contents in a folder view; the files and directories it contains are displayed as file and folder objects with their own context menus and properties.

You can navigate a remote host's file system by opening subfolders to get to the desired remote directory, just as with any directory on the local machine. To view a remote file, double-click on it. In this case, the viewer in which the file is opened is the executable on the local machine that associates to the file's extension. For example, a remote .BMP file, when opened, is loaded into an image viewer on the local machine; a .TXT file is loaded into the default editor on the local machine; and a .WAV file is loaded into the audio player on the local machine. This functionality lets you quickly view and sample data files that exist on the remote host. You can also change the initial starting directory for the remote host,

which is used as the starting point for navigating that host, by editing the "Initial remote directory" field in its Properties notebook.

Alternately, you can open a remote file by dragging it from an open view of a Host folder and dropping it onto a program object on your desktop that you want to use to view the file. In addition, you can print a remote file by dragging and dropping it onto a printer on your desktop.

In all these cases of viewing and printing a remote file, a get of the file is done transparently to you. When this happens, if you have not specified a default download directory in the FTP Host folder's Properties notebook, the directory specified by the TMP environment variable on your machine is used as the download directory for the transparent get operation.

Remote hosts may be running any operating system that supports an FTP server. For this reason, on the client, the FTP Host folder provides folder-based views of directories and files that exist on remote hosts running UNIX, VM, Windows NT, OS/2 Warp, or other operating systems—right alongside folder-based views of directories and files that reside on your local machine!

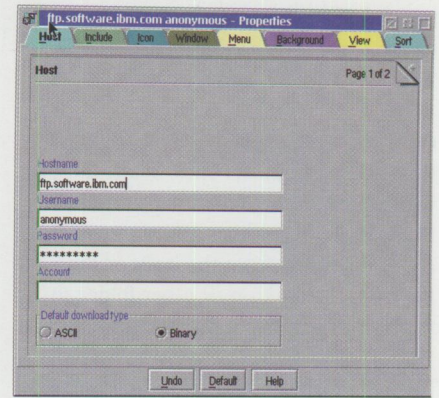


Figure 7. FTP Host Folder's Properties Notebook, Page 1 of 2

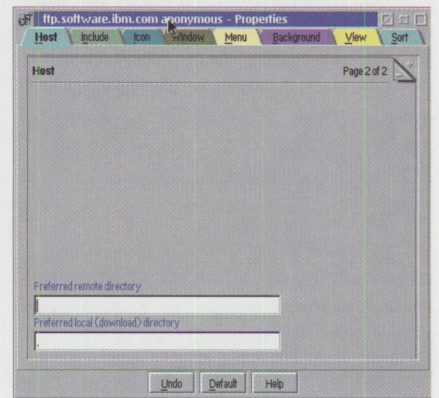


Figure 8. FTP Host Folder's Properties Notebook, Page 2 of 2

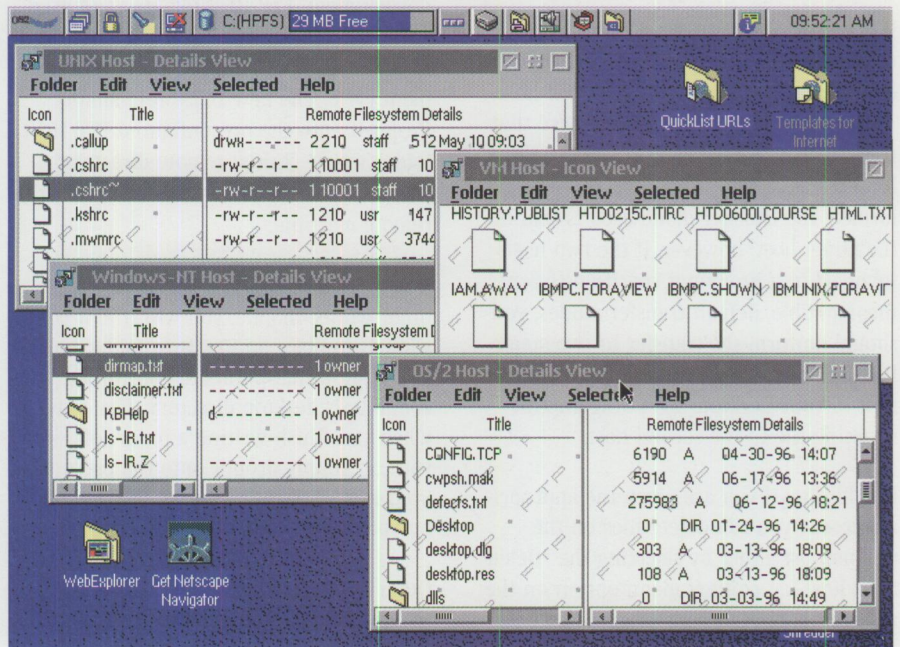


Figure 9. Four Open FTP Hosts

Figure 9 shows four open FTP Host views—a VM host, an OS/2 host, a Windows NT host, and a UNIX host.

Once you have opened a view of an FTP Host, you can transfer files. Select the files with your mouse, then either drag them to the desktop or other folder to perform a get operation from the host, or drag a file from the desktop or other folder to the host to perform a put operation.

If you perform the drag from the remote host directly (i.e., without using the remote file object's "Get. . ." popup menu items), you will see no prompts or progress indicators. If, however, you initiate the get operation from the remote file object's "Get. . ." popup menu item, you will see the standard Workplace Shell progress dialog. The "Get. . ." popup menu option also allows you to use the Workplace Shell's built-in target resolution dialog to pick the target folder for the get operation, just as with any other menu-initiated operation on an object. You can perform an mget or mput operation by selecting multiple files for the operation.

When you perform get and put operations, the default transfer mode (either binary or ASCII) that is currently specified for the host is used. This value can be toggled from the FTP Host folder's context menu or from its Properties notebook.

You can directly transfer files between two open FTP Host folders that reside either on the same host or different hosts. This "proxy put" uses an FTP service that transfers the files without involving the local client. When proxy puts are performed, the transfer mode used is that of the target host; however, if the two hosts involved in a proxy put specify different, incompatible, default transfer modes, you should perform the transfer in two steps, first by dragging the desired file from one host to your desktop, then dragging the resulting file to the second host.

In addition, if you are given the appropriate access, you can delete files on the remote host either by selecting the "Delete from host. . ." context menu option on the remote file object or by dragging and dropping the remote file object onto the Shredder.

Other operations allowed on an FTP Host folder are pinging, querying the host's operating system, and querying the host's present working directory. You can select these operations from the remote host folder's context menu. The output of the ping operation estimates the access time to the host in KBytes per second transferred; that number indicates how long it will take to transfer given files to and from the host.

Once the initial connection with the host has been established, use the second page of the FTP Host folder's Properties notebook to specify the directory to which you want to change and to specify any path name that is valid on the remote host. For example, for OS/2 Warp hosts, you can specify a path name with a different drive letter than that of the initial login directory (even a drive letter that specifies a virtual drive or a LAN drive on the remote host), or you can simply specify a path name for a directory farther down in the file system.

In the event that the remote file system's contents may have changed since the FTP Host view was opened, you can use the FTP Host folder's "Refresh" menu option to refresh the folder view.

You will find it useful to configure FTP Host folder objects for the sites you most frequently visit. (Viewing them is only a double-click away!) During OS/2 Warp 4's development, FTP Host folders were used to continually transfer new DLLs to a test machine as a part of the daily development cycle. The new DLLs were simply dropped onto the preconfigured FTP Host folder whose "initial remote directory" was set to be the test DLL directory on the remote machine.

If you are a "connected consumer" or, in other words, mobile, you will find it convenient to place an FTP Host folder on your laptop that points to your office computer's desktop directory. That way, when you finish writing a report off site, you can simply drop it onto the preconfigured FTP Host folder, and it will pop up on your office computer's desktop!

Other applications of these new features will make it easier to work with different sources of information, coordinate team projects, and telecommute.

Integrating Java Applets with the Workplace Shell

Java promises to break the barriers between disparate systems, so that developers can create software that everybody, everywhere can execute. Java is installed as part of OS/2 Warp 4, and the Workplace Shell can help you take advantage of it. One of the types of objects that has been added to the Workplace Shell is the Java Applet Reference.

WebExplorer v1.2, which comes with OS/2 Warp 4, is not a Java-enabled browser. When a Java-enabled browser becomes available, then running Java applets through that Java-enabled browser will be as simple as visiting another Web site. Until then, it's not automatic, but if you follow a few steps, you'll be downloading, viewing, and playing some nifty stuff in no time. Even with a Java-enabled browser, the Java objects that have been added to the Workplace Shell will be useful to you for keeping favorite applets just a double-click away.

Running Java Applets via Java Applet Reference Objects

A Java Applet Reference object does what its name implies—it points to Java applets that reside on your local computer or on the World-Wide Web.

To create a Java Applet Reference object, you can drag a new one off the template in the Templates for Internet folder and drop it onto the desktop or any other folder, or you can select "Create another" from an existing Java Applet Reference object. Once created, you must configure a Java Applet Reference object (within its Properties notebook) to point to a particular applet and to specify values for parameters expected by the applet.

As Figures 10 and 11 show, two properties pages—the Applet page and the Reference page—control access to the applet. The Applet page allows you to enter into the object everything that is in the HTML description for the applet. The Reference page identifies the URL specification of the directory containing the applet's .CLASS file, as well as settings for how to access the Web via a proxy, if required (e.g., if your desktop resides inside a firewall).

Figures 10 and 11 show the required entries for configuring a Java Applet

Reference object's Properties notebook for the Blink demo applet that comes with the Java for OS/2 Development Kit (JDK). The Blink demo is an example of a Java applet whose class file resides locally on your computer. To access the many Java applets that reside on the Web, you can use a Java Applet Reference object to point to non-local applets as well as local applets.

The starting point for configuring a Java Applet Reference object is the HTML source for the applet. If the applet is local (e.g., one of the demos installed with the JDK), its .HTML file can be found in the directory with its .CLASS file. If the applet resides on the Web, its corresponding HTML file can be found in the HTML source for the Web page containing the applet. In the case of a non-local applet, you should load the page containing the applet into WebExplorer, view its HTML source, and look for the <applet> HTML tag. In either case, you must enter the information found in the applet tag into the Java Applet Reference object's Properties notebook.

Figure 12 gives an example of how to set up a Java Applet Reference object. It contains the HTML source for the Blink applet (which is located in the \javaos2\demo\blink directory, if you included the JDK as part of your OS/2 Warp 4 installation). The parts you need to enter into fields in the Java Applet Reference properties page are highlighted.

The tags labeled title, width, and height have direct counterparts in the Java Applet Reference object's Properties notebook. The Java class name is designated by the code= field of the <applet> tag; in this case, the class name is Blink. Specifying the .CLASS extension is optional.

For each param tag in the HTML source, create a line in the Parameters field on the Browser page of the Properties notebook. For example, if the HTML source includes the line <param name=X value=Y>, create a line in the Parameters field specifying X=Y. Enter applet parameters, one per line, into the notebook's entry field.

The Reference page of the Properties notebook is for the URL specification of the directory containing the .CLASS file for the applet. For local applets (those stored

on your local computer), the URL has a prefix of file:////. (Note that the file: prefix requires three forward slashes.) For applets residing on the Web, the URL has a prefix of http://. For the Blink demo applet (a local applet), the URL is file:///c:\javaos2\demo\blink/. The slashes here are significant. The mixed slashes in the URL are part of the legacy of the UNIX origins of the Web and the Internet. UNIX path names have forward slashes to separate directory and file names, while OS/2 Warp path names have backward slash separators.

If you are configuring a Java Applet Reference object for an applet that resides at a URL on the Web (say, http://www.foo.bar/html/applet.html), the URL field should be http://www.foo.bar/html/ (don't forget the trailing forward slash!).

If the applet resides on your local computer or inside a firewall, you don't have to enter anything in the other fields of the Reference page. If your desktop is located inside a firewall, but the applet resides outside the firewall, you will need to configure the "Proxy host" and "Proxy port" fields. In this case, set the "Proxy host" field to your network's proxy server, set the "Proxy port" field (e.g., 80), and check the "Enable proxy" checkbox.

Once you have configured your Java applet, you can easily change the parameters of the applet to tailor it to your particular tastes or to see how different parameter values affect the applet's execution.

Now to run the applet, just double-click on the Java Applet Reference object!

Running Java Applets via URL Objects

An alternate mechanism for running a Java applet is to launch the Java applet from a URL object. The Java applet viewer

(APPLET.EXE) is part of the Java for OS/2 runtime. The difference between this mechanism and the one described above is that Java Applet Reference objects enable you to vary the applet's parameters, whereas an ordinary URL object does not; however, using a URL object is simpler. So, if you do not need to vary an applet's parameters, you should use a URL object. This is the mechanism used to showcase the Java for OS/2 samples in the URLs for Samples folder (which resides in the Samples for Sun's Java Programming Environment folder).

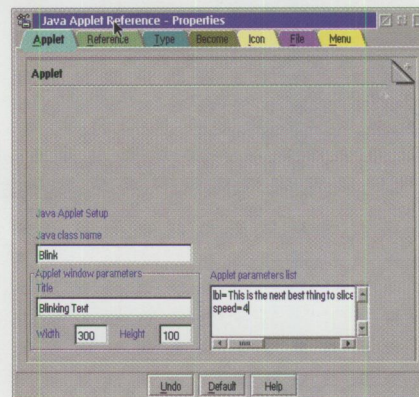


Figure 10. Java Applet Reference Object's Properties Notebook, Applets Tab

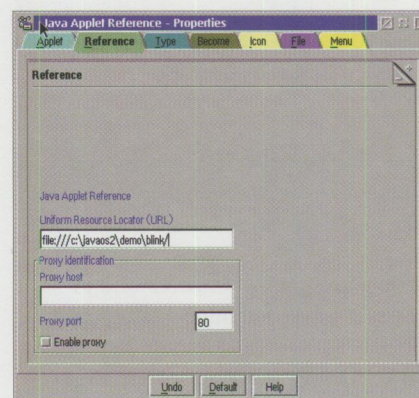


Figure 11. Java Applet Reference Object's Properties Notebook, Reference Tab

```
<title>Blinking Text</title>
<hr>
<applet code="Blink.class" width=300 height=100>
<param name=bl value="This is the next best thing to sliced bread!">
<param name=speed value="4">
</applet>
<hr>
<a href="Blink.java">The source.</a>
```

Figure 12. HTML Source Code for the Blink Java Applet

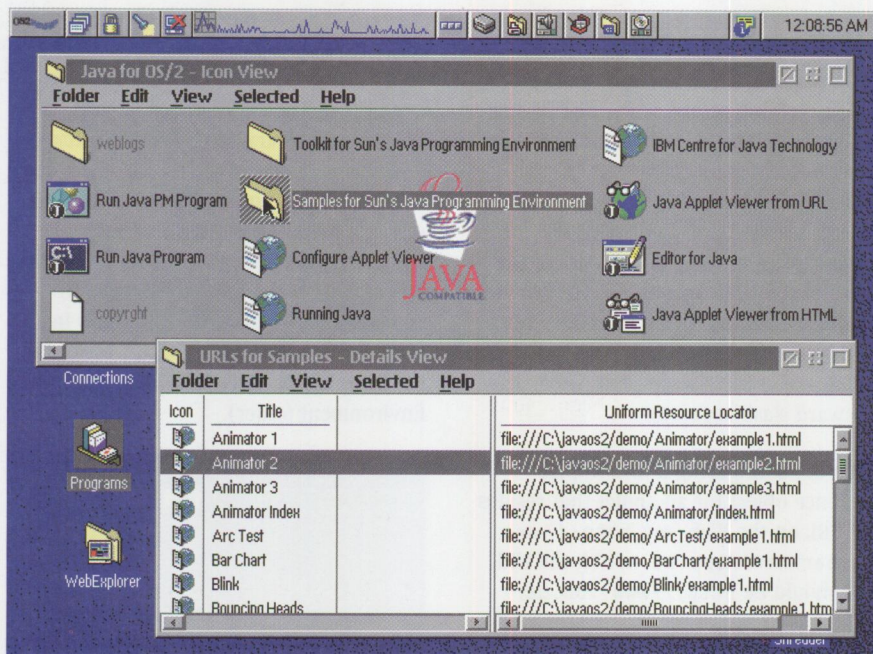


Figure 13. URLs for Samples Folder

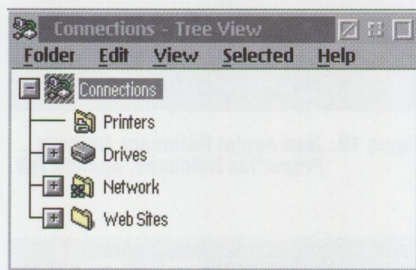


Figure 14. Connections Folder

Figure 13 shows the JDK samples folder with its URL objects configured to use the Java applet viewer.

If you are using WebExplorer v1.2 to browse a page containing a Java applet, you may not see an indication that there is a Java applet in the page (but if you had a Java-enabled browser, you would see it). In this case, you can scan the HTML by pulling down the File menu item and selecting "View file (HTML)." If the HTML source for the page you are viewing has `<applet>` in it, it contains a Java applet, and you can drag the page containing the applet from WebExplorer v1.2 to the desktop. A URL object will be created on the desktop.

Once you have created a URL object pointing to the Web page containing a Java applet in this manner, you can run the applet using the Java applet viewer. To do this, click mouse button 2 on the

URL object you just created to bring up its popup menu. Then select "Java applet viewer from URL" from the Open submenu of the URL object, which passes the URL on to the Java applet viewer and launches the applet.

A final note about the Java applet viewer: If your desktop resides inside a firewall, the viewer's own version of proxy/gateway information must be initialized once. To do this one-time configuration, go to an OS/2 command prompt and type:

```
cd ?:\javaos2\demo\tumblingduke
applet example1.html
```

where `?` is the drive on which Java was installed.

Any JDK demo will do. Once the applet viewer is open, click on the Applet menu bar item and select "Properties." Fill in the fields with the values required for you to access URLs outside your company's firewall. Select the Apply button, and you are ready to use URL objects to execute Java applets across the Web.

The Whole Network Computing Package in OS/2 Warp 4

The Connections folder on the desktop is a starting point for exploring many of OS/2 Warp 4's networking features. Figure 14 shows an open view of the Connections folder. Inside it, you will find the following folders:

- **Printers**—Contains local and network printers accessible from your desktop.
- **Drives**—Provides access to local, remote, and PCMCIA disk drives and directories. Any drive on your system that can be identified with a drive letter is found in the Drives folder and can be browsed with a Workplace Shell folder view.
- **Network**—Provides access to resources on the LAN to which your desktop is connected as a peer or client. LAN drives and directories are presented as regular Workplace Shell folders; you can open files and directories that reside on the LAN and drag and drop them to and from the desktop.
- **Web Sites**—Contains an assortment of more than 100 pre-configured URLs in the areas of Business & Shopping, Computing, Entertainment, Reference, Web Search Sites, IBM Web Pages, OS/2-Related Web Pages, Education, and News & Sports. Have fun surfing!

Enhancements

Installing the components for the Internet- and LAN-enabled Workplace Shell is simpler than ever. To use the FTP Host folders and URL objects, as well as to install WebExplorer v1.2, simply select TCP/IP as one of the components during installation, and be ready to enter your TCP/IP address, hostname, domain, router, and name server. Or accept the defaults, and enter your information later via the TCP/IP configuration object in the System Setup folder.

In another improvement over previous OS/2 Warp Connect packaging, the various pieces of the TCP/IP, File, and Print Client user interfaces have been integrated with the similar pieces from the base operating system. For example:

- The desktop's Assistance folder contains the help and reference information for all of the installed pieces, rather than distributing them in different places on the desktop.
- Configuration objects are centrally located in the System Setup folder, and a new Programs folder is the centralized location for selectively installed applications such as TCP/IP, multimedia, speech, Java Development Kit, etc.

- Selective install and selective uninstall utilities for all pieces of OS/2 Warp 4 are located in the new Install/Remove folder, which is in the System Setup folder.

Something for Everyone

The Internet-related features of the OS/2 Warp 4 desktop will appeal to different audiences.

- End users will immediately benefit from the built-in onramp to the Internet.
- Connected consumers can use these features whether they are connected directly to their organization's LAN or intranet or are connected via a modem from home.
- System managers responsible for setting up multiple OS/2 Warp clients and servers can programmatically create and configure instances of the new Internet-related Workplace Shell objects discussed above (via REXX or Win APIs).

Figure 15 shows a sample REXX script that creates a URL on the desktop pointing to a particular Web page. Note the `ClassName` variable, `WPUr1`.

To create an FTP Host folder, specify the `ClassName` `WPHost` and appropriate values (listed in Figure 16) for a `WPHost` setup string.

For more information about using REXX and Workplace Shell setup strings, consult the OS/2 Warp 4 Developer's Toolkit documentation.

New Setup Strings

Figures 16 and 17* list the new setup strings for the `WPUr1` and `WPHost` classes, respectively.

Application developers can programmatically create and configure URL and FTP Host folders using the Workplace Shell's object-oriented programming interface, also documented in the OS/2 Warp 4 Developer's Toolkit.

*Figures 16 and 17 are on pages 34 through 36

```
/* create a URL object via a REXX command file */
call RxFuncAdd 'SysLoadFuncs', 'RexxUtil', 'SysLoadFuncs'
call SysLoadFuncs

ClassName='WPUr1'
Title='OS/2 Warp Home Page'
Destination='<WP_DESKTOP>'
SetupString='LOCATOR=http://www.software.ibm.com/pspinfo/os2.html'
SetupString=SetupString||'OBJECTID=<NEW_URL>'

rc=SysCreateObject(ClassName, Title, Destination, SetupString)
if rc then
  say 'URL object creation succeeded'
else do
  say 'URL object creation failed'
end
exit
```

Figure 15. Sample REXX Program to Create URL Object

Merging the Desktop with the Internet

The features discussed in this article are a first step toward merging the desktop with the Internet and its resources. These Internet-related features, combined with the overall set of new features added to the Workplace Shell for OS/2 Warp 4, have created a desktop operating system

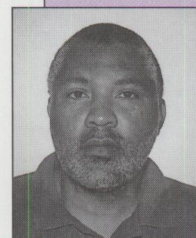
that is more fun to use, while remaining as solid as ever. OS/2 Warp 4 with its Internet-enabled Workplace Shell is a powerful vehicle for bringing the world to your fingertips.



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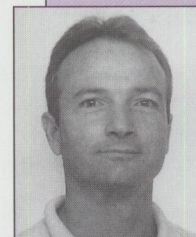
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Lanness

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Keyword	Value	Description
BROWSER=	<i>name pathname</i>	Specifies the executable that is invoked to display the Web page designated in the URL field. This field can be either a pathname or name of a browser in the PATH statement. EXPLORE.EXE (IBM WebExplorer v1.2) is the default browser for OS/2 Warp 4. You can also use the Java applet viewer (APPLET.EXE) to view Java applets with the URL object, but be sure to set the INTEGRATEDBROWSER= field to NO, because APPLETT.EXE does not understand URL-specific browser options, whereas EXPLORE.EXE does.
DEFAULTBROWSER=	<i>name pathname</i>	Sets the default value for BROWSER= for all URL objects. This value is placed in the "Path and file name" field on the Browser page of a URL object's Properties notebook when the Default pushbutton is pressed and when the URL object is first created. (See definition of BROWSER=.)
DEFAULTDISPLAYIMAGES=	YES NO	Sets the default value for DISPLAYIMAGES= for all URL objects. This value is reflected in the "Display images while loading" checkbox on the Web Page page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of DISPLAYIMAGES=.)
DEFAULTEMAILADDRESS=	<i>address</i>	Sets the default value for EMAILADDRESS= for all URL objects. This value is placed in the "Electronic mail address" field on the Server page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of EMAILADDRESS=.)
DEFAULTENABLEPROXY=	YES NO	Sets the default value for ENABLEPROXY= for all URL objects. This value is reflected in the "Enable proxy" checkbox on the Server page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of ENABLEPROXY=.)
DEFAULTENABLESOCKS=	YES NO	Sets the default value for ENABLESOCKS= for all URL objects. This value is reflected in the "Enable socks" checkbox on the Server page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created.
DEFAULTINTEGRATEDBROWSER=	YES NO	Sets the default value for INTEGRATEDBROWSER= for all URL objects. This value is reflected in the "Integrated browser" checkbox on the Browser page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of INTEGRATEDBROWSER=.)
DEFAULTLOADGRAPHICS=	YES NO	Sets the default value for LOADGRAPHICS= for all URL objects. This value is reflected in the "Load graphics" checkbox on the Web Page page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of LOADGRAPHICS=.)
DEFAULTNEWSSERVER=	<i>newsserver</i>	Sets the default value for NEWSSERVER= for all URL objects. This value is placed in the "News server" field on the Server page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of NEWSSERVER=.)
DEFAULTPALETTEAWARE=	YES NO	Sets the default value for PALETTEAWARE= for all URL objects. This value is reflected in the "Palette aware" checkbox on the Web Page page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of PALETTEAWARE=.)
DEFAULTPARAMETERS=	<i>parameters</i>	Specifies the value to be placed in the Parameters field on the Browser page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created.
DEFAULTPRESENTATIONMODE=	YES NO	Sets the default value for PRESENTATIONMODE= for all URL objects. This value is reflected in the "Presentation mode" checkbox on the Web Page page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of PRESENTATIONMODE=.)
DEFAULTPROXYGATEWAY=	<i>proxy</i>	Sets the default value for PROXYGATEWAY= for all URL objects. This value is placed in the "Proxy gateway" field on the Server page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of PROXYGATEWAY=.)

Figure 16. Setup Strings Understood by URL Objects (ClassName WPUrl) (continued on next page)

Keyword	Value	Description
DEFAULTSOCKSSERVER=	<i>socks</i>	Sets the default value for SOCKSSERVER= for all URL objects. This value is placed in the "Socks server" field on the Server page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of SOCKSSERVER=.)
DEFAULTWORKINGDIR=	<i>pathname</i>	Sets the default value for WORKINGDIR= for all URL objects. This value is placed in the "Working directory" field on the Browser page of a URL object's Properties notebook when the Default pushbutton is pressed or when the URL object is first created. (See definition of WORKINGDIR=.)
DISPLAYIMAGES=	YES NO	Specifies whether or not the browser should show the images as they are received from the server. YES (the default) shows the images as they are being constructed on the page. NO shows the page only after all images have been received from the server.
EMAILADDRESS=	<i>address</i>	Specifies a user's return e-mail address, which the browser requires when responding to newsgroup articles or other users via <code>mailto:</code> fields in Web pages. This should be the complete Internet e-mail address (e.g., <code>john.doe@ibm.net</code>). Leaving this field blank disables you from responding to <code>mailto:</code> fields and newsgroup articles.
ENABLEPROXY=	YES NO	Specifies whether or not to use the proxy server designated in the "Proxy gateway" field (on the Server page of a URL object's Properties notebook) to access the Web. YES uses the proxy server; NO does not.
INTEGRATEDBROWSER=	YES NO	Specifies whether the executable designated in the "Path and file name" field on the Browser page of a URL object's Properties Notebook has been integrated with the URL object. For example, IBM WebExplorer v1.2 has been integrated, so specify YES if you are using <code>EXPLORE.EXE</code> ; the Java applet viewer is not integrated, so specify NO if you are using <code>APPLET.EXE</code> . Other browsers may not be integrated with the URL object; consult your user manual or the browser's manufacturer to be sure. The default for this field is YES. Specifying NO in this field disables (grays out or turns off) some browser parameters for the URL object (e.g., "Palette aware," "Presentation mode," "Load graphics," etc.), because a non-integrated browser does not understand these command-line arguments.
LOADGRAPHICS=	YES NO	Specifies whether graphics and images should be loaded on the Web page specified by this URL. If the link being used to browse the Web is slow, or if the user is interested in only the textual aspects of the Web page, then viewing the pages without graphics speeds up page downloads. YES (the default) loads graphics; NO does not.
LOCATOR=	<i>url</i>	Specifies the URL (e.g., <code>http://your.company.com</code>) or IP address (e.g., <code>http://123.45.67.8</code>) that uniquely identifies each Web page. The keywords LOCATOR= and URL= can be used interchangeably.
NEWSSERVER=	<i>news</i>	Specifies the hostname (e.g., <code>your.company.com</code>) or IP address (e.g., <code>123.45.67.8</code>) of the server that handles newsgroups for your company or account.
PALETTEAWARE=	YES NO	Specifies whether the executable designated in the "Path and file name" field on the Browser page of a URL object's Properties notebook is able to use the OS/2 palette to display its pages and images. The default for this field is YES. If you encounter problems with the colors when displaying Web pages with other browsers, try NO in this field.
PARAMETERS=	<i>params</i>	Specifies strings to include in the command-line invocation of, and to pass to, the executable designated in the "Path and file name" field on the Browser page of a URL object's Properties notebook when that executable is started. If the browser being used permits optional parameters, this is where they should be declared.
PRESENTATIONMODE=	YES NO	Specifies whether or not the browser should be placed into full-screen (non-windowed) mode generally used for presentations. YES tells the browser to use presentation mode; NO (the default) tells the browser not to use presentation mode.

Figure 16. Setup Strings Understood by URL Objects (ClassName WPUrl) (continued on next page)

Keyword	Value	Description
PROXYGATEWAY=	<i>proxy</i>	Specifies the URL (e.g., <code>http://your.company.com/</code>) or IP address (e.g., <code>http://123.45.67.8/</code>) of the server that handles the interface to the Web for your company or account. The proxy gateway is the firewall that insulates a company's computers from the outside world. A proxy port can also be appended to the end of the proxy string if the proxy server supports it (e.g., <code>http://your.company.com:80/</code>). The slash at the end is required. Contact your system administrator for details about using a proxy gateway server on your system.
SOCKSSERVER=	<i>socks</i>	Specifies the hostname (e.g., <code>your.company.com</code>) or IP address (e.g., <code>123.45.67.8</code>) of a server that provides the browser with a WINSOCK interface to the Web. Contact your system administrator for details about using a socks server on your system.
URL=	<i>url</i>	Specifies the URL (e.g., <code>http://your.company.com</code>) or IP address (e.g., <code>http://123.45.67.8</code>) that uniquely identifies each Web page. The keywords URL= and LOCATOR= can be used interchangeably.
WORKINGDIR=	<i>pathname</i>	Specifies, if required, the OS/2 Warp working directory for the executable designated in the "Path and file name" field on the Browser page of a URL object's Properties notebook. A working directory is required if the specified browser requires DLLs or other files from a directory that is not specified in the LIBPATH or another environment variable.

Figure 16. Setup Strings Understood by URL Objects (ClassName WPUrI)

Keyword	Value	Description
HOSTNAME=	<i>hostname</i>	Sets the hostname to access via this FTP Host folder, e.g., <code>ftp.software.ibm.com</code> .
USERNAME=	<i>username</i>	Sets the username to supply when accessing a hostname via this FTP Host folder.
PASSWORD=	<i>password</i>	Sets the password to use to access a particular host with a particular username. This value is not required when the object is created. If no password is specified, you are prompted to enter a password after the host is accessed. When they are furnished, passwords are stored in an encrypted form.
ACCOUNT=	<i>account</i>	Sets the account value to be used when accessing a particular hostname and username via this FTP Host folder. This value is required only when the FTP server being accessed maintains account information for host accesses.
FILETRANSFERTYPE=	ASCII BINARY	Sets the default file transfer mode for an FTP Host folder. The default is BINARY.
REMOTEDIR=	<i>pathname</i>	Used as the initial working directory when connecting to a host via the specified FTP Host folder (e.g., <code>e:\public\bin</code> or <code>/usr/johndoe/work</code> or <code>pub</code>). This path specification's format must be understood by the remote host's operating system, and the username and account must have permission to access this directory on the remote host.
LOCALDIR=	<i>pathname</i>	Used as the default download directory for <code>get</code> operations via the FTP Host folder whenever a download directory is not explicitly indicated.
INCLUDE=	<i>pattern</i>	Used to filter remote files and directories from the FTP Host folder's open views. The syntax of the pattern must be understood by the remote host's operating system, e.g., <code>*.exe</code> .
HOSTOSTYPE=	UNIX OS2 WIN VM OTHER	Specifies the type of operating system (OS) running on the remote host. When the host OS type is not explicitly specified, the FTP Host folder tries to determine it. This type is used for determining how to display the contents of the remote directory in a folder view. In general, setting an explicit value for HOSTOSTYPE is not required; however, it may be necessary to override the default detected type for some remote hosts (e.g., hosts that do not reply to OS type requests via their FTP servers). <i>Note:</i> the UNIX type is used to include OSs that use similar file specification syntax and directory formatting information. When OTHER is specified, or when a host OS type cannot be determined, only files will be displayed in the FTP Host folder view (i.e., the equivalent of an <code>ls</code> operation will be shown, as opposed to a <code>dir</code> operation).

Figure 17. Setup Strings Understood by FTP Host Folders (ClassName—WPHost)

The New Workplace Shell in OS/2 Warp 4

Many new features and enhancements are in OS/2 Warp 4's Workplace Shell. Some of them are obvious, such as the new colors, fonts, icons, and bitmaps used for the desktop, while others are more subtle functional changes. This article discusses the new Workplace Shell's major features in detail.

The Workplace Shell, the outer layer of OS/2 Warp, provides easy access to programs, utilities, and system operations. The Workplace Shell has evolved from its humble beginnings as a Program Selector in OS/2 Standard Edition 1.0 to a graphical, object-oriented user interface introduced in OS/2 Warp. Now, along with OS/2 Warp 4, OS/2's major new release, the Workplace Shell continues to improve, with many new features and enhancements.

A New Look

In OS/2 Warp 4, the desktop, folders, and windows all look different from previous versions of OS/2.

As Figures 1 and 2 illustrate, the standard Workplace Shell objects are reorganized into a different set of folders to make it easier to find the objects and to make the desktop less cluttered. The redesigned standard controls used to construct dialogs and other windows give OS/2 Warp 4 a more three-dimensional look. And the icons for the standard Workplace Shell objects have been redrawn.

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Rick Efruss
Brad Fraley
Peter Magid
Ann Mizell Robinson
Ira Schneider
Les Wilson
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The Properties notebook, formerly called the Settings notebook, is totally redesigned (see Figure 3). The most frequently used pages are now at the front of the notebook. The fields within the pages are moved around to fit the new notebook

orientation. And the notebook control is redrawn, with a set of colored tabs at the top representing a set of dividers in a filing cabinet.

The open views of a folder also look different (see Figure 4). From a menu bar below the folder's title, you can select pulldown menus to perform the functions that were formerly hidden in the folder's system menu. These functions are grouped so that each pulldown menu is relatively small, making it easier to find the option you want to invoke. The streamlined popup menu for the folder makes it easier to find the options on the menu. The folder's title bar now contains a close button, enabling you to close the view by just single-clicking on this button instead of double-clicking on the system menu icon.

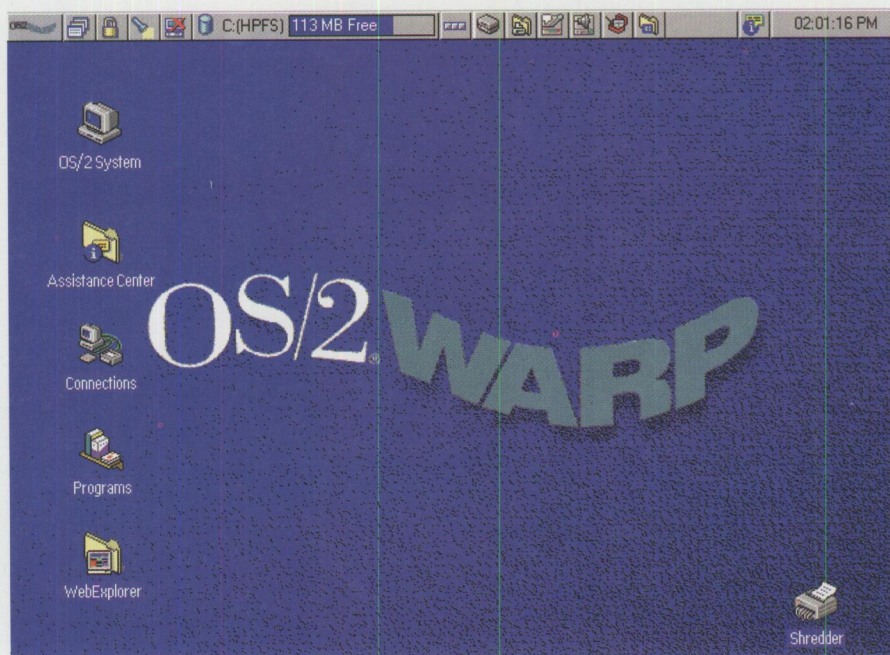


Figure 1. OS/2 Warp 4 Desktop

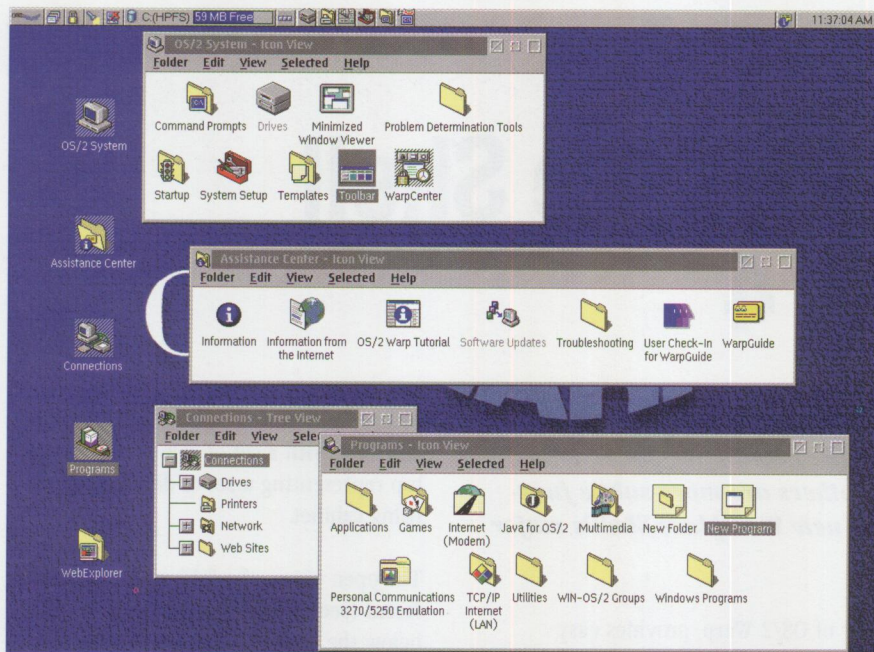


Figure 2. Standard Folder Contents

Fonts used for icon labels, window text, title bar text, and menu text have been replaced to make the text on the desktop easier to read.

New default colors for the desktop background and folder elements produce a more pleasant-looking user interface. Also, OS/2 Warp 4 comes with a new set of background bitmaps, including the new default desktop and lockup backgrounds.

Across the top of the screen in Figure 1 is the WarpCenter, a new feature in OS/2 Warp 4. WarpCenter (discussed later) lets you conveniently access frequently used objects and tasks.

Scheme Palette

OS/2 Warp 4's Scheme Palette looks very similar to the Scheme Palette for OS/2 Warp 3.0; however, looks can be deceiving.

The OS/2 Warp 4 Scheme Palette, shown in Figure 5, has fewer predefined schemes, each containing sets of complementary colors as well as new system fonts. For some schemes, the overall theme is emphasized with a desktop background bitmap and an appropriate sound scheme.

The OS/2 Warp 4 scheme contains the colors, fonts, bitmaps, and sounds that you see when you first install OS/2 Warp 4. If,

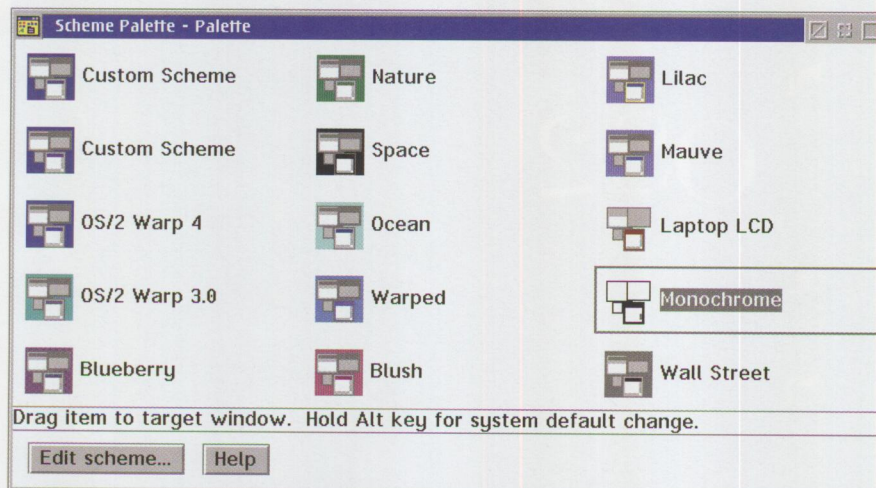


Figure 5. Scheme Palette

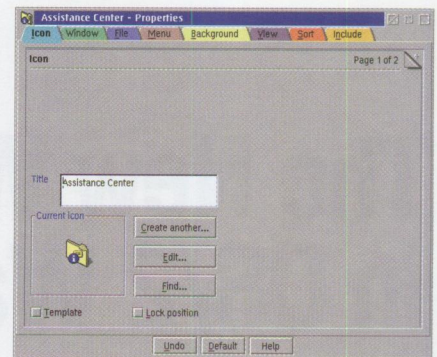


Figure 3. Properties Notebook

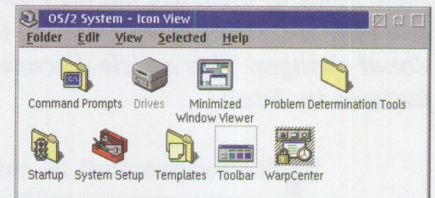


Figure 4. The New Folder Look

after customizing the palette, you want to return to the default setup, just hold the Alt key and drag and drop the OS/2 Warp 4 scheme onto the desktop. Other schemes include:

- *OS/2 Warp 3.0*—Colors, fonts, and bitmaps that were installed with OS/2 Warp 3.0.
- *Laptop LCD*—Colors that look good on a laptop computer.
- *Monochrome*—Black, white, and shades of gray (suitable for use on a monochrome display).
- *Custom*—For you to customize any way you desire. The Custom schemes are not the same as the OS/2 Warp 4 scheme—the Custom schemes contain a background bitmap for folders.
- *Nature*—Desktop background bitmap of a forested hillside near a lake, with coordinating colors for objects and text that show up well against this background. The Garden sound scheme is associated with the Nature scheme.
- *Space*—Desktop background bitmap of a planet lit up by a nearby star, with coordinating colors to make objects and text easy to see. It uses the Space sound scheme.
- *Ocean*—Desktop background bitmap of a rocky waterfront that blends into the sky in the horizon. Complementary

colors and fonts make objects and text easy to read. The associated Ocean sound scheme completes the theme.

- *OS/2 Warp 4*—Desktop background bitmap of OS/2 Warp, the OS/2 Warp 4 default colors and fonts for objects and text, and the desktop sound scheme.
- *Warped*—Similar to the OS/2 Warp 4 scheme, except that it has a desktop background bitmap of a blue and white swirl.
- *Wall Street*—Desktop background bitmap of green marble, with coordinating colors for objects and text.
- *Blueberry, Blush, Lilac, and Mauve*—Corresponding colors for the desktop background, with colors for objects and text selected to fit with the color theme of the scheme.

The Scheme Palette contains a new customizable element, a sound scheme. (Refer to Figure 6.) You can now choose a coordinated set of system sounds. Sound schemes are discussed in the “Sound Schemes” section later in this article.

Drag-and-Drop Scheme Editing

So much for cosmetic changes. Remember we said that with the Scheme Palette, looks are deceiving? The Scheme Palette in OS/2 Warp 4 can now accommodate drag-and-drop when editing a scheme. This means you can open the Edit Scheme dialog box for a scheme and drop colors from the Color Palette, fonts from the Font Palette, or even schemes from the Scheme Palette into the sample window.

For example, suppose you like most of the OS/2 Warp 3.0 scheme but want to change a few things and retain the original scheme in case you decide to remove your changes. In OS/2 Warp 4, you can do this. Open the Scheme Palette and double-click on one of the Custom Schemes to open the Edit Scheme dialog box. Using mouse button 2, drag the icon for the OS/2 Warp 3.0 Scheme Palette into the middle of the sample window in the Edit Scheme dialog box. When you release mouse button 2, the Custom Scheme you were editing takes on all of the characteristics of the OS/2 Warp 3.0 scheme.

Suppose you want to change the background color for folders to cyan. Select one of the color palettes (Solid Color Palette or Mixed Color Palette) from the

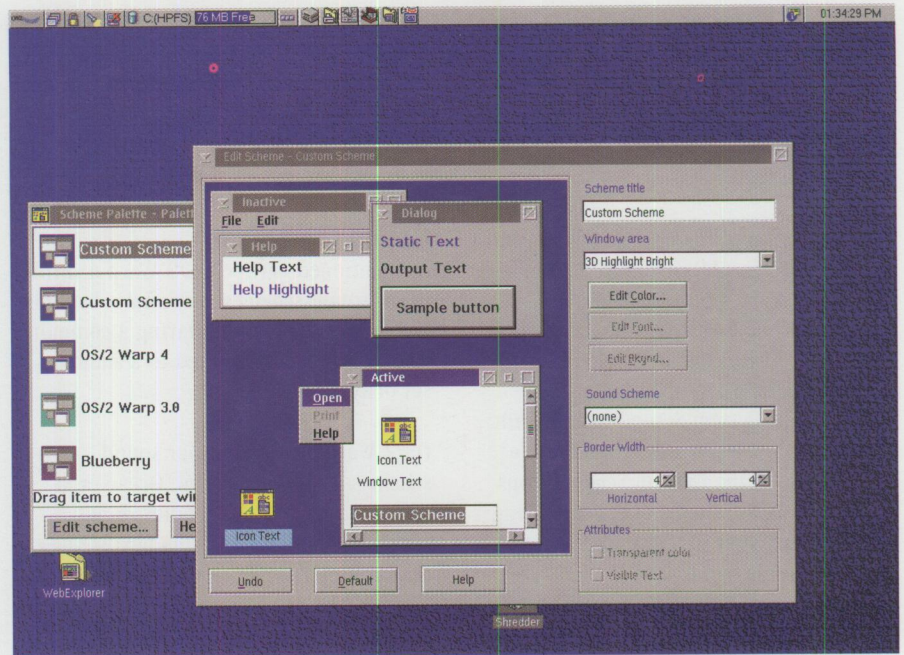


Figure 6. Edit Scheme Dialog

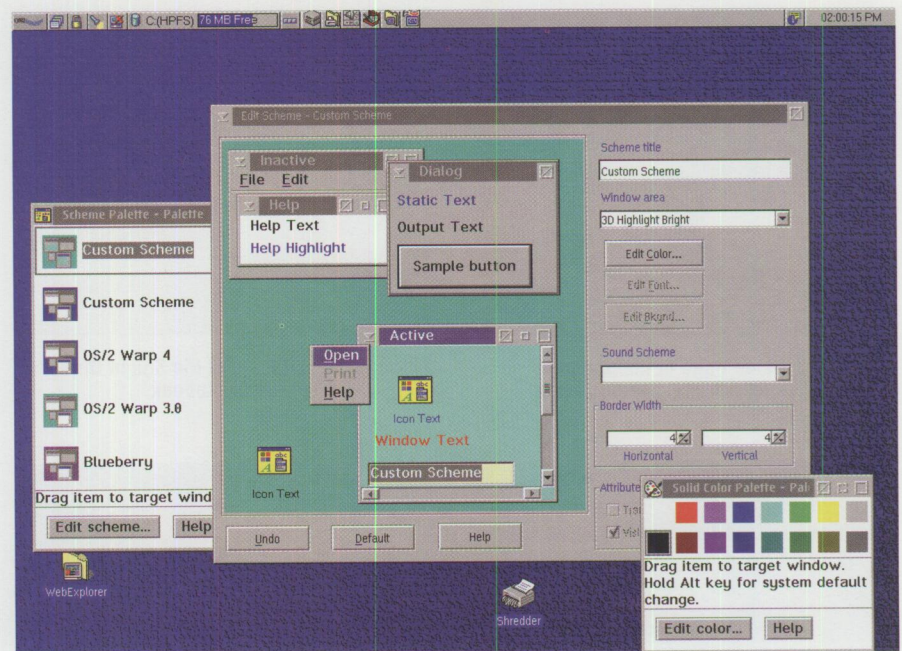


Figure 7. Custom Scheme After Dragging Cyan from Color Palette to Folder Sample

System Setup folder, and drag the color you want over the picture of the folder in the Edit Scheme dialog. When you drop the color, it becomes the background color of the sample folder in the scheme (see Figure 7).

When you drop a color onto an element in the sample window, you change the background color for that element. If you hold the Ctrl key while dropping the color onto an element in the sample window,

you change the foreground color for that element. For example, if you drop a color onto the picture of the sample folder while holding the Ctrl key, you change the Window Text color. If you drop a color onto the text below the icon in the sample folder (that is, onto the label “Icon Text”) while holding the Ctrl key, you change the Folder Icon Text color.

Similarly, you can open the Font Palette and drag a font over one of the sample

windows to change the font for that window. However, because the Scheme Palette doesn't have a font corresponding to the text within a dialog box, dropping a font over the Dialog sample window has no effect.

You can even use this drag-and-drop facility to migrate an old, customized scheme from OS/2 Warp 3.0 to OS/2 Warp 4. Open the Scheme Palette in the System Setup folder within your Previous Desktop folder. Then open the Scheme Palette in the System Setup folder within your new OS/2 Warp 4 desktop. Double-click on one of the Custom Scheme icons to open the Edit Scheme dialog box. Drag the icon from your old Scheme Palette into the sample window in the Edit Scheme dialog box. The Custom Scheme now contains a copy of your old scheme. You can change the Scheme title to denote

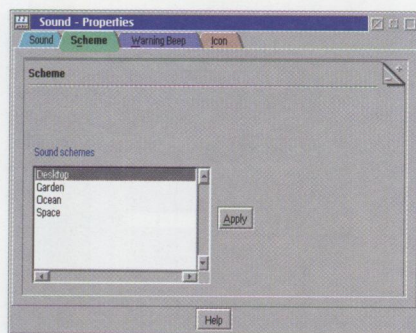


Figure 8. Scheme Page of the Sound Object's Properties Notebook

that this is now your customized scheme. You can make any changes you want to it, then drag it to the (current) desktop while holding the Alt key. You have now copied your old customized scheme to your OS/2 Warp 4 system.

Sound Schemes

As mentioned earlier, OS/2 Warp 4 introduces sound schemes. A *sound scheme* is a collection of sounds sharing a common theme that can be applied to a standard set of system events.

OS/2 Warp 4 provides four sound schemes: Desktop, Garden, Ocean, and Space. Desktop is the default sound scheme; it contains the standard sounds that are active when you install OS/2 Warp 4. The other sound schemes contain sets of sounds that coordinate with the theme of a scheme palette:

- The *Garden* sound scheme associates with the Nature scheme palette. Its sounds include frogs, crickets, birds, hedge clippers, and a squeaking gate.
- The *Ocean* sound scheme coordinates with the Ocean scheme palette and has sounds such as seagulls, boat horns, and rolling waves.
- The *Space* sound scheme is appropriate for the Space scheme palette. Its weird sounds suggest science-fiction special effects.

To see which sound schemes are installed, go to the System Setup folder and open the Sound object. Select the Scheme tab (see Figure 8) to view a list of sound schemes that have been installed in the system. You can apply them by highlighting the desired sound scheme and clicking on the Apply pushbutton.

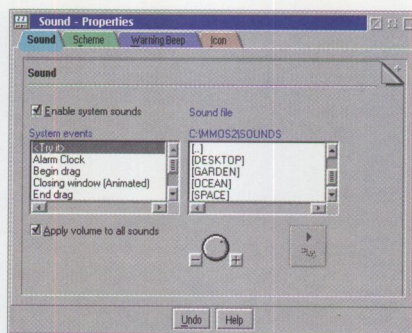


Figure 9. Sound Page of the Sound Object's Properties Notebook

To hear a sample of the individual sounds that make up a sound scheme, select the Sound tab. (Refer to Figure 9.) In the System Events list, check that the <Try it> entry is highlighted. Then examine the Sound file list. The Sound file list is initially set to the system sounds directory (for example, C:\MMOS2\SOUNDS) and lists all the files and subdirectories within the system sounds directory. Scroll down the Sound file list until you see entries for the system sound schemes, which are located in subdirectories whose names correspond to the scheme names. (For example, the sounds for the Desktop sound scheme are located in the subdirectory \MMOS2\Sounds\Desktop and the entry in the Sound file list is labeled [Desktop].) Double-click on the subdirectory entry to get a list of files in that subdirectory. Then either double-click on an entry to play the sound, or highlight the entry and select the Play pushbutton.

To add your own sound scheme to the system, first decide which of your sound files to assign to the system events. The system events that can be assigned sounds are listed in Figure 10.

After you assign a collection of sounds to the system events, your next step is to install this collection by updating the system initialization file.

Event Number	Event Name	Event Description
0	Warning	You select a disabled item or receive a warning message
1	Information	You receive an information message
2	Error	You receive an error message
3	Open Window	You open an animated window
4	Close Window	You close an animated window
5	Drag	You pick up an object
6	Drop	You drop an object
7	System Startup	You start the system
8	System Shutdown	You shut down the system
9	Shred	You drop an object on the shredder
10	Lockup	You lock the desktop
11	Alarm Clock	The time of an alarm setting is reached
12	Printer Error	You receive a printer error message

Figure 10. System Events

One method of updating the system INI file is to use a REXX script such as the sample in Figure 11. To use the REXX script, follow the steps in Figure 12.

An alternate technique for updating the system INI file is to make a copy of the OS2SYS.RC file, add your changes for your sound scheme, and use MAKEINI.EXE to regenerate the system INI file when you have the system in Maintenance Mode at a command prompt.

WarpGuide: The User Interface Agent

For years now, the graphical user interface (GUI) and object-oriented user interface (OUI) have raised the intuitiveness of the human/machine interface. For some users, the abstraction of an electronic desktop, menus, windows, and buttons are clear and easy to deal with; for others, they aren't. The use of this metaphor has been successful but only to a point.

Enter the role of the user *interface agent*. The computer familiarity gap among the user population is broadening; it now includes users who are not as adept at dealing with interface abstractions. This has made the job of designing user interfaces more difficult.

One expensive trend in user interface design is to create new, simpler, but less functional, interfaces. Another trend is to use an interface agent to narrow the gap between an interface's technology and a user's ability. The new Workplace Shell incorporates both of these techniques in a user interface agent named WarpGuide.

Theory of Design

Designed and developed jointly with an IBM Almaden (California) research team, WarpGuide is based on intelligent agent research at both IBM and Stanford University. It is designed to fill the gap between user and user interface by compensating for a variety of user differences such as experience, cognitive styles, learning modes, and control preferences. WarpGuide is based on four principles:

- Proaction
- Adaptation
- User interface annotation
- User interface substitution

```

/*-----*/
/* SetSound.CMD */
/* Sets up a sound scheme by writing the appropriate */
/* entries into the specified system INI file. */
/* Syntax: */
/* SetSound <filespec> */
/*-----*/
/* Set the sound scheme variables */
/*-----*/
Title = 'MySoundScheme'
KeyName = 'PM_SOUNDS_MYSOUNDS'

Event.0 = 13
Event.1 = '?:\mmos2\sounds\mysounds\my_warn.wav'
Event.2 = '?:\mmos2\sounds\mysounds\my_info.wav'
Event.3 = '?:\mmos2\sounds\mysounds\my_err.wav'
Event.4 = '?:\mmos2\sounds\mysounds\my_opnw.wav'
Event.5 = '?:\mmos2\sounds\mysounds\my_clsw.wav'
Event.6 = '?:\mmos2\sounds\mysounds\my_drag.wav'
Event.7 = '?:\mmos2\sounds\mysounds\my_drop.wav'
Event.8 = '?:\mmos2\sounds\mysounds\my_sstr.wav'
Event.9 = '?:\mmos2\sounds\mysounds\my_ssht.wav'
Event.10 = '?:\mmos2\sounds\mysounds\my_shrd.wav'
Event.11 = '?:\mmos2\sounds\mysounds\my_lock.wav'
Event.12 = '?:\mmos2\sounds\mysounds\my_alck.wav'
Event.13 = '?:\mmos2\sounds\mysounds\my_prer.wav'

/*-----*/
/* Get the input arguments */
/*-----*/
Parse Upper Arg fSpec

/*-----*/
/*Check if the REXX external functions are registered. */
/*If not, then register them so we can use them */
/*-----*/
if RxFuncQuery('SysLoadFuncs') then
do
Call RxFuncAdd 'SysLoadFuncs', 'RexxUtil', 'SysLoadFuncs'
Call SysLoadFuncs
end

/*-----*/
/* Set up the filespec for the INI file */
/*-----*/
if fSpec = "" then
do
IniFile = "SYSTEM"
end
else
do
/*-----*/
/* Parse the input filespec into its component parts */
/*-----*/
tDrive = filespec("drive",fSpec)
tPath = filespec("path",fSpec)
tName = filespec("name",fSpec)

/*-----*/
/* Get the local drive and current directory */
/*-----*/
LocalCurDir = directory()
LocalDrive = substr( LocalCurDir, 1, 1 )
lDrive = LocalDrive||':'

LocalDir = substr(LocalCurDir, 3)
lDir = LocalDir||'\

/*-----*/
/* Set the INI file spec */
/*-----*/
if tDrive = "" then
tDrive = lDrive

if tPath = "" then
tPath = lDir

IniFile = tDrive||tPath||tName
end

```

Figure 11. Sample REXX Script for Installing a Custom Sound Scheme (continued on next page)

```

/*-----*/
/* Set the keys for the new sound scheme we're adding */
/*-----*/
results = SysIni( IniFile, "PM_SOUND_SCHEMES_LIST", Title, KeyName )
if results = 'ERROR:' then
do
  say "SetSound ERROR: Unable to set PM_SOUND_SCHEMES_LIST
    in the INI file"
  exit
end
else
do
  say "SetSound: The following keywords have been set in
    the INI file:"
    IniFile
  say "SetSound: PM_SOUND_SCHEMES_LIST , " Title " , " KeyName
end
/*-----*/
/* For the KeyName, set the sounds for the events */
/*-----*/
do i=1 to Event.0
  Type = i-1
  results = SysIni( IniFile, KeyName, Type, Event.i )
  if results = 'ERROR:' then
do
  say "SetSound ERROR: Unable to set Type" Type "for the file"
    Event.i "in the INI file"
end
else
do
  say "SetSound: System Event Type" Type " = " Event.i
end
end
exit 0
/*-----*/
/* End of REXX script */
/*-----*/

```

Figure 11. Sample REXX Script for Installing a Custom Sound Scheme

To be *proactive*, WarpGuide automatically displays messages in cue cards when it thinks you have fallen below an expected level of performance. It does this so you don't have to ask or search for help. As you become more familiar with an interface, WarpGuide becomes less proactive. Finally, when it thinks you are familiar with an interface, it just puts a button on the title bar to indicate that cue cards are available.

Figure 13 shows a sample cue card and also shows the WarpGuide button in the top left corner of the Find Objects window.

To be *adaptive*, WarpGuide tracks what you do and keeps a model of your activity with an interface. As you gain experience with that interface, WarpGuide changes its cue cards and becomes less and less proactive. In other words, WarpGuide adapts

the level of detail it gives you and the way it presents information to you, according to your skill level. If you are a novice user, WarpGuide helps you learn gradually and simply when you use an interface; if you are a skilled user, WarpGuide gives you more advanced assistance than it gives a novice user doing the same task.

User interface annotation is the technique that enables WarpGuide to communicate its messages by drawing them atop the user interface on the display screen. In this manner, WarpGuide provides guidance at the same time that the user interface is present on the desktop. This keeps your attention on the task at hand.

User interface substitution is another technique that WarpGuide uses to provide an alternate user interface for some tasks in the user interface. These simplified interfaces reduce a task's complexity. To

do this, WarpGuide uses a special notebook-like interface that provides step-by-step guidance through a task. This is most useful for tasks where the benefits of simplicity and successful performance are more important than operational power and flexibility. (For an example, see Figure 14.)

How WarpGuide Works

Using these principles, WarpGuide can help users who have different thinking styles, analytical abilities, and computer experience to understand and use the abstractions in the Workplace Shell. And, because WarpGuide can adapt, it changes its behavior and guidance information as you gain proficiency.

Think of WarpGuide as a task mentor. It knows about hundreds of individual things in the Workplace Shell and uses cue cards to explain:

- What things are
- How they work
- What certain options mean
- Ways to use something that might not be obvious

Then, building on its knowledge, WarpGuide is set up to guide you through a dozen or so tasks such as installing a device driver, configuring WebExplorer servers, customizing a system, and creating a printer.

Over time, WarpGuide automatically changes the way it assists you with tasks. The first time you do something that WarpGuide knows about, it asks for your experience level (see Figure 15). WarpGuide uses your response to determine the technique to use and type of information to give you.

At the novice level, WarpGuide automatically puts up cue cards, highlights the part of the user interface you are using, and shades out unrelated parts that may be distracting. Information in the cue cards at this level is very basic and concrete. As you get better at a certain interface, WarpGuide stops the shading and automatic cue cards; eventually it just shows its "hailing indicator," the WarpGuide button, in the title bar. At this level, assistance for a particular part of an interface is just a click away.

A WarpGuide folder located within the Assistance Center folder on the OS/2 Warp 4 desktop (shown in Figure 16) contains several Guidance objects that provide access to some of the tasks that WarpGuide knows about. The Printer and System Customization guidance objects employ user interface substitution. The others start the Workplace Shell user interface for a particular task.

In OS/2 Warp 4, WarpGuide is an active participant in the user interface. For learning new or infrequently done tasks, WarpGuide transforms the traditional assistance technologies of "Help System" into an integrated "Guidance" system. In turn, this brings the Workplace Shell another step closer to a system that can dynamically adapt to users and achieve a higher and more powerful form of human/computer interaction.

WarpCenter

Capitalizing on IBM's acquisition of Lotus, OS/2 Warp 4 incorporates an improved version of the Lotus SmartCenter as the OS/2 WarpCenter.

Similar to the Toolbar (originally called LaunchPad in OS/2 Warp 3.0), the WarpCenter provides a convenient place to access frequently used objects and system actions. For instance, there are buttons for Window List, Lockup, Find, and Shutdown. In the WarpCenter, groups of objects are organized in a series of trays through which you can rotate. You can access options in the WarpCenter via its popup menu. WarpCenter objects also have popup menus that allow access to their actions and options.

You can configure the WarpCenter either at the top (the default) or bottom of the screen. The default option prevents Presentation Manager windows and the desktop from overlaying the WarpCenter space on the screen. If you prefer, you can let the WarpCenter float and have it rise to the surface when the mouse enters its logical window area. Figure 1 shows the WarpCenter at the top of the screen.

The WarpCenter provides several new functions that did not exist in the Toolbar:

- The Window List displays as a menu instead of a separate window. You can

1. Get a copy of the system INI file. For example, you could use the following commands:

```
C:
CD \OS2
ATTRIB -S -R OS2SYS.INI
COPY OS2SYS.INI D:\TMP\OS2SYS.INI
```

2. Edit the sample REXX script and set the keywords for your sound scheme:

```
Title = 'MySoundScheme'
Event.1 = '?:\mmos2\sounds\mysounds\my_warn.wav'
Event.2 = '?:\mmos2\sounds\mysounds\my_info.wav'
Event.3 = '?:\mmos2\sounds\mysounds\my_err.wav'
Event.4 = '?:\mmos2\sounds\mysounds\my_opnw.wav'
Event.5 = '?:\mmos2\sounds\mysounds\my_clsw.wav'
Event.6 = '?:\mmos2\sounds\mysounds\my_drag.wav'
Event.7 = '?:\mmos2\sounds\mysounds\my_drop.wav'
Event.8 = '?:\mmos2\sounds\mysounds\my_sstr.wav'
Event.9 = '?:\mmos2\sounds\mysounds\my_sshw.wav'
Event.10 = '?:\mmos2\sounds\mysounds\my_shrd.wav'
Event.11 = '?:\mmos2\sounds\mysounds\my_lock.wav'
Event.12 = '?:\mmos2\sounds\mysounds\my_alck.wav'
Event.13 = '?:\mmos2\sounds\mysounds\my_prer.wav'
```

3. Run the sample REXX script on the copy of the system INI file:

```
D:
CD \TMP
SETSOUND D:\TMP\OS2SYS.INI
```

4. Shut down OS/2 Warp 4 and reboot.

5. When "OS/2" appears in the upper left hand corner of the screen, press Ctrl+Alt+F1 to start Maintenance Mode.

6. When the Maintenance Mode screen is displayed, press F2 to start a command prompt.

7. Copy your updated system INI file to the system directory:

```
C:
CD \OS2
COPY OS2SYS.INI OS2SYS.BAK
COPY D:\TMP\OS2SYS.INI
```

8. Type PMSHELL at the command prompt to start the Workplace Shell.

Figure 12. Steps for Using a REXX Script to Update the System INI File

still access the Window List using either Ctrl+Esc or the desktop menu.

- Folder objects display their contents as menus instead of opening the folder window. If you want to open the folder into a view, you have to use the folder's popup menu.
- An OS/2 Warp button lets you use menus to navigate the contents of the desktop.
- A monitor area allows you to view your system activity level and to keep an eye

on the amount of space available on each of your drives. You cycle through each of the monitors by repeatedly clicking on the monitor area with mouse button 1.

- A second area allows laptop users to cycle through displays of the current time, current date, a timer, and a battery meter.

The OS/2 Warp 3.0 Toolbar is still available in the OS/2 System folder. If you want to reconfigure the system so that

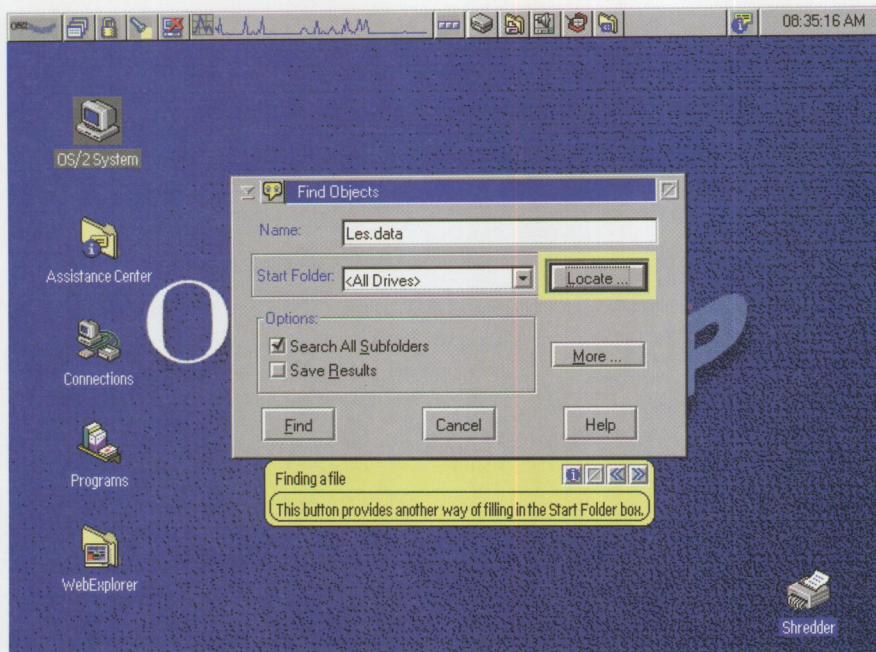


Figure 13. WarpGuide Providing Novice-Level Guidance

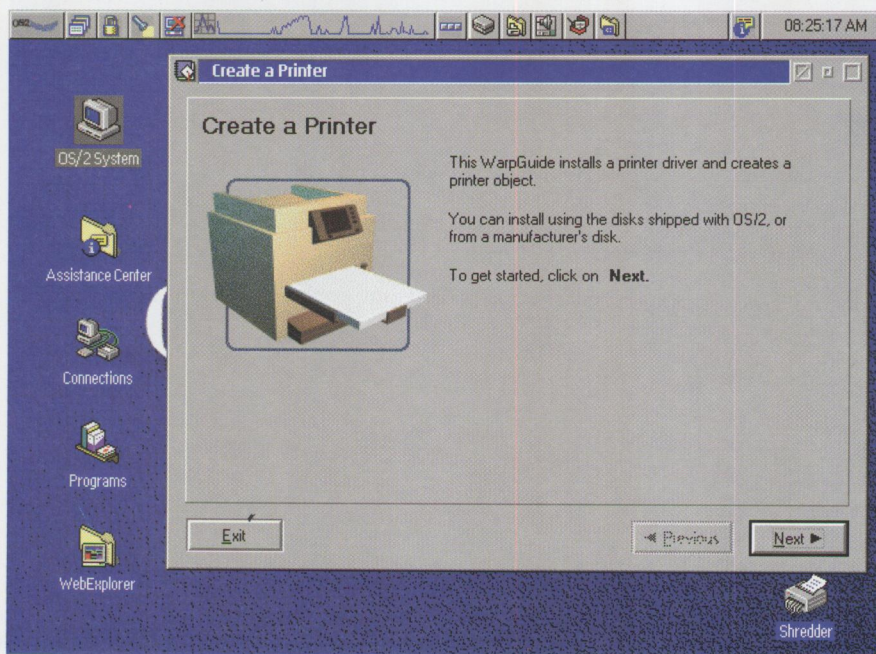


Figure 14. WarpGuide Step-by-Step Interface for Creating a Printer

the Toolbar (instead of the WarpCenter) opens when you double-click on the desktop's blank area, change the SET AUTOSTART= entry in the CONFIG.SYS file from WARPENTER to TOOLBAR. If you specify both, they will both open when you double-click on the blank area. An example of the syntax for specifying both WarpCenter and the OS/2 Warp 3.0 Toolbar is:

```
SET AUTOSTART=PROGRAMS, TASKLIST,
FOLDERS, WARPENTER, TOOLBAR
```

Note: In a SET statement, no blank spaces are permitted other than the blank space after the word SET.

Folder Enhancements

OS/2 Warp 4 has many enhancements to the way you interact with folders. These enhancements give you better control over the layout and look of folders, as

well as the behavior of objects within folders.

A noticeable new feature in OS/2 Warp 4 folders are the pulldown menus. These menus contain many of the same options that were in the popup menus; however, the pulldown menu options are arranged into logical groups (see Figure 4).

The menus also contain extra functions. The menu labeled Selected contains actions that operate on all objects that are currently selected in the folder.

You will also find the standard Edit pulldown menu. This menu contains another new feature in OS/2 Warp 4 folders: the Paste operation. Paste allows you to copy most types of data from the clipboard into a new object in a folder. When you select Paste, you see a dialog box in which you can title the object and select an available object class for any recognizable render formats. The render format identifies the data type and how it is presented. (The render formats are also listed and selectable.) Once you have made your choices, click on the Paste button in the dialog box to create the object in the folder.

Pasting is a useful way to gather information for later use. Some examples of data you can paste are paragraphs of text or collections of bitmap images.

Note: The pulldown menu feature can be set within the Properties notebook of a folder. Select the Menu tab, go to Page 2 of 2, and select or deselect the checkbox labeled Display Folder Menu Bars.

Another new feature of OS/2 Warp 4 folders lets you switch from one view of a folder to another. Prior versions forced you to open a new view of the folder if the current view was not the one you wanted. This caused the overhead of creating, populating, and eventually cleaning up an additional view. If a folder contained many objects, this overhead became significant. Now, in OS/2 Warp 4, you can switch within a single view among the Icon, Details, and Tree view formats.

In Icon view, you were always able to select three layout options: Non-grid, Flowed, and Non-flowed. In OS/2 Warp 4 (in the OS/2 System folder's Properties

notebook, View tab, Icon View, Page 1 of 3), the names of these layouts are changed to As Placed, Multiple Columns, and Single Column, respectively.

There is also a fourth layout called Gridded. This layout lets you view your folder's objects laid out onto a grid. By default, the system gives you a grid spacing that best fits the objects that are in the folder.

You can customize the grid spacing. In the folder's Properties notebook, View tab, Icon View, Page 1 of 3, press the "Icon Spacing" button. You see a dialog box (shown in Figure 17) that lets you change both the horizontal and vertical spacing. (The values are in pels, so a change of 1 or 2 makes a very small difference.)

In Figure 17, the Spacing Preview window shows you the relative grid spacing of nine sample objects within a sample folder. When you change the horizontal or vertical spacing, you can immediately see the results, because the grid spacing of the sample objects in the Spacing Preview window is adjusted accordingly.

When you choose OK in the Spacing Preview dialog box, it applies the new spacing immediately to all of the folder's views that have the Gridded layout selected.

The grid spacing has no effect on either the Multiple Column layout or the Single Column layout of the folder's Icon view. The grid spacing does, however, affect the As Placed layout of the folder's Icon view. The grid spacing also affects the Arrange operation, which lets you set the placement of objects in your folder. The Arrange feature also has new options, which are discussed next.

New Arrange Features

Many OS/2 Warp 4 enhancements involve the Arrange feature. There are now eight different Arrange options accessible from either the View pulldown menu or the View submenu within the Context menu for the folder. (See Figure 18.)

If you click on the cascade arrow next to Arrange, you see a menu with the following choices: Standard, From Top, From Left, From Right, From Bottom, Perimeter, Selected Horizontal, and Selected Vertical.

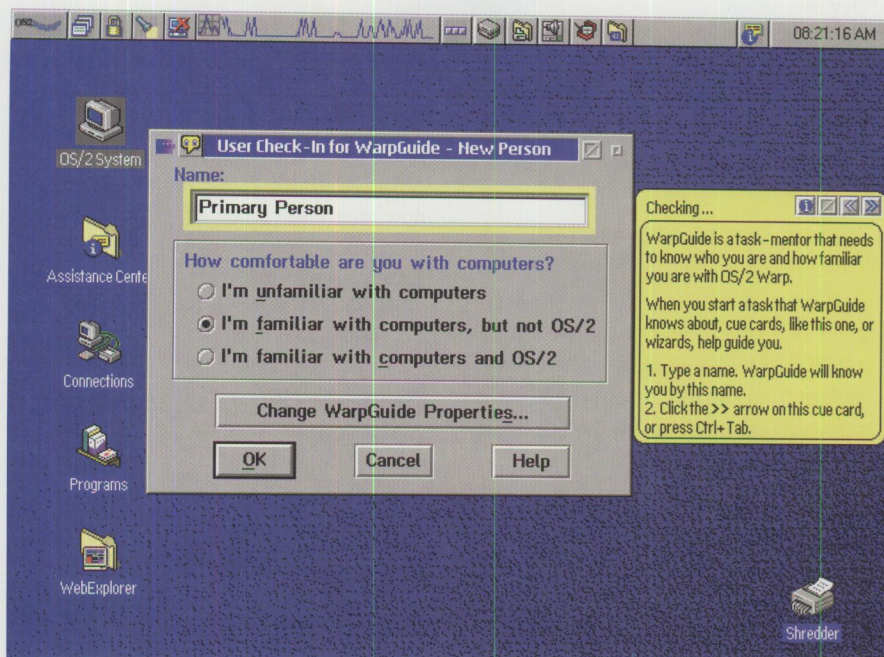


Figure 15. WarpGuide Introducing Itself and Asking for Your Experience Level

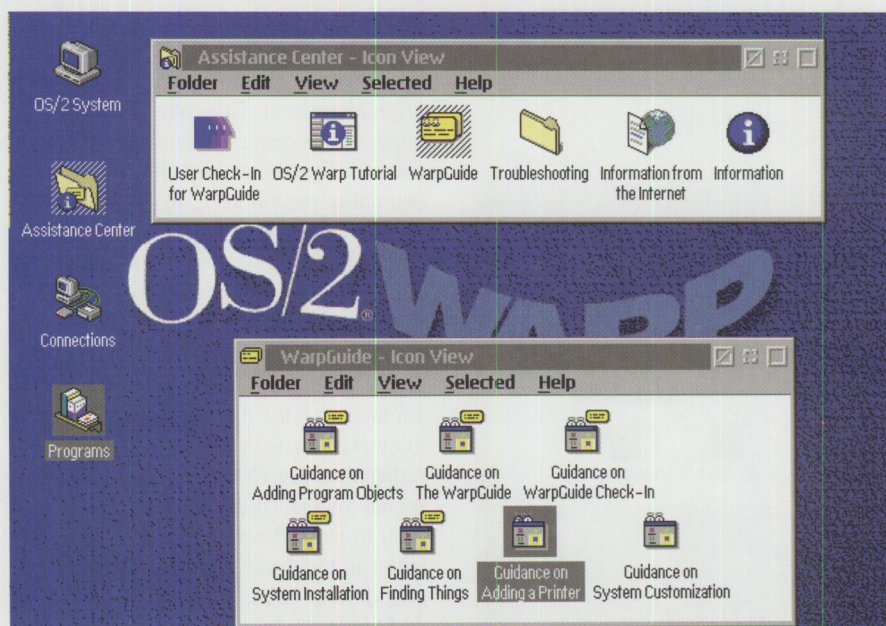


Figure 16. WarpGuide Folder for Guidance Objects

Standard arranges your objects into rows, as Arrange did in previous versions of OS/2. None of the icons or their text will overlap.

The remaining options all cause an arrangement based upon the folder's grid spacing.

- *From Top* arranges objects beginning at the upper left, across the visible top of the folder, then proceeding to the next row.

- *From Left* begins at the upper left, goes down the visible left side of the folder, then proceeds to the next column to the right.

- *From Right* begins at the upper right, goes down the visible right side of the folder, then proceeds to the next column to the left.

- *From Bottom* begins at the bottom left, crosses the visible bottom of the folder, then proceeds to the next row above.

If the folder runs out of visible space, all four of the From options proceed to the next non-visible row and go left to right. A vertical scroll bar appears, so you can scroll down to the objects that would not fit in the original window.

- *Perimeter* begins at the upper left, crosses the top, and then creates a perimeter, alternating left side with right side, and finally across the bottom of the folder. (That is, it builds a square from the top down.) If you have more objects than can fit, the bottom is beneath the visible window.
- *Selected Horizontal* and *Selected Vertical* are two-step operations. First, select the objects to arrange. Second, choose either Selected Horizontal or Selected Vertical. Your cursor then changes to indicate the arrangement type and, when you click in the folder, the objects are arranged in a row or column from the point where you clicked.

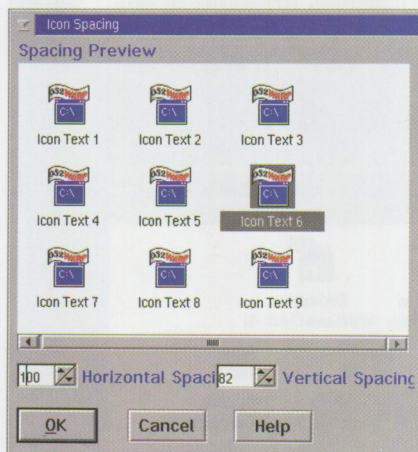


Figure 17. Preview Window for Icon Spacing

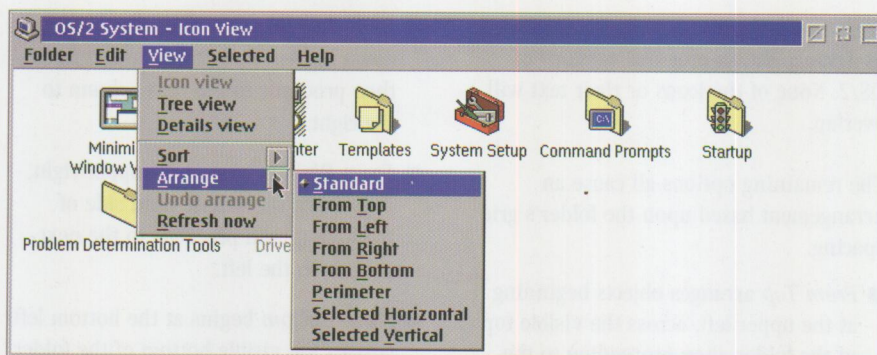


Figure 18. View and Arrange Menus

The final folder enhancement is object-based. Each object in the system has a new option, "Lock position," to lock the object in place. (You can set the lock position from either an object's popup menu or the Icon page in the object's Properties notebook.) When you lock an object in position, it remains there during an Arrange operation. Also, you cannot move a locked object to another position within the same folder.

Drag-and-Drop Enhancements

One goal in OS/2 Warp 4 was to improve the flexibility of arranging object icons within folders.

One often-requested enhancement was to be able to reposition objects in folders by a small amount (i.e., a few pixels). Performing this task in previous OS/2 releases required two steps. First, you had to drag the object's icon past its border to an acceptable drop area elsewhere in the folder. Then you had to drag the icon back to the desired position in the folder—only a few pixels away from the icon's original position. This roundabout technique was necessary because the Workplace Shell prevented an object from being dropped on itself. In OS/2 Warp 4, the Workplace Shell now interprets a small move operation as a reposition and permits the drop operation to complete.

A common technique for getting quick access to objects is to drag the object from a folder onto the desktop. This allows you to quickly locate and open an object, rather than search for it through layers of nested folders. Often, however, you don't want to move the object from its original folder to the desktop; you simply want to gain quicker access by creating, on the desktop, a shadow object that points to the original object in the folder.

OS/2 Warp 4 simplifies the process of dragging objects to the desktop by changing the default drop operation from Move to Create Shadow. The default operation for dragging objects to a folder other than the desktop is still Move.

You can still perform a Move to the desktop by pressing the Shift key when dragging an object with the mouse or by selecting Move from the object's context menu. If you want the default drop operation to the desktop to remain Move (as in prior OS/2 releases), you can modify it via the "Default drop operation" field in the Desktop page of the desktop's Properties notebook (accessed by selecting Properties from the desktop context menu).

The Workplace Shell uses the concept of a Program object to point to an executable program file (.EXE). Prior to OS/2 Warp 4, the default drop operation when dragging a program file was Move. But, because many applications require their executable program file to stay in the directory where it was installed, moving the program file often had the adverse effect of breaking the application.

To remedy this situation, in OS/2 Warp 4 the default drop operation when dragging program files has changed from Move to Create Program Object. When you drag a program file's icon anywhere (including the desktop), the default drop operation is to create a Program object.

You can still perform a Move operation by pressing the Shift key when dragging the program file with the mouse or by selecting Move from the program file's context menu.

New System Options

You will discover many new features in the Workplace Shell as you look at the options in the Properties notebooks and look through a folder's pulldown menus.

To see an object's Properties notebook, put your mouse cursor on top of that object, click mouse button 2, then select Properties in the menu that appears.

For example, if the object is a folder, you can now set the shadow text color from the View page of the folder's Properties notebook. You can also choose whether or

not an open view of a folder has a menu bar. For a single folder, make this choice in that folder's Properties notebook. For all folders in the system, make this choice in the Properties notebook for the System object. The System object is found in the System Setup folder, which is located in the OS/2 System folder on the desktop.

The System object's Properties notebook contains several new options:

- **Confirm closing OS/2 and DOS windows**—You can choose whether or not to have the system confirm as it closes each OS/2 and DOS windowed session.
- **Menu options**—You have the option to display long or short menus on popup menus. When you select short menus, options that can normally be done via drag-and-drop (e.g., copy, move, delete) are not displayed. There is also an option to control the display of menu bars in folders.
- **User Interface options**—Several new options on the User Interface page include:
 - **Full window dragging**—This lets you see a window's entire contents, instead of just the window's outline, while it is being moved.
 - **Alt+Tab switching window**—When you choose this option, then press Alt+Tab, you are not only switched to the next program, but you also see a small window telling you which program is receiving the focus.
 - **VIO mouse actions**—When you select this option, you need not choose Mark from the system menu in order to mark a selection when you drag the mouse in a VIO window session. You can also display a popup menu listing the actions available within the VIO window.
 - **Asynchronous focus change**—When you enable this option, the system switches the focus away from an application that does not respond to a focus-change message. This prevents you from having to wait indefinitely for the currently selected application window to allow the focus to change to the newly selected window.

OS/2 Warp 4 includes new mouse pointer sets, including left-handed pointers. To find these pointer sets, go to the Pointers

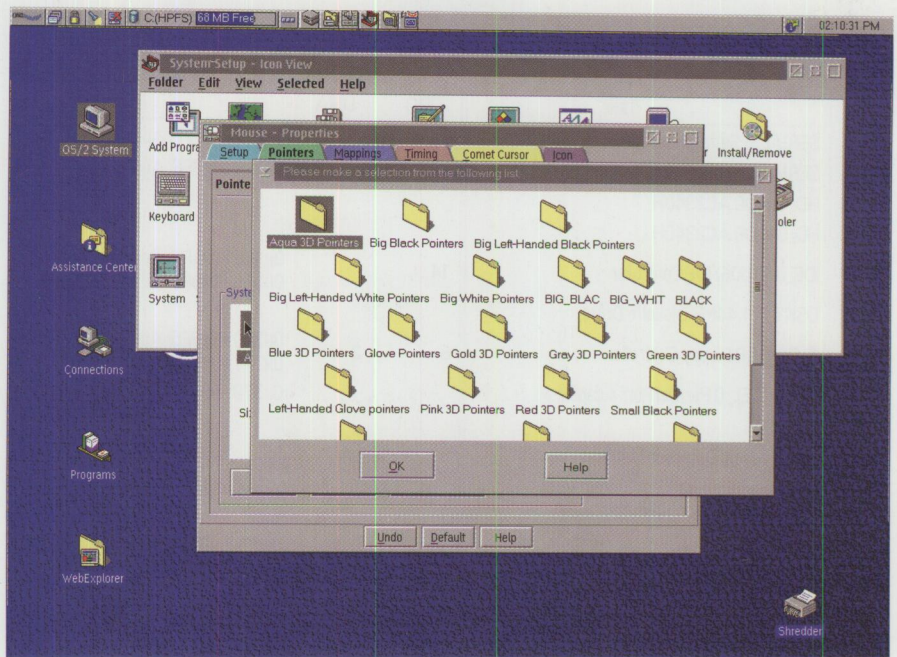


Figure 19. Pointer Sets

page in the Mouse object's Properties notebook and click on the Load set... button. The result is shown in Figure 19.

If you installed the Multimedia Software Support feature, you will find that the image files used for folder backgrounds, lockup, and schemes are no longer limited to bitmap (.BMP) files. You can now use any image file supported by Multimedia Software Support, including AVI (.AVI), DIB (.DIB), GIF (.GIF), JPEG (.JPG), PCX (.PCX), PCD (.PCD), Targa (.TGA), TIFF (.TIFF), and VID (.VID) files.

The system Lockup facility now includes a screen-saver mode. When you choose screen-saver mode from the third Lockup page in the desktop's Properties notebook, the system no longer requires a password to unlock the system; you need only press the Enter key to return to normal system operation. Screen-saver mode works with either automatic (timed) or manual lockup.

Printer objects now have a new Text Form page. From this page, you can control the default font for printed text, as well as options for printing page and line numbers, headings, and text borders.

Hardware Manager

The Hardware Manager is a new object in OS/2 Warp 4. Located in the System Setup folder, it contains graphical

representations of all hardware devices on your computer. Each hardware device brings with it valuable information about the system resources it needs and uses.

The information in the Hardware Manager is useful for installing new hardware or diagnosing problems with existing hardware. For example, if you want to add a hardware device that requires you to set hardware jumpers for the interrupt request (IRQ) level, and the new device works only on IRQ 1 or 5, you can open the Hardware Manager to see whether IRQ 1 or 5 is already in use. If you are experiencing problems with an installed device, you can use the Hardware Manager to see which system resources (IRQ, DMA, I/O, and Memory) the device is using.

The Hardware Manager is intended for people who have experience with installing and maintaining hardware on a personal computer. But if you are a novice user, you can use the Hardware Manager when you have to ask a service technician to help you diagnose a hardware problem.

By default, the Hardware Manager opens into a Details View (see Figure 20) that displays a lot of information about the installed devices on your computer. Every installed device is shown in this view, along with the resources used by each device.

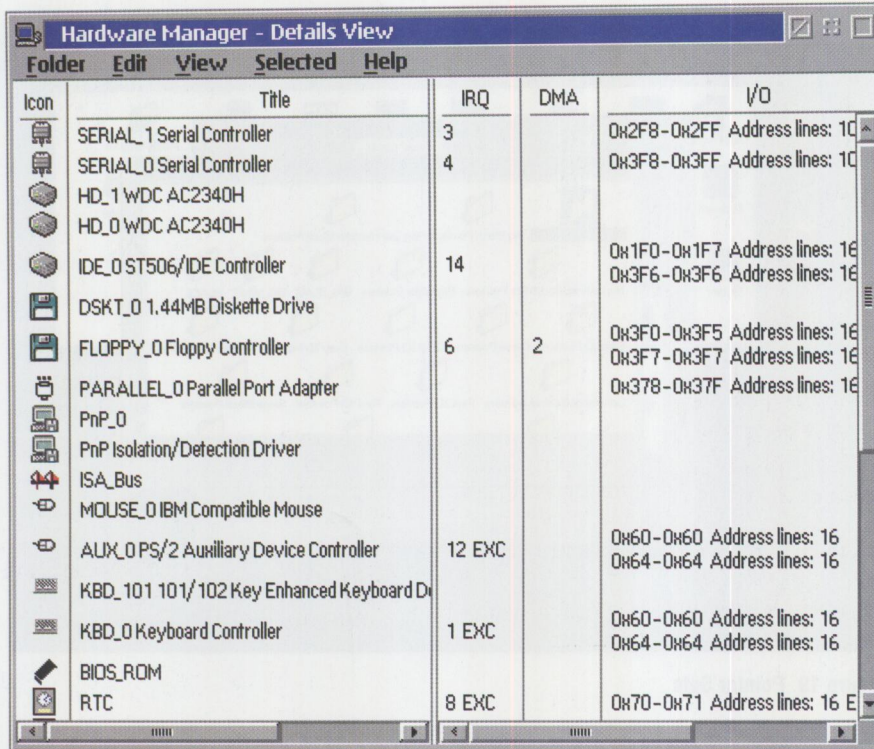


Figure 20. Hardware Manager—Details View

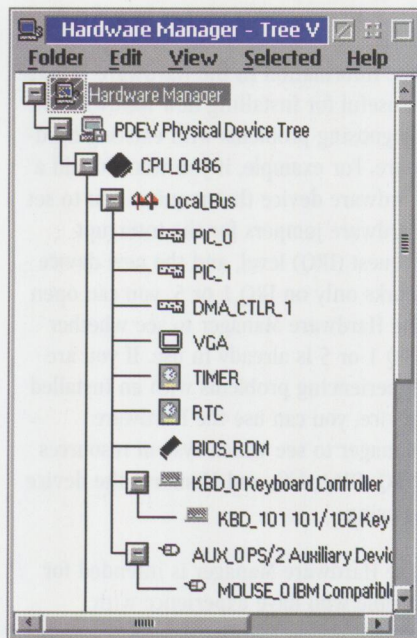


Figure 21. Hardware Manager—Tree View

You can also open the Hardware Manager using two other views: Tree and Icon. Click mouse button 2 on the Hardware Manager icon, click on the cascade arrow to the right of the “Open as” selection, and click on Icon View or Tree View.

Tree View provides a unique look at the hardware devices on your computer. The

Tree View in Figure 21 shows, in hierarchical form, which devices are parents, siblings, and children. The Icon View is the normal icon view seen throughout the Workplace Shell.

Hardware Manager Properties

Each object in an open view of the Hardware Manager represents a hardware device. Double-clicking on an object brings up a Properties notebook that contains more information about that device. Within each of these Properties notebooks, there are five pages for each device:

- **Device**—Information about the device driver that “owns” this device. The device driver’s name, description, vendor, version number, and date are displayed.
- **IRQ Level**—A list of all IRQ levels used by this device.
- **DMA Channel**—A list of all direct memory access (DMA) channels used by this device.
- **I/O Ports**—A list of all input/output (I/O) ports used by this device. Each I/O port listed contains a beginning and ending address, plus an indication of whether it has 10 or 16 address lines.

- **Memory**—A list of all memory addresses used by this device. Each memory address listed contains its beginning and ending address.

A blank listbox on any of the IRQ, DMA, I/O, and Memory pages means the device is not using that function. If the EXC string appears to the right of a listbox, that function is assigned exclusively to that device and can’t be used by any other device. The information on these five pages cannot be modified.

Hardware Detection Level

The Hardware Manager gives you a way to set the detection level on your computer. The *detection level* is the level of hardware snooping that is performed each time you boot your computer.

Hardware snooping is a process that tries to find all hardware devices installed on your computer. In particular, hardware snooping allows plug-and-play hardware to be detected and configured to operate correctly. Hardware snooping also determines which system resources are in use versus which are available. This information helps you to add or change your hardware configuration.

To set the detection level, click mouse button 2 on the Hardware Manager icon to bring up its context menu. Click on “Properties” to open the Properties notebook. The first page displayed is the Detection Level page, shown in Figure 22.

Two settings can be made on this page:

- **Default**—The level of detection that will occur after the next system restart. The selection in the Default field tells the system to either recognize or ignore hardware changes when you start your system. The choice that you make here is duplicated in the “Next system restart only” field. Select a different level of detection in the “Next system restart only” field if you want to run the hardware snooping differently from the Default, *only* the next time you start your system. After that, the hardware snooping will again run according to the selection in the Default field.
- **Next system restart only**—The level of detection that will occur *only* during your next system restart. The snooping

level set here applies for only one reboot. After reboot and snooping take place at the "Next system restart only" detection level, that level is immediately reset to the "Default" level of hardware snooping.

Select detection levels from the choices in the listboxes:

- *No hardware detection*—Causes no hardware snooping to occur during your next system restart. Use this detection level if you are having boot-up problems that you suspect are due to hardware detection. If there are plug-and-play devices on your computer, they are not reconfigured.
- *Use previous detection*—Works exactly like the "No hardware detection" level, except that if there are plug-and-play devices on your computer, they are reconfigured.
- *Detect removed hardware*—Causes snooping to check only for previously detected hardware to see if that hardware is still present. Use this detection level if you have removed a hardware device from your computer.
- *Detect added hardware*—Causes snooping to check only for hardware that you added to your computer since the last system restart. Use this detection level if you have added a hardware device to your computer.
- *Full hardware detection*—Causes full snooping of all hardware on your computer.

Note: Hardware detection and snooping are not supported on a Micro Channel-based computer, so setting the detection level on a Micro Channel computer has no effect.

The Hardware Manager retrieves all of its hardware device information from the OS/2 Resource Manager. If you do not see a hardware device listed in the Hardware Manager, it is likely that the device driver for that device has not registered itself with the Resource Manager.

Migrating from Earlier Versions to OS/2 Warp 4

When you install OS/2 Warp 4 over a prior OS/2 version or over a previous OS/2 Warp 4 installation, your old desktop is preserved and a new desktop is

created with a shadow object linking to your previous desktop. All objects that you created yourself or that your applications created continue to reside on your previous desktop.

All system objects, such as the OS/2 System folder, are recreated on the new desktop. System object IDs, such as <WP_SYSTEM>, are removed from the old System folder and redirected to the new System folder.

If you retain your old printers and do not install any new ones, then your existing printer objects continue to reside on your previous desktop.

Several objects provided in OS/2 Warp 4 must be specially handled. Their corresponding objects on the previous desktop are not left there; instead, they are moved to newly assigned places on the new OS/2 Warp 4 desktop. Shadows are created on the old desktop, where the objects previously existed, to link to the objects' new locations. The objects handled in this manner are Country, Drives, Hardware Manager, Keyboard, Minimized Window Viewer, Sound, Spooler, Startup, System, System Clock, and Touch. (*Note:* Hardware Manager is a new object in OS/2 Warp 4; however, if you install OS/2 Warp 4 over itself, the Hardware Manager becomes an old object.)

If you are responsible for rolling out OS/2 Warp 4 across many users' computers, you may prefer to have OS/2 Warp 4 behave the same way as prior versions of OS/2, where the current desktop was updated instead of a new one being created. To accomplish this, you need to build custom `os2.ini` and `os2sys.ini` files before each phase of installation. Before phase 2 of installation, modify `install.rc` and change all occurrences of `PRESERVEOLD` and `RELOCATE` to `UPDATE`. Then use the `makeini` command to create `os2.ini` from `install.rc`. Before phase 3 of installation, modify the `ini.rc` file and follow the same procedure.

New Setup Strings

You can use setup strings to modify the properties of Workplace Shell objects. Setup strings can be passed to an object by:

- Using the `SysSetObjectData` function in a REXX script
- Calling the `WinSetObjectData` function from within a Presentation

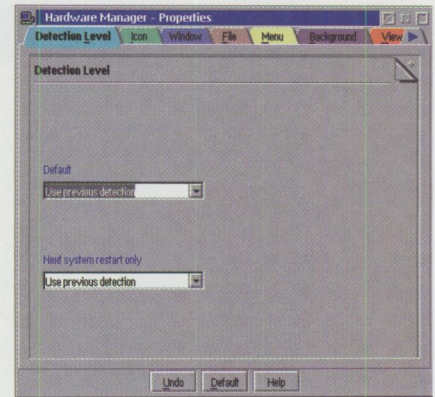


Figure 22. Detection Level Page

Manager or non-Presentation Manager program, or

- Calling the `wpSetup` method for the object from a Workplace Shell program.

Setup strings have the following form:

```
keyword=value;keyword=value;...
```

where `keyword=` specifies the property to be modified, and `value` specifies the new value for that property.

Most keywords support a single value, either a number or a string; however, some keywords support a list of values, with each value separated from other values by a comma or blank.

If more than one property is specified, each `keyword=value` specification is separated from the next by a semicolon (;). For example, you can specify a setup string as

```
iconfile=sample.ico;objectid=<my_object>
```

No blank spaces are permitted in this statement.

If you have to embed a semicolon within a value, precede the semicolon with a caret (^). For example, if you specify a setup string as

```
mykey=value1^;value2;objectid=<my_object>
```

then the value of the `mykey=` keyword is `value1;value2`.

As an example, to change the Icon Text color to cyan in the System Setup folder, include the following statement in a REXX script:

Keyword	Defined by Class
ADDOBJECT=	WarpCenter
ADDTOTRAY=	WarpCenter
ADDTRAY=	WarpCenter
AUTOLOCKUP=	WPDesktop
AUTOSETUP=	WPFontPalette, WPSchemePalette
DETAILSSHADOWCOLOR=	WPFolder
DETAILSTEXTCOLOR=	WPFolder
ICONSHADOWCOLOR=	WPFolder
ICONTEXTBACKGROUND=	WPFolder
ICONTEXTCOLOR=	WPFolder
ICONTEXTVISIBLE=	WPFolder
LOCKEDINPLACE=	WPObject
LOCKUPAUTODIM=	WPDesktop
LOCKUPBACKGROUND=	WPDesktop
LOCKUPFULLSCREEN=	WPDesktop
LOCKUPONSTARTUP=	WPDesktop
LOCKUPSCREENSAVERMODE=	WPDesktop
LOCKUPTIMEOUT=	WPDesktop
MENUBAR=	WPFolder
MENUITEMSELECTED=	WPObject
MENUS=	WPObject
PROGTYPE=	WPProgram, WPProgramFile
SAVENOW=	WarpCenter
SHOWALLINTREEVIEW=	WPFolder
TREESHADOWCOLOR=	WPFolder
TREETEXTCOLOR=	WPFolder
TREETEXTVISIBLE=	WPFolder

Figure 23. New and Changed Setup String Tables

Keyword	Value	Description
LOCKEDINPLACE=	YES <u>NO</u>	Specifies whether or not this object's icon is fixed in position in an open Icon View of the folder containing the object
MENUITEMSELECTED=	menu-item-ID	Simulates selecting the specified menu item from the object's popup menu
MENUS=	SHORT <u>LONG</u>	Specifies the type of popup menu to display for this object

Figure 24. WPObject Setup Strings

```
call SysSetObjectData
"<WP_CONFIG>","icontextcolor=cyan"
```

To customize your system to automatically lock the keyboard after 15 minutes of inactivity and display the OS2WARP.BMP bitmap, include the following statement in a REXX script:

```
call SysSetObjectData
"<WP_DESKTOP>";
"background=?:/os2/
 bitmap/os2warp.bmp,
 n,1,i,d;";,
"autolockup=yes;
 lockuptimeout=15"
```

Figure 23 summarizes the setup strings, either added or changed in OS/2 Warp 4, that are supported by the object classes defined by the Workplace Shell. For each setup string, Figure 23 shows which object class defines the setup string. Then Figures 24 through 30 provide more information about the setup strings, categorized by each relevant object class. Values with underscores indicate the default setting. *Note:* None of the keywords summarized in Figure 23 is mandatory. A keyword can be omitted if it is not needed.

Behind the Scenes

If you want to peek at what happens behind the big OS/2 Setup and Installation window, click on the minimize button in the top right corner. If the minimize button is not there, press and hold Alt+Shift and then press F3 to add a minimize button to the OS/2 Setup and Installation window.



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previously worked on development of software motion video in the OS/2 Multimedia area, on multimedia support in IBM's version of Taligent's CommonPoint, and on developing DOS-based communications products for the IBM PC. She was among the first developers of OS/2 and coauthored one of the first books about OS/2. Ann joined IBM in 1982 after earning a BS degree in Systems Engineering from Case Western University. Her Internet ID is annr@austin.ibm.com.

Additional author information is on page 53.

Keyword	Value	Description
BACKGROUND=	[filename], [N I S], [1 scale], [I C], [color r g b D]	Folder background. filename = fully qualified image file name N = normal image T = tiled image S = scaled image scale = scaling factor between 1 and 20 I = display image C = color only color = standard color name (BLACK, RED, YELLOW, GREEN, CYAN, BLUE, MAGENTA, WHITE, DARKGREY, DARKRED, DARKYELLOW, DARK GREEN, DARKCYAN, DARKBLUE, DARKMAGENTA, PALEGREY) r g b = three decimal numbers between 0 and 255, separated by blanks, indicating the amounts of each primary color (red, green, blue) D = default <i>Note:</i> You can omit the values that don't apply. For example: BACKGROUND=c:\os2\bitmap\os2logo.bmp,S,2,I or BACKGROUND=,,C,0 128 128 or BACKGROUND=,,C,YELLOW
DETAILSSHADOWCOLOR=	color	Text color for a shadow object in the Details View. color may be a standard color name or an r g b set of numbers.
DETAILSTEXTCOLOR=	color	Text color for a normal object in the Details View. color may be a standard color name or an r g b set of numbers.
ICONSHADOWCOLOR=	color	Text color associated with shadow icons in the Icon View. color may be a standard color name or an r g b set of numbers.
ICONTEXTBACKGROUND=	color	Background color for normal text in the Icon, Tree, and Details Views. color may be a standard color name or an r g b set of numbers.
ICONTEXTCOLOR=	color	Text color associated with normal icons in the Icon View. color may be a standard color name or an r g b set of numbers.
ICONTEXTVISIBLE=	YES NO	Specifies whether or not the names of objects contained in the folder are displayed in the Icon View.
ICONVIEW=	NONGRID GRIDDED FLOWED NONFLOWED, NORMAL MINI INVISIBLE	Specifies the arrangement and icon size in the Icon View.
MENUBAR=	YES NO	Specifies whether or not to display the menu bar in an open view.
SHOWALLINTREEVIEW=	YES NO	Specifies whether or not to show all objects in an open Tree View. YES means show all objects; NO means show only folders.
TREESHADOWCOLOR=	color	Text color associated with shadow icons in the Tree View. color may be a standard color name or an r g b set of numbers.
TREETEXTCOLOR=	color	Text color associated with normal icons in the Tree View. color may be a standard color name or an r g b set of numbers.
TREETEXTVISIBLE=	YES NO	Specifies whether or not the names of objects contained in the folder are displayed in the Tree View.

Figure 25. WPFolder Setup Strings

Keyword	Value	Description
PROGTYPE=	FULLSCREEN WINDOWABLEVIO VDM WINDOWEDVDM WIN PROG_30_STD PROG_31_STD PROG_31_ENH PROG_31_STDSEAMLESSCOMMON PROG_31_ENHSEAMLESSCOMMON PROG_31_STDSEAMLESSVDM PROG_31_ENHSEAMLESSVDM SEPARATEWIN PM DOSMODE	Specifies how to run the program.

Figure 26. WPProgram and WPProgramFile Setup Strings

Keyword	Value	Description
AUTOSETUP=	YES NO	Specifies whether or not the font palette is to be reinitialized with the default set of fonts.
FONT=	font[,...]	Specifies the fonts to be used in the font palette. font is in the form of size.name, where size is the point size and name is the name of the font including modifiers. For example, specify 9.Helv for a 9-point Helvetica.

Figure 27. WPFonPalette Setup Strings

Keyword	Value	Description
AUTOSETUP=	YES NO	Specifies the schemes to be put into each cell. YES uses the predefined OS/2 Warp 4 schemes for the first 15 schemes, with the excess initialized to the OS/2 Warp 4 scheme. NO uses the OS/2 Warp 4 scheme to initialize all schemes.

Figure 28. WPSchemePalette Setup Strings

Keyword	Value	Description
AUTOLOCKUP=	YES NO	Specifies whether or not automatic lockup is enabled. YES means the mouse and keyboard will lock up after the specified time of inactivity. NO means the system will not automatically lock the keyboard and mouse, no matter how long they are inactive.
LOCKUPAUTODIM=	YES NO	Specifies whether automatic dimming is enabled. YES means the screen blanks out and a floating lock icon is displayed two minutes after the keyboard and mouse are locked. NO means the system does not blank out the screen after the keyboard and mouse are locked.
LOCKUPBACKGROUND=	[filename], [N T S], [scale], [I C], [color r g b D]	Lockup background. filename = fully qualified image file name N = normal image T = tiled image S = scaled image scale = scaling factor between 1 and 20 I = display image C = color only color = standard color name (BLACK, RED, YELLOW, GREEN, CYAN, BLUE, MAGENTA, WHITE, DARKGREY, DARKRED, DARKYELLOW, DARKGREEN, DARKCYAN, DARKBLUE, DARKMAGENTA, PALEGREY) r g b = three decimal numbers between 0 and 255, separated by blanks, indicating the amounts of each primary color (red, green, blue) D = default The system is installed with the lockup background set as c:\os2\bitmap\os2warp.bmp,T,,I.

Figure 29. WPDesktop Setup Strings (continued on next page)

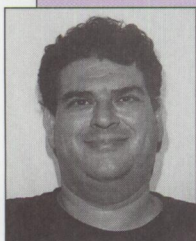
Keyword	Value	Description
LOCKUPFULLSCREEN=	YES NO	Specifies whether or not the entire screen is taken up by the lockup background image.
LOCKUPSCREENSAVERMODE=	YES NO	Specifies whether or not a password is required to unlock the keyboard and mouse. YES means lockup acts like a screen saver and no password is required. NO means you must supply the correct password to unlock the keyboard and mouse.
LOCKUPONSTARTUP=	YES NO	Specifies whether or not the keyboard and mouse are automatically locked when the system is started.
LOCKUPTIMEOUT=	number	Specifies the number of minutes of keyboard and mouse inactivity to cause lockup. The default is 3 minutes.

Figure 29. WPDesktop Setup Strings

Keyword	Value	Description
ADDOBJECT=	object	Specifies an object to be added to the current tray. object is the persistent handle of the object.
ADDTOTRAY=	traynumber, object[,...]	Specifies one or more objects to be added to a tray.
ADDTRAY=	trayname[,object[,...]]	Specifies the name of a new tray to be added. A list of object handles may optionally be added to the new tray.
SAVENOW=	YES	Specifies that the WarpCenter should save its configuration (now). <i>Note:</i> There is no NO value for this keyword.

Figure 30. WarpCenter Setup Strings

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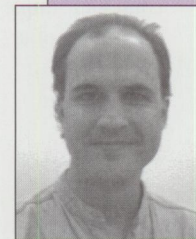


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changed features in the Workplace Shell. His IBM positions since joining IBM in 1969 include OS/2 development (design and programming of the original Swapper, team leader for System Initialization, system architect for OS/2 1.2), and several positions within OS/360, OS/VS2, VTAM, and 3270 PC Attachment development. Ira is coauthor of *OS/2 Warp Uncensored*, published by IBM Press in 1995. He has a BS degree in Electrical Engineering from Northeastern University. Ira's Internet ID is iras@austin.ibm.com.

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Les Wilson is a senior programmer in the Personal Software Products Programming Center in Austin, Texas. He joined the OS/2 team in 1991 after many years developing graphics

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Java in OS/2 Warp 4

Java is several things—a programming language, a virtual machine, and a way to bring user interaction, animation, sound, and sizzle to traditionally static Web pages. Java can also be used to write platform-independent distributed Internet applications. Applications created in Java need only be developed once, after which they will run on any Java-enabled platform, such as OS/2 Warp 4. This article describes the major features of Java for OS/2 Warp.

Java is a simple object-oriented programming language with features that support multithreading, synchronization, and automatic storage management.

Java, the programming language, is well suited to creating applets (small embedded applications) and applications for the Internet. Java applets and applications are compiled into platform-independent Java class files that can be run on any Java-enabled platform. Figure 1 illustrates a simple Java program.



Java, the virtual machine, is an environment for running platform-independent Java class files. Java for OS/2 Warp is a fully compliant implementation of a Java virtual machine and carries the

authorized Sun Microsystems Java compatibility logo. It is capable of running any correctly written Java applet or program.

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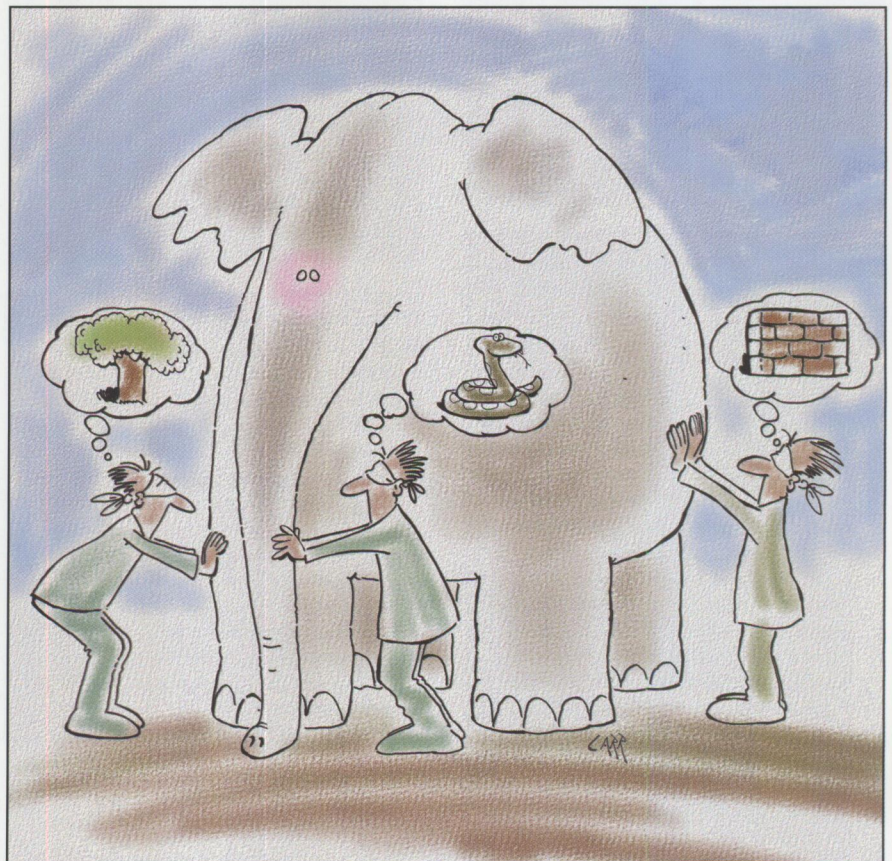
OS/2 Warp 4 contains, in addition to the virtual machine, a number of tools for developing Java programs. These include `javac`, a Java language compiler (itself written entirely in Java), as well as utilities for debugging Java programs, building documentation, and writing native methods.

Installation Choices

Java for OS/2 Warp is supplied with the OS/2 Warp 4 operating system and is installed as part of the normal OS/2 Warp 4 installation process. For installation purposes, Java for OS/2 Warp is divided into three components: Java runtime, Java toolkit, and Java samples.

The *Java runtime* component is installed by default as part of the base operating system and provides the Java virtual machine environment for OS/2 Warp. This means that other applications can rely on the availability of the Java runtime.

The *Java toolkit* allows Java applets and programs to be compiled, debugged, and tested. Extensive Java class library documentation is also provided in hypertext markup language (HTML) format. To help



with problem diagnosis, the toolkit contains a set of Java debug executables whose file names end in `_g`; for example, `applet.exe` becomes `applet_g.exe`.

The *Java samples* are a set of Java applets that illustrate some of the things possible with Java. The provided source code introduces the novice Java programmer to the Java language and applet writing.

Java was designed to operate in environments allowing long file names. For example, Java source code files end in the extension `.java`, and compiling these files produces Java class files ending in the extension `.class`.

Although Java was designed for long file names, it won't always be installed on a disk partition formatted using High-Performance File System (HPFS), which allows long file names. Some OS/2 Warp systems may be installed using the File Allocation Table (FAT) format only, in which case all file names must adhere to the 8.3 naming convention. In OS/2 Warp, IBM has modified Java to allow the use of the Java runtime environment on a FAT-only system. This enables Java applets to be run over the Internet, although the compilation and running of local Java programs is not possible.

You should install Java in a partition that supports long file names, because you may later decide to develop or use local Java applets and applications. To help you, the OS/2 Warp installation utility installs Java onto the OS/2 boot drive if that drive is formatted using HPFS, otherwise onto the first HPFS-formatted drive it finds. If an HPFS partition is found, then the Advanced installation choices are made available; these let you choose whether or not to install the Java toolkit or samples and in which HPFS partition to install Java. If no HPFS partition is found, then only the Java runtime is installed onto the boot drive.

Java on the Desktop

The Java for OS/2 folder, found in the Programs folder on the desktop, contains a variety of objects, even in a system that has only the Java runtime installed (see Figure 2, which shows a full installation).

Java Applet Viewer

Perhaps of most interest to the beginner

```
class HelloWorld
{
    public static void main(String[] args)
    {
        System.out.println("Hello, warped world");
    }
}
```

Figure 1. The Ubiquitous "Hello World" Program Written in Java

is the Java applet viewer. The applet viewer recognizes and acts on the new applet tags, which many existing Web browsers ignore.

The Java applet viewer is a Java program that takes a Web page URL as a parameter. After accessing the Web page, the applet viewer scans the page looking for applet HTML tags. Each time the applet viewer finds an applet tag, it runs the Java applet associated with that tag, ignoring all other HTML tags and text.

Two icons for the applet viewer appear in the Java folder—one for running applets from a URL reference and the other for running applets from an HTML file.

A *URL reference* is a desktop object used by applications that work with URLs (e.g., IBM WebExplorer and the Java applet viewer) and is a bookmark for

remembering the location of a Web page. Normally, double-clicking on a URL reference object will start WebExplorer on the selected reference.

URL reference objects can reside on the desktop or in special folders that show the URL references in a convenient form. An example of such a URL folder is the Web Sites folder within the Connections folder on the desktop (see Figure 3).

The Java applet viewer is also associated with these URL reference objects and can be started against any URL reference object either by using the "Open as" option on a reference object or by dragging and dropping a URL reference object on the "Java Applet Viewer from URL" program object. To see how this works, open the Connections folder, then the Web Sites folder, then find and drag the "IBM Centre for Java Technology" icon and drop

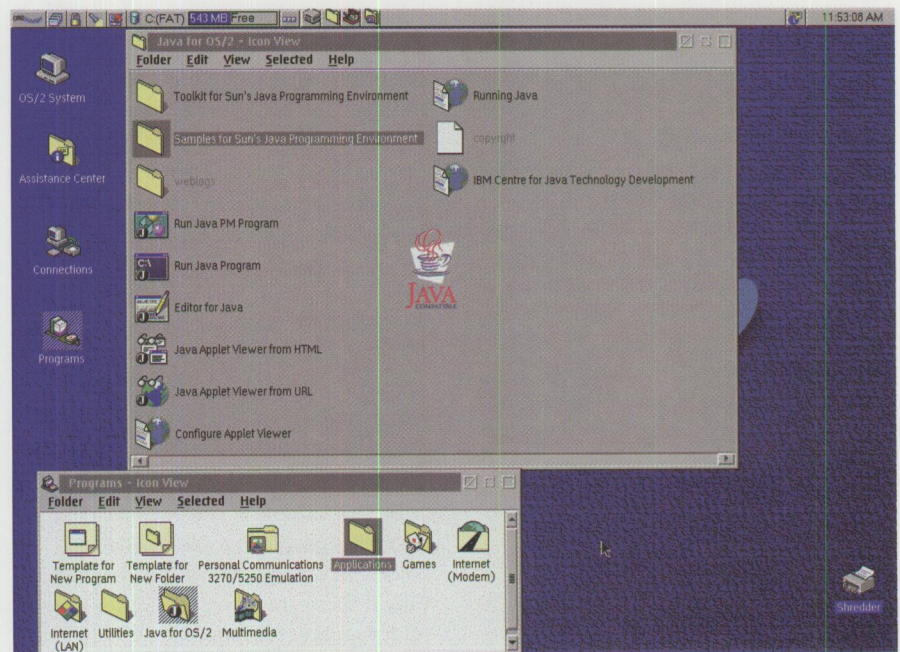


Figure 2. Contents of Java for OS/2 Folder with Java Runtime, Toolkit, and Samples Installed

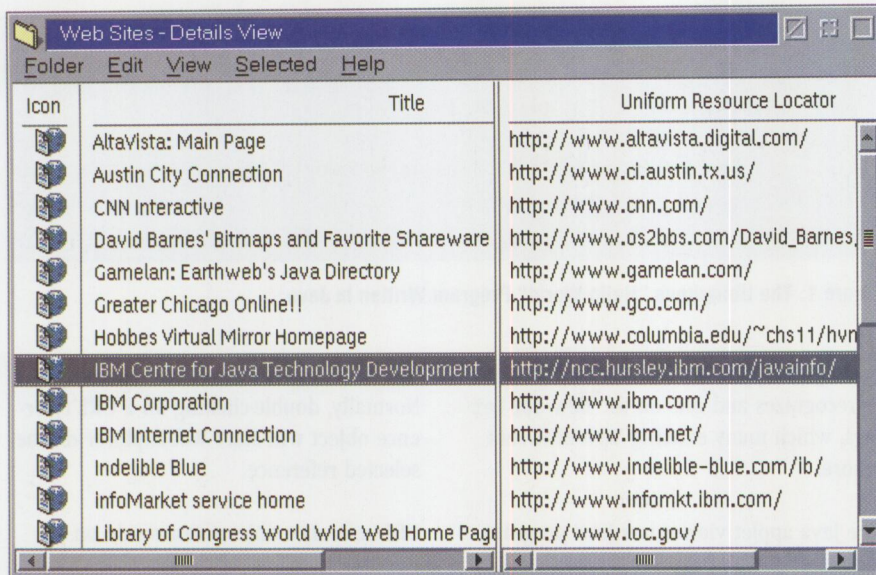


Figure 3. Web Sites Folder

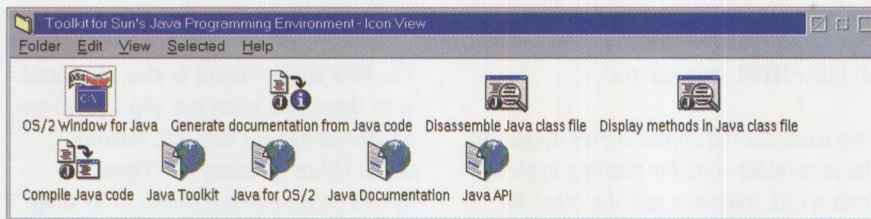


Figure 4. Java Toolkit Folder

it on the "Java Applet Viewer from URL" icon in the "Java for OS/2" folder.

Although the IBM WebExplorer Internet browser supplied with OS/2 Warp is not Java-enabled, the applet viewer object provides a way to view applets in a Web page. If you're using WebExplorer to view a Web page that contains Java applets, then (using mouse button 2) you can drag a URL object off the Web page onto the desktop or another folder. You can then drag the URL object onto the "Java Applet Viewer from URL" icon or open it using the applet viewer.

If you want to access the Internet from OS/2 Warp running in a network environment protected by a firewall, then you need to configure the applet viewer to use a Proxy gateway. This straightforward process can be done by clicking on the "Configure Applet Viewer" icon. You should obtain the name of the local Proxy gateway from your local network administrator.

The Weblogs folder, a shadow of the weblogs files in the `\javaos2` subdirectory,

holds log files (messages) generated by the applet viewer as it loads the various Java classes. These files can help you diagnose problems in viewing applets with the applet viewer. To view messages as they are generated by the applet viewer, rather than have them redirected to a weblog file, start the applet viewer with the `-cons` option. It is easy to modify the properties of the applet viewer program object to add the `-cons` option at the start of the applet viewer program object's Parameters field.

Java Toolkit

Installing the Java Toolkit adds various program objects to the Java Toolkit folder (see Figure 4). The Java compiler program object is associated with files having a `.java` extension; therefore, one of its "Open as" actions is compile. The compilation takes place in an OS/2 windowed command prompt, which closes automatically if there are no errors. Although useful for quickly recompiling a file, this program is not designed for extensive Java program development.

The "Display methods in Java class file" and "Disassemble Java class file" program objects allow you to inspect the internals of Java class files. Both of these program objects are associated with `.class` objects and therefore can also be dragged and dropped onto the display program object or the disassemble program object.

The "Generate documentation from Java code" program object uses the `javadoc` utility on a Java source file to generate HTML documentation from comments inserted by the programmer in the source code, as shown in Figure 5.

The "OS/2 Window for Java" program object brings up a windowed command prompt where you can execute various Java commands and utilities. An unusual aspect of the "OS/2 Window for Java" object is that the directory where it starts is specified by dragging a data file or folder object onto this object. The subdirectory in which that data file or program resides then becomes the subdirectory in which the window opens.

The "Java API" URL object provides extensive documentation of the Java class libraries. This object points to an HTML file that gives an overview of the classes and documentation generated by `javadoc` from the Java class library source. You can find OS/2-specific Java documentation in the "Java for OS/2" icon in the Java Toolkit folder.

The "Java samples" option gives you a choice of 33 HTML pages using 24 applets. The sample files are accessible from two folders located in the samples folder (see Figure 6) within the Java for OS/2 folder. The first of these folders, the URLs for Samples folder, lets you run an applet just by double-clicking on its URL icon (these URL objects have been created to use the applet viewer rather than WebExplorer as their default browser).

The second folder, the Demo folder, is a shadow of the demo folder under the `\javaos2` subdirectory. All Java source files, `.class` files, HTML files, and other files that drive the applets are visible here.

Java Assistance

By default, the "Editor for Java" program object is associated with files of `.java`

and .html extensions, so you can edit these files simply by double-clicking on the file icons.

If you have not installed the Enhanced Editor (EPM.EXE), then you can modify the "Editor for Java" program object to use the default system editor. To modify it, change the program name to ?:\os2\e.exe, where ?: is the boot drive.

EPM in OS/2 Warp supports Java through several enhancements. Keyword highlighting for the Java language (type `toggle_parse 1 epmkwds.jav` from the EPM command dialog if Java keyword highlighting is not enabled) marks different elements—keywords, comments, variables, strings, and punctuation—in different colors. EPM also has syntax assistance and will complete `if/then/else`, `do/while`, and similar constructs when the first element is entered.

More adventurous users can configure EPM with a Java toolbar (see Figure 7) to perform certain actions with the press of a button. A sample Java toolbar, available from <ftp://ncc.hursley.ibm.com/pub/java/os2/javabar.zip>, provides the following actions:

- **KwdHilit**—Toggle on and off keyword highlighting
- **MonoFont**—Monospace font
- **Messages**—Display editor messages
- **Shell**—Start a shell within the editor, allowing OS/2 commands and programs to be run inside the editor
- **List Ring**—List all of the files being edited
- **Build All This**—Compile this Java file and all its dependencies using the Java compiler in an EPM shell window
- **Build This**—Compile this Java file using the Java compiler in an EPM shell window
- **View**—Refer compiler errors in the shell window back to the source file
- **CurrErr**—Show the compiler error generated by this source line
- **NextErr**—Skip to the next error
- **PrevErr**—Go to the previous error

```

/**
 * An example class to show how Java documentation comments are
 * embedded in the Java source. These documentation comments are
 * stripped out by the javadoc utility, and can be converted to
 * HTML page format and cross-referenced for subsequent use.
 */
class example_class
{
    ...
}

```

Figure 5. Documentation Comments in Java Source Code

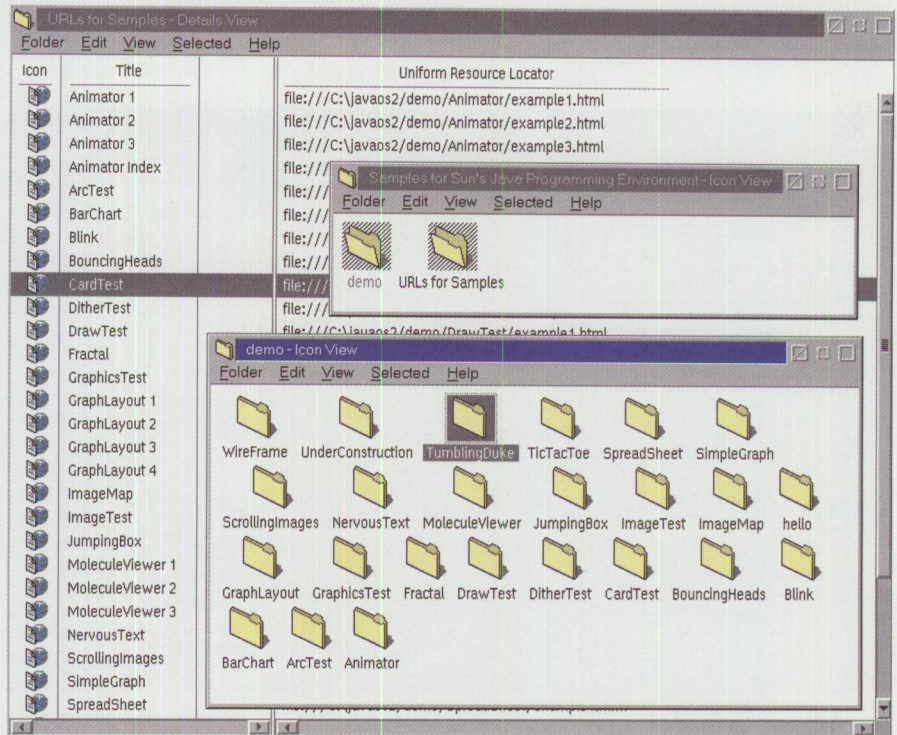


Figure 6. URLs for Samples Folder

- **MakeTags**—Create cross-reference of method names
- **TagsName**—Change where cross-reference data is stored
- **CurrProc**—Find where the method name under the cursor is defined
- **FindProc**—Find where a method is defined

This toolbar provides a simple starter development environment for Java applets and programs. After creating a Java program source file, you can compile the file by pressing the "Build This" button. This compiles the file in an editor window, where any errors are listed. The "View" button refers you to the source file with

the first error, which you can then correct. The "NextErr" button then goes to the next error, which will be in the right place in the source file even if correcting the previous error involved adding lines to the source file. When all the errors have been corrected, you can use the "Build This" button to rebuild the application; repeat the cycle until your application compiles without any errors.

After writing a Java applet, you can write a simple HTML file in which to embed the applet, perhaps using one of the HTML files from the samples as a guide. After saving the HTML file, you can test the applet by bringing up a shell window using the "Shell" button and type, for example, `applet example1.html`. Any

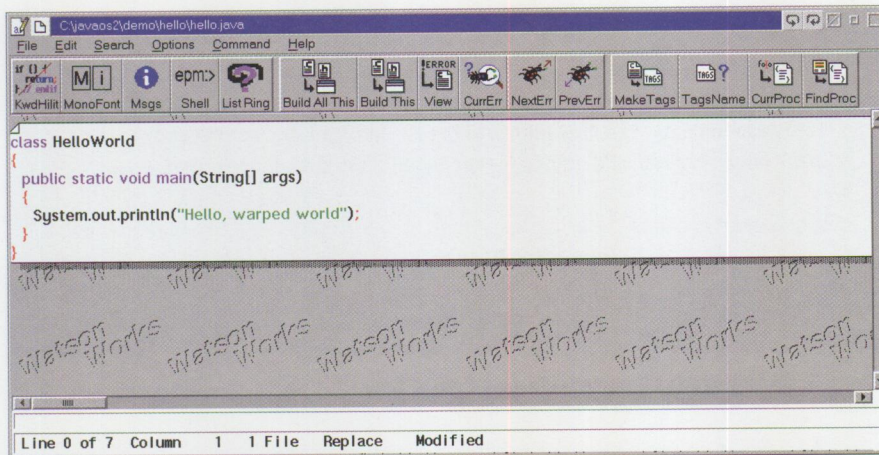


Figure 7. Java Toolbar

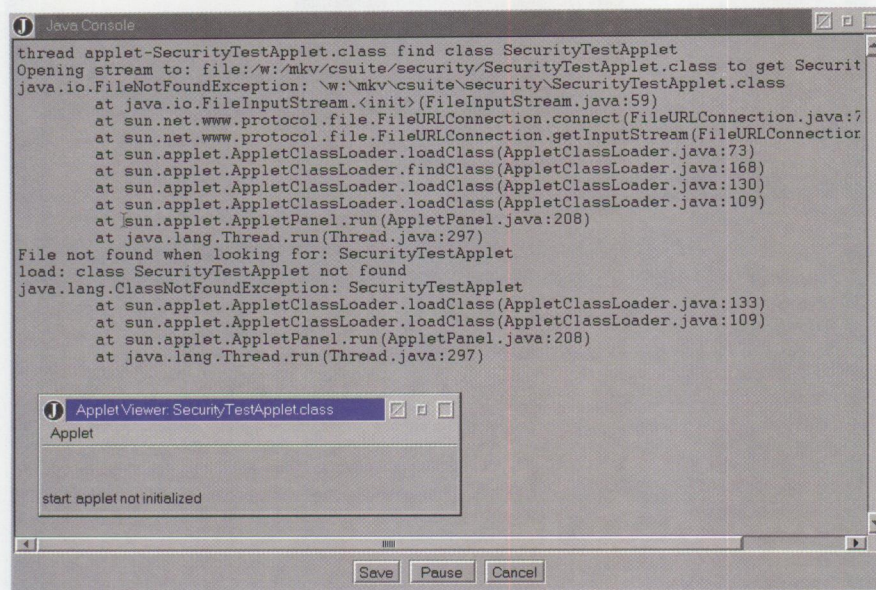


Figure 8. Java Console

output from the applet will be redirected to a weblog file. To prevent redirection of output and instead view the output in the Shell window, use the `-nore` option. Type `applet -nore example1.html`.

Java from the Command Line

You can view applets from the OS/2 command line using the applet viewer called `applet`. You can run Java programs using either `java` or `javapm`. Use `java` for command-line Java programs, and use `javapm` for Java programs that use the Abstract Window Toolkit (AWT) to access the OS/2 Presentation Manager graphical user interface (GUI).

To aid with problem diagnosis, you can invoke a console facility (see Figure 8) by specifying the `-cons` option when

invoking either the applet viewer or `javapm`, for example, `applet -cons example1.html`. To start the console facility every time, set a Java environment variable as follows: `set java_console=1`.

Java Native Methods

A *native method* is a different kind of Java method. Instead of being written in the Java language and executed by the Java virtual machine, a native method is implemented in a language other than Java (usually C) and is executed by the real processor as native code.

Any Java class file that employs a native method must be accompanied by a platform-specific native library that implements the native methods. While a native method gives a Java class access to

resources outside of the Java virtual machine environment, it also inhibits platform independence to some extent, because a platform-specific native library must be provided for every platform on which the Java class will run.

Unlike Java class files, platform-specific native libraries are not automatically distributed to clients as required. Instead, they must be put in place by another means, for example, via FTP. Figure 9 shows an example of how a native method should be defined. In Figure 9, the `native` keyword identifies a method as native. The `static` block at the top of the class is invoked the first time a class object is created, and it makes the native method library accessible to the Java virtual machine.

After successfully compiling (using `javac`) the Java class containing the native method, generate a set of native library entry points for the native library. To do this, use the `javah` utility, e.g., `javah -stubs methods_example`.

Next, generate C header definitions for the native methods. Again, use the `javah` utility, e.g., `javah methods_example`. The generated header file contains a structure definition that gives native methods access to object instance variables, as well as C prototype definitions for the native methods themselves.

You now need to implement the native methods using the prototype definitions in the previously generated header file. The C stubs file previously generated by `javah` and the C source containing the native methods need to be compiled and linked through the `_Optlink` linkage convention.

Build a Dynamic Link Library (DLL) with the same name specified in the `System.loadLibrary` statement in the original class file, in this example `MyLib` (case is not significant). For OS/2 Warp, this name should adhere to the 8.3 naming convention. Once you place the DLL in the `LIBPATH` statement, the native methods can be called from Java.

Voluntary Suspend

Java for OS/2 Warp operates a threading model that uses OS/2 threads in conjunction with a voluntary suspend mechanism.

To suspend a Java thread, a request is made to suspend the thread (a "please suspend" flag is set); then the requesting thread waits until the thread to be suspended sees the request, acknowledges it, and suspends itself. For this mechanism to work successfully, all Java threads must periodically check to see if they have been requested to suspend. To maintain system performance, the inspection interval should be very short.

Java programmers need not worry about this level of detail, because it is completely hidden from Java programs. Only programmers of native methods should be aware that they should not enter a hard block on a non-Java resource while in a native method. Instead of a hard block in a native method, a timed block should be used, interleaved with a call to the Java voluntary suspend mechanism, `ThreadCheckForSuspend()`. Figure 10 illustrates how to use the voluntary suspend mechanism.

Updates to Java for OS/2 Warp

IBM intends to continually improve Java for OS/2 Warp. The most current version of Java for OS/2 Warp will always be available from the Web pages of the IBM Centre for Java Technology Development at <http://ncc.hursley.ibm.com/javainfo/>. Also at this site is a collection of IBM's latest Java-related information.

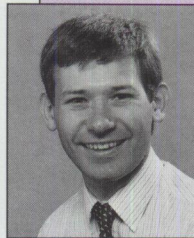
The downloadable Java drivers will run under OS/2 Warp 4 and earlier versions of OS/2. You need not have OS/2 Warp 4 in order to run Java.

```
class methods_example
{
    private int variable1;
    static { System.loadLibrary("MyLib"); }
    public void java_method (String text)
    {
        System.out.println(text);
    }
    public native void native_method (String text);
}
```

Figure 9. Defining a Native Method in a Java Class

```
Instead of this:
    rc = DosRequestMutexSem(mutex, SEM_INDEFINITE_WAIT);
write this:
do
{
    rc = DosRequestMutexSem(mutex, 200);
    if (rc == ERROR_TIMEOUT) ThreadCheckForSuspend();
}
while (rc == ERROR_TIMEOUT);
```

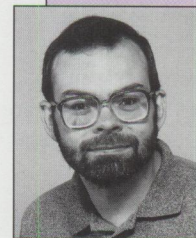
Figure 10. Using the Voluntary Suspend Mechanism



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Developing with Java and OS/2 Warp 4

As network computers become a reality, Java will play a major role in the presentation of information, exploiting the multimedia dynamics while delivering the content. This article presents the nuts and bolts of Java, describing its technical aspects and providing Java application and applet examples.

An exciting aspect of Java technology is its ability to present a platform-neutral application environment that can exploit Internet technology as a whole and, equally as important, can permeate the appliance and consumer spaces.

As the consumer electronics market focuses on appliances, embedding the Java runtime as a fundamental element provides a standard platform that you can use to create a network of intelligent devices. For example, with Java embedded in your dishwasher's electronics, the start of the wash cycle can "inform" your heater to prepare the adequate amount of water for this task.

Appliance application developers can market platform-neutral Java programs to several hardware vendors, even though they may use different hardware to build their units. The developer's application still runs, and the market is greatly expanded.

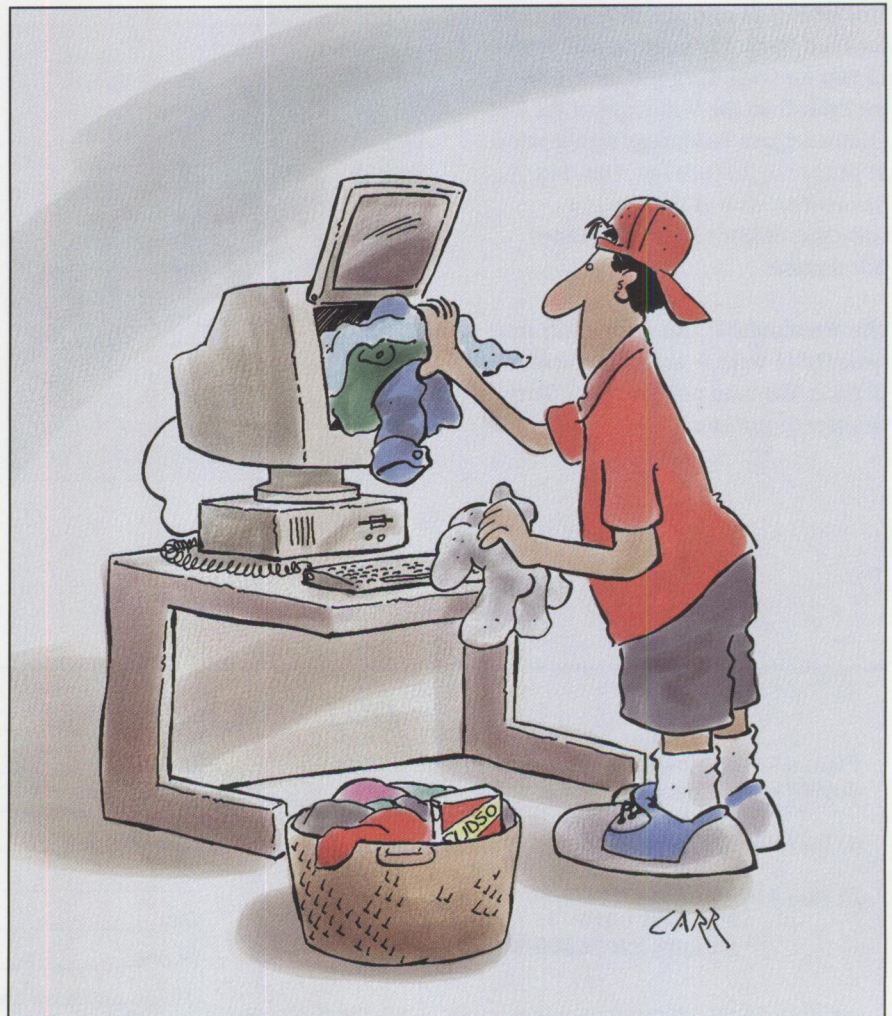
Herman Rodriguez
Miguel Sang
IBM Corporation
Austin, Texas

Technical Overview

Although Java has the look and feel of C++, it has several key differences:

- Java forces you to accept object orientation as the programming model.

- Java eliminates the use of pointers.
- Java encapsulates arrays in a class structure.
- Java runtime provides automatic garbage collection; memory management is built in.
- Java provides built-in multithreading features.
- Java enforces strong security measures to protect against ill-behaved programs.



The Java source program is compiled using JAVAC.EXE. This compilation creates a file made of Java “bytecodes” that represent your program in a way similar to the object code produced by a C or C++ compiler. However, these bytecodes are not machine instructions (or processor-specific instructions); they are commands to the Java interpreter. OS/2 Warp 4 provides a native Java interpreter. There are also Java interpreters ported to Solaris, Windows NT, Windows 95, and other platforms. Java programs run unmodified and without having to be recompiled on any of these platforms.

Java’s portability becomes apparent when users connect to the Internet. A Java program runs on any platform that supports a Java-enabled browser. The primary benefit to the user is that your Java program does not have to be installed or configured. The user simply selects a link on a Web page that represents a Java program. The Java-enabled browser requests the program from the remote site and runs it seamlessly.

At runtime, the interpreter resolves symbolic references and determines the storage scheme for each Java class. Although there is a slight performance penalty in runtime reference resolution, a major benefit is that classes can be updated without affecting your code. This benefit is certainly a key feature required in a distributed environment like the Internet.

Java is Robust

Java creates a reliable environment for running distributed applications. The features that make Java robust include the following:

- Eliminates pointer manipulation so that memory usage is encapsulated in classes specifically built for that purpose.
- Maintains runtime integrity by ensuring that distribution and dynamic linking have not introduced errors into the code (in addition to type checking at compile time). The interpreter ensures that bytecodes have not been tampered with and that transmission errors have not modified the code.
- Eliminates the common problem of out-of-bounds array access attempts in C and C++. Java always catches access to invalid array elements; some are

```
File name: Hello.java

1:  class Hello
2:  {
3:      public static void main(String argv[])
4:      {
5:          System.out.println("Hello Java!");
6:      }
7:  }
```

Figure 1. Simple Java Application

caught at compile time, and others are caught at runtime when computing index values.

- Supports multithreading by providing synchronization modifiers in the language. At the object level, threaded applications can inherit classes specifically created for that purpose.

Specific threads’ priority can be set by applications to suit specific needs, allowing unique modes of preemptive multitasking.

The Object of Every Class

Java provides a completely object-oriented programming environment. The basic Java distribution includes several classes that are grouped into packages. These packages provide the basic building blocks upon which you create your application. These packages are:

- Language package (`java.lang`)—Provides the elementary classes for strings, arrays, and elementary data types of the Java language.
- Utility package (`java.util`)—Provides support for vectors, stacks, hash tables, encoding, and decoding.
- I/O package (`java.io`)—Provides standard input and output (I/O), as well as a file I/O.
- Applet package (`java.applet`)—Provides support to interact with the browser.
- Abstract Window Toolkit (AWT) package (`java.awt`)—Provides support to control the visual aspects of your application. Objects such as buttons, scroll bars, and fonts are available in this class.
- Network package (`java.net`)—Provides the basic support to communicate with

peer programs over the network, as well as standard protocols such as Telnet, FTP, and URL access.

With these features in mind, it is time to move to the practical application of Java. We’ll start by creating and analyzing the typical “Hello World” program.

Programming in Java

You can create two types of programs with Java: an application and an applet. The main difference between them is the way each program is run. A Java application is a regular program such as a C or C++ program; however, unlike C or C++, a Java application requires an interpreter to run. OS/2 Warp 4 includes a Java interpreter called JAVA.EXE (or JAVAPM.EXE for programs that use the AWT classes).

A Java applet is a more restricted Java program. Because an applet is intended to be delivered over the Internet, it is small and does not have access to all the functions normally available to a regular program. These restrictions give a Java applet the security level required to avoid intentional data corruption and malicious programming, such as viruses.

A Java applet is usually run by a Java-enabled browser, whereas a Java application is usually run by a Java interpreter. OS/2 Warp 4 includes an applet viewer (APPLET.EXE) that allows you to run Java applets without a Java-enabled browser.

Once loaded, the program runs inside a Java virtual machine. The virtual machine is a controlled environment where the Java bytecodes are interpreted and translated into machine language.

A Java Application

Figure 1 demonstrates a simple Java application. Compile the application by

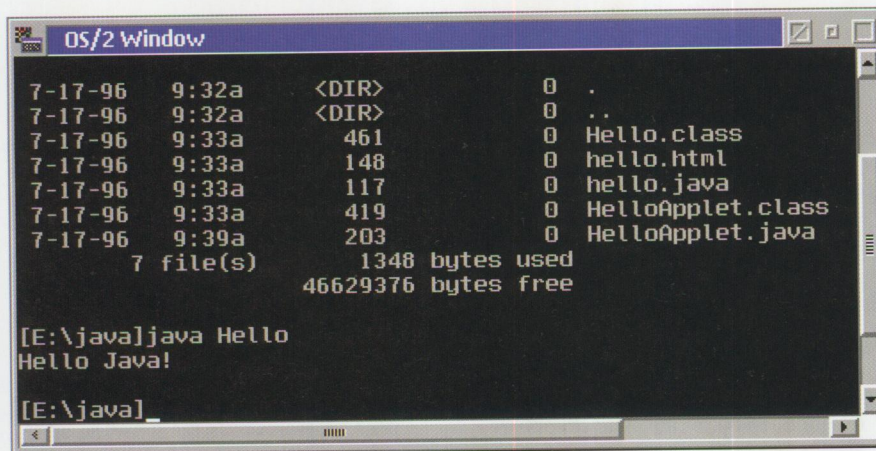


Figure 2. Application Results

```
File name: HelloApplet.java

1:  import java.applet.*;
2:  import java.awt.*;
3:  public class HelloApplet extends Applet
4:  {
5:      public void paint (Graphics objGraphics)
6:      {
7:          objGraphics.drawString("Hello Java!", 10, 40);
8:      }
9:  }
```

Figure 3. Simple Java Applet

```
File name: hello.html

1:  <html>
2:  <head><title>A Java Applet</title>
3:  </head>
4:  <body>
5:  <applet code=HelloApplet.class width=200 height=100>
6:  </applet>
7:  </body>
8:  </html>
```

Figure 4. HTML File to Run Applet

entering `javac Hello.java` to invoke the Java compiler (JAVAC.EXE).

The code produces the `Hello.class` file, which is run by invoking the Java interpreter. The result is shown in Figure 2. Notice that the `.class` extension is not required by the interpreter to find the application; it is assumed by the interpreter. Following is a line-by-line analysis of the `Hello.java` source:

- `class Hello`—Declares a Java class called `Hello`. The outer curly braces,

`{` and `}`, define the scope of the code that belongs to the `Hello` class.

- `public static void main(String argv[])`—Defines a method. Several Java keywords are used to define a method. In this code example, `public` indicates that this method can be invoked from any other class; `static` specifies that this method applies to the class globally, instead of at the instance level; `void` indicates this method does not return any value; and `main` is used to define the method

to be called when the program is initially run.

- `System.out.println("Hello Java!");`—Invokes the `println` method of the `PrintStream` class. The `PrintStream` class is instantiated as `out` in the class named `System`. The `System` class is instantiated as `System`. The `Object` class is the root of every Java class. In other words, every Java class inherits from the `Object` class. A semicolon ends all Java statements.

A Java Applet

The code in Figure 3 demonstrates a simple Java applet. To compile the applet, type `javac HelloApplet.java` at an OS/2 command prompt; it produces a file called `HelloApplet.class`. To run the applet, use the HTML file shown in Figure 4.

Type `applet hello.html` at an OS/2 command prompt to run the applet. The screen in Figure 5 displays on your desktop.

Following are the details of the applet source:

- `import java.applet.*; import java.awt.*;`—Imports the `java.applet` and `java.awt` packages that contain the `Applet` and `Graphics` classes respectively. In short, packages are the means by which several different Java classes can be stored together. `java.applet` refers to the `Applet` package and `java.awt` refers to the `Abstract Window Toolkit (AWT)` package.
- `public class HelloApplet extends Applet`—Declares the `HelloApplet` class. The `extends` keyword indicates that this class inherits from the `Applet` class. Java allows only single inheritance, thereby eliminating many of the problems associated with multiple inheritance. Java provides a mechanism called `Interfaces` to allow some of the functionality available with multiple inheritance.
- `public void paint (Graphics objGraphics)`—Declares the `paint` method. This method is called by the `AWT` when the applet needs to be redrawn. In this example, when `paint` is called, it in turn calls:
 - `objGraphics.drawString("Hello Java!", 10, 40);`—Draws the `Hello Java!` string. The `drawString` method is located in the `Graphics`

class, of which `objGraphics` is an instance.

In the `hello.html` file, the HTML statement `<applet code=HelloApplet.class width=200 height=100>` contains the HTML keywords `applet`, `code`, `width`, and `height`.

- `applet` declares a Java applet.
- `code` declares the full name of the Java applet.
- `width` defines the width of the applet window.
- `height` defines the height of the applet window.

More Java Applets

To do something useful, an applet must always override at least one of the standard methods. In the previous example, the `paint` method was overridden to draw the `Hello Java!` string. A typical applet is more complex. Listed in called sequence, the basic Java methods are:

- `void init()`—This method is the first one to be called once the applet is loaded. Variables can be initialized here. Be aware that if this class is inherited by another class, this method can be overridden in that class and, therefore, is never called.
- `void start()`—This method tells the applet to start running. It is called every time the applet's HTML page is loaded and is visible on the Web browser or applet viewer.
- `void stop()`—This method is called when the applet's HTML page is no longer the current page. This is the place for the applet to suspend any threads it might have.
- `void destroy()`—This method is called when the applet is no longer needed. The applet should free any resources and terminate.

As in C++, Java also allows you to specify a class constructor. The constructor is called before any of the methods listed previously and, unlike the `init()` method, it cannot be overridden. To define a constructor, create a public method in the class with the same name as the class.

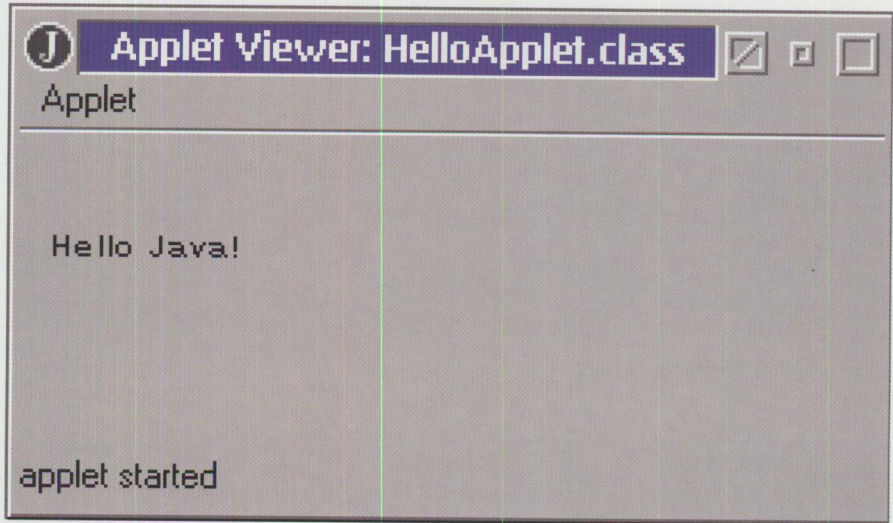


Figure 5. Applet Display

```
File name: HelloMsg.java

1:  import java.applet.*;
2:  public class HelloMsg extends Applet
3:  {
4:      String HelloMsgStr;
5:      public HelloMsg()
6:      {
7:          HelloMsgStr = new String("Hello");
8:      }
9:  }
```

Figure 6. Example 1—Defining HelloMsg

```
File name: HelloApplet2.java

1:  import java.awt.*;
2:  public class HelloApplet2 extends HelloMsg
3:  {
4:      String HelloMsgStr2, PrintHelloMsg;
5:      public HelloApplet2()
6:      {
7:          HelloMsgStr2 = new String(" and Welcome to Java!");
8:      }
9:      public void init()
10:     {
11:         PrintHelloMsg = new String(HelloMsgStr + HelloMsgStr2);
12:     }
13:     public void paint (Graphics objGraphics)
14:     {
15:         objGraphics.drawString(PrintHelloMsg, 10, 40);
16:     }
17: }
```

Figure 7. Example 2—Defining HelloApplet2

```
File name: hello2.html

<html>
<head><title>A Java Applet</title>
</head>
<body>
<applet code=HelloApplet2.class width=300 height=100>
</applet>
</body>
</html>
```

Figure 8. HTML File to Run Applet

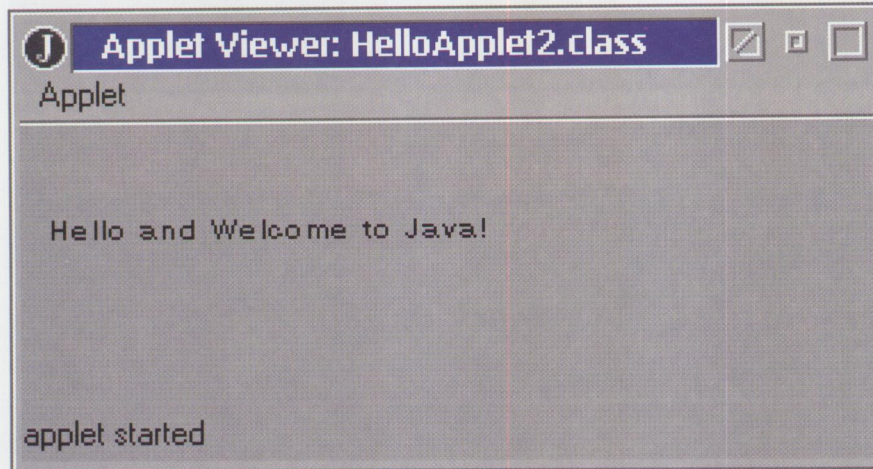


Figure 9. Applet Viewer

The examples in Figures 6 and 7 illustrate the calling sequence for applets.

Example 1 defines a class called `HelloMsg`. This class uses the `String` class (located in the `java.lang` package) to declare a variable that points to an instance of it. The code on lines 5 through 8 defines the constructor for this class. In this example, the constructor creates an instance of the `String` class and initializes it to the `Hello` string.

Example 2 defines a class called `HelloApplet2` that inherits from the `HelloMsg` class. In doing so, `HelloApplet2` inherits the methods and variables from the `HelloMsg` class. The constructor for `HelloApplet2` (lines 5 through 8) initializes the `HelloMsgStr2` class variable to the string " and Welcome to Java!". Notice that the `HelloMsg` class inherits from the `Applet` class.

The `init` method (lines 9 through 12) creates a new `String` instance and initializes it with the concatenation of the `String` objects `HelloMsgStr` (inherited from `HelloMsg`) and `HelloMsgStr2`.

Once the applet is loaded and the `paint` method is called, line 15 displays the content of the `String` object `PrintHelloMsg`, which by then will contain the "Hello and Welcome to Java!" string.

Type `javac HelloApplet2.java` at an OS/2 command prompt to compile `HelloApplet2.java` (Figure 7) and `HelloMsg.java` (Figure 6).

Notice that you did not specify `HelloMsg.java`. The Java compiler automatically searches for the `HelloMsg` class and will build from the source file if necessary.

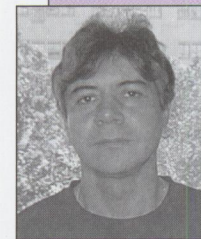
To run the applet, use the HTML file in Figure 8, then type `applet hello2.html` at an OS/2 command prompt. The screen in Figure 9 displays on your desktop.

The `HelloApplet2.java` and `HelloMsg.java` code examples demonstrate inheritance as well as the applet calling sequence for the `init()` and `paint()` methods and for the class constructor.

Summary

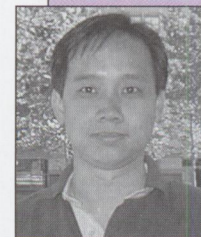
This article describes the characteristics that make Java a simpler programming language to use than the more complex C++. Although a simpler programming language, Java's features (such as being object-oriented) allow it to handle complex programs. These features, along with its platform independence, make Java the ideal platform for Internet programming.

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The Dedicated DOS/Windows Session in OS/2 Warp 4

This article discusses OS/2 Warp 4's dedicated DOS/Windows session, called Trapdoor. The article offers tips for using Trapdoor's hibernate feature by itself, how to use Trapdoor for Windows 95 programs, and how to install Trapdoor on SCSI drives.

OS/2 Warp 4 provides a new dedicated DOS/Windows session, which temporarily suspends all OS/2 activity and restores the OS/2 environment when the dedicated session completes. Called Trapdoor, this session gives DOS and Windows programs complete access to the system hardware. Programs that can benefit from this new feature include DOS games and Windows 3.1 programs that do not execute properly in OS/2's DOS or WinOS2 sessions.



Although some OS/2 Warp 3.0 preloads on OEM systems have a "trapdoor" feature for running DOS and Windows games that normally would not run in the WinOS2 environment, the dedicated DOS/Windows session in OS/2 Warp 4 provides an enhanced way to perform the dual boot function to run DOS and Windows programs. When you run a DOS or Windows program in this new environment, OS/2 Warp 4 does not shut down as it does when you use dual boot, but instead hibernates to disk and resumes after you complete your dedicated session.

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IBM Corporation
Austin, Texas

Trapdoor Features

Additional features in OS/2 Warp 4 include:

- The ability to create Trapdoor icons for:
 - DOS applications
 - DOS command prompt
 - Windows applications
 - Windows 3.1 Program Manager
- Program template with a modified Settings page that includes the Trapdoor session type



Environment	Action			
	Close App	Reboot	Power Off/On	OS/2 PIF
DOS command line	n/a	resume OS/2	resume OS/2	n/a
DOS application	resume OS/2	resume OS/2	resume OS/2	n/a
Win 3.1 Progman	resume OS/2	resume OS/2	resume OS/2	not required
Win 3.1 application	resume OS/2	resume OS/2	resume OS/2	n/a
Win 95 desktop	n/a	reboot Win 95	reboot Win 95	reboot OS/2
Win 95 application	none	reboot Win 95	reboot Win 95	n/a

Figure 1. Trapdoor Environment Resume Behavior

```

/* Set up "Trapdoor" for Windows 95 */
"boot /dos /noboot /quiet"
"hybernate -r"
exit

```

Figure 2. Trapdoor Code for Windows 95 Support

- MIGRATE.EXE file to check the application type and set up the proper session type

Rationale

The most desirable solution for running DOS/Windows applications under OS/2 Warp is for WinOS2 to support these applications in virtual DOS machine (VDM) sessions; however, VDM sessions are often incapable of handling the large number of interrupts required to run certain games while maintaining the same look and feel that they have in a native DOS environment. Also, exclusive device ownership and similar actions are not permitted in a protected, multitasking environment such as OS/2 Warp.

In addition, using OS/2 Warp's standard dual boot feature to enter a DOS environment requires shutting down OS/2 Warp, booting DOS, and then rebooting OS/2 Warp. In many instances, this consumes too much time.

The solution in OS/2 Warp 4 is to use a hibernate/resume operation as a trapdoor to a dedicated DOS/Windows environment. This solution provides a native DOS/Windows application environment while preserving the OS/2 environment in a suspended state, thus permitting the application to execute without interfering with the OS/2 Warp environment.

Overview

The Trapdoor environment is an

enhanced method of performing the dual boot operation to load and execute specific DOS and Windows applications. You start Trapdoor applications from desktop icons just as you do any other application.

When a Trapdoor application is launched, the following actions occur:

1. The OS/2 Warp 4 environment is hibernated to disk.
2. A DOS/Windows environment (with a CONFIG.SYS file specific for each application if necessary) is loaded and the application starts. If the application is a Windows 3.1 application, the actual Windows code is loaded and the application is launched in place of the Windows Program Manager. (A method for accessing the Windows 95 desktop is described later.)
3. When the application exits, the DOS kernel calls the OS/2 loader to restore the OS/2 Warp 4 desktop.

Figure 1 summarizes the resume behavior in the Trapdoor environment.



Hibernation Setup

The OS/2 Warp hibernation feature is an integral part of the dedicated DOS/

Windows session support. You can access the hibernation function from either an icon on the desktop or a button in the WarpCenter.

If you don't need to access the dedicated session, you can still take advantage of the hibernation function for a fast suspend/resume operation. Rather than shutting down and rebooting, you can hibernate OS/2 Warp prior to power-off and have it resume automatically on power-up. Restoring OS/2 Warp from a hibernated state takes only about 15 seconds, as opposed to minutes required for booting the system.

To invoke the hibernate function, create an OS/2 full-screen program object that points to \OS2\SYSTEM\HYBERNAT.EXE. When you launch this program, it displays a message that indicates if the hibernation was successful and when it is safe to power-off your machine. For almost all users (with the following exceptions), the hibernate function removes the need to reboot OS/2 Warp.

- Some device drivers may not be enabled for the suspend/resume operation and will not work correctly when the system is powered on after hibernation. You may need to reboot your system to recover these devices.
- Ejecting a PCMCIA adapter before hibernating and then inserting it after resuming will help preserve the correct operation of the adapter.



Windows 95 Setup

Although Windows 95 is not directly supported by OS/2 Warp's dedicated DOS/Windows session, you can set up your OS/2 Warp system so that it behaves as though it supports Windows 95.

Install OS/2 Warp and Windows 95 in the same partition using dual boot. Before continuing, use dual boot to ensure everything works properly.

Next, create an OS/2 Warp full-screen program object containing the code shown in Figure 2. Set the path name to a command file such as WIN95.COM. You can use the Windows 95 icon to access the WIN95.COM file.

Now, simply click on the object, and OS/2 Warp will hibernate itself and boot up Windows 95. When you return from Windows 95, OS/2 Warp will quickly restore the system to its previous state.

On your Windows 95 desktop, create a shortcut to \OS2\BOOT.COM /OS2 / QUIET. Use the Advanced Program Settings pushbutton to execute the program in MS-DOS mode. Turn off the warning message checkbox and select the checkbox to use the current MS-DOS configuration. This makes the return to OS/2 Warp as seamless as possible.

You can migrate long file names from Windows 95 to OS/2 Warp's 8.3 naming convention with extended attributes by using the Just Add OS/2 Warp utility. You can also install Windows 95 without long file name support.

User Interfaces

When you select a Trapdoor icon, a message appears informing you that Trapdoor uses a special session that suspends other applications (see Figure 3).

If you choose to continue, you will have to restart any communications sessions that were running prior to suspension.

In Figure 3, the OK button is an affirmative response to the question about continuing. The checkbox preceding the second question offers you a way to turn off future occurrences of this message. If you mark the checkbox, it means you want to continue seeing this message. (There is also a checkbox to disable this dialog on the Program page in the program object's Properties notebook.)

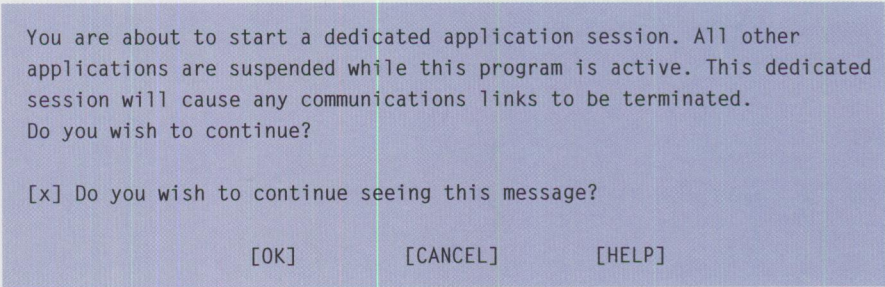
If there is insufficient space to create the hibernation file, you are informed that the Trapdoor request has failed.

The Migrate utility sets up a previously installed application to operate in the Trapdoor environment.

The Workplace Shell program template lets you create a program object for Trapdoor applications that do not exist in the migration database.

Device Drivers

Most of the base OS/2 device drivers have been enabled to save and restore device states during hibernation and resumption. The driver should be capable of restoring the device state if the device is reprogrammed, reset, or powered off. If there is no state information, the driver need not be enabled.



You are about to start a dedicated application session. All other applications are suspended while this program is active. This dedicated session will cause any communications links to be terminated. Do you wish to continue?

Do you wish to continue seeing this message?

[OK]

[CANCEL]

[HELP]

Figure 3. Warning When Starting a Dedicated Application Session

Device drivers are notified to save their states using the Suspend/Resume Strategy Command, 20h - SUSPEND/RESUME. The SUSPEND command saves any device state information to memory before relinquishing control of the device. To regain control of the device, the RESUME command restores any device state information from memory.

A device driver is called with this request packet only if it has turned on the SUSPEND/RESUME support flag of the Capabilities field found in the physical device driver header.

Installation

Install Trapdoor applications in a standard dual boot environment. This lets you verify that the application works correctly in its native environment, and it allows the DOS CONFIG.SYS file to be modified without interfering with the OS/2 CONFIG.SYS file. Then use Add Programs in the System Setup folder to migrate applications.

Trapdoor applications must be installed on a File Allocation Table (FAT) disk partition, because High-Performance File System (HPFS) partitions are not accessible from DOS/Windows. (Remember that, when you are executing in the Trapdoor environment, you are running the application in its native environment.) HPFS is permitted in extended partitions for use by OS/2 Warp.

The FAT disk partition must also be located on an integrated drive electronics (IDE) disk drive. The OS/2 Warp installation program will not install the Trapdoor feature if your system does not have the FAT partition on an IDE drive.

The hibernate/resume logic uses the generic INT 13 BIOS interface to perform

its functions. This logic works with many small computer system interface (SCSI) disk devices; however, some SCSI device drivers put the disk or adapter in such a state that it cannot be accessed through the INT 13 BIOS interface, thus preventing the hibernation logic from working correctly.

If you want to install the Trapdoor feature on your SCSI disk, insert the following command in the CONFIG.SYS file after the first installation phase is complete:

```
SET TRUEMODE=1
```

When the first installation phase is complete, you are instructed to reboot the system. Press F3 at this point to go to a command line and edit the CONFIG.SYS file.

Note: This method will work on many SCSI systems, but it is *not* supported.

If you want to use Trapdoor for Windows applications, you must have already installed Windows 3.1. If you installed Windows in a directory other than \WINDOWS and you want to use the dedicated Windows session, edit the OS/2 CONFIG.SYS file and add the following line to the bottom of the file:

```
SET WIN3DIR=C:\WIN
```

where C:\WIN is the path where you installed Windows 3.1.

Migration

If an application will operate in a WinOS2 session, then that is how it is migrated. If it will not operate in WinOS2, then it is migrated to use the Trapdoor environment.

Windows 3.1 and WIN32S applications are migrated to the WinOS2 environment.

```

REM -----
REM TOP GUN      BY SPECTRUM HALOBYTE CD VERSION
REM -----
NAME             TOPGUN.EXE
TITLE            TOP GUN CD Version
TYPE             DOS
ASSOC_FILE       SETUP.EXE
DEF_DIR          \TOPGUN
SESSION_MODE     DOS_MODE
FOLDER          <WP_GAMES>

```

Figure 4. Migration Database Entry for a Trapdoor Application

If the application does not work suitably in WinOS2, you can modify the session type from WinOS2 to Trapdoor at a later time.

A new `SESSION_MODE` is provided in the migration database for Trapdoor applications. It is called `DOS_MODE`, to emphasize that this is a special environment for DOS/Windows applications. Figure 4 shows a sample entry for a Trapdoor application in the migration database.

The application can have a specific `CONFIG.SYS` file defined in its default directory if necessary. Otherwise, the standard dual boot `CONFIG.SYS` file is used.

No special `AUTOEXEC.BAT` file is provided because most functions, including setting environment variables, can be handled in the `CONFIG.SYS` file. Few applications actually need anything specific in an `AUTOEXEC.BAT` file that is not already supported by the Trapdoor environment's `CONFIG.SYS` file.

Workplace Shell

You can create a Trapdoor icon when the application is not in the migration database. A program template lets you fill in the necessary parameters to launch the application in the Trapdoor environment. You can also change the session type for an existing program object, e.g., from WinOS2 to the Trapdoor session type.

The Properties notebook for a Trapdoor program object (as well as any other program object) contains modifications to the following pages:

- **Program**—Provides the name of the application and its working directory. This page also contains the radio button for the dedicated DOS/Windows

mode and a warning message checkbox to display a reminder when launching a Trapdoor application.

- **Session**—Allows selection of session type, including the new Trapdoor type. The DOS Settings page is not selectable for this session type.
- **Icon**—Allows selection of an icon and title for the program object.

Boot Manager

Trapdoor is installed in a dual boot partition. Dual boot is the mechanism used to switch between the OS/2 and Trapdoor environments.

Boot Manager is a superset of this function. If Boot Manager is enabled, it prompts you to select the operating system to be booted, which can be either another operating system or an OS/2 Warp system that does not support the Trapdoor environment. When the original OS/2 Warp partition supporting Trapdoor is selected, it resumes its normal dual boot operation.

Disk Space

The hibernation file can consume an amount of disk space equal to the size of real memory. Only the physical memory pages actually in use are written to the hibernation file.

The hibernation file space is dynamically allocated and deallocated. It does not exist during OS/2 Warp operation, but the space must be able to be allocated in order to enter the Trapdoor environment.

Hibernate/Restore Operation

Hibernation captures the state of the OS/2 Warp system and the hardware and quickly saves it to disk, allowing the system to

be either rebooted or powered off. When the system is rebooted or powered on, the OS/2 loader recognizes that the system was hibernated and quickly restores OS/2 to its previous state.

With hibernation, the process of running a dedicated DOS/Windows session is simply a matter of clicking on a desktop icon, running the application in a dedicated DOS/Windows environment, and returning to OS/2 Warp when the application is complete. OS/2 Warp's multitasking capabilities are suspended during this operation.

When you launch the application, which behaves as if it were a normal OS/2 Warp application, the following steps occur:

1. You click on an icon representing a Trapdoor application.
2. The system performs the hibernation operations.
3. The DOS kernel loads using the dual boot `CONFIG.SYS` file. A custom `CONFIG.SYS` file is used if one is located in the application's working directory.
4. The application loads and initiates.
5. Once the application exits or the system is reset, the OS/2 Warp loader is invoked. The loader detects a hibernated system and performs the resume operation.
6. When the resume operation is complete, the OS/2 Warp 4 desktop is restored to the original state from which the Trapdoor application was started.

Details

The hibernation feature performs the following functions:

- Evaluates the current state of the system, determining whether hibernation is feasible
- Displays appropriate messages for error conditions, e.g., not enough disk space
- Acquires the disk space for the hibernation file
- Sends suspend notifications to quiesce device drivers
- Stops thread scheduling

- Flushes file system buffer and cache
- Directs the hibernate-to-disk process

When the Trapdoor application exits, the DOS kernel loads and executes the OS/2 Master Boot Record. The OS/2 boot loader detects that the system has been in hibernation and loads the resume program. The resume program restores the OS/2 Warp memory image and then:

- Resumes scheduling of threads
- Sends resume messages to device drivers to restore device states
- Frees the disk space used by the hibernation file
- Refreshes the FAT image in memory from the FAT on disk

DOS Kernel

Using a custom DOS kernel (as opposed to any DOS kernel found in the system) provides several benefits. The main benefit is that OS/2 Warp, even though it is not running, can remain in control of the system. Some features of the custom DOS kernel and its DOS wrapper program are:

- DOS is loaded without any messages to the screen during DOS initialization, so that invocation of the application is seamless.
- There is no need to rearrange the boot partition. If the system is rebooted or powered off or on, the OS/2 loader restores the suspended OS/2 Warp environment.
- When the application exits, the OS/2 Master Boot Record is loaded so that the OS/2 loader operates correctly.

Windows 3.1 Initialization

Windows 3.1 applications are launched with a replacement SYSTEM.INI file in the following steps:

1. The original Windows SYSTEM.INI file is saved in \OS2\SYSTEM.
2. The file is then modified so that the original SHELL=PROGMAN.EXE file is replaced with SHELL=apname.EXE.
3. The original SYSTEM.INI file is replaced immediately after restoring OS/2 Warp.
4. The backup copy in \OS2\SYSTEM is erased, indicating that the application is successfully initialized.

If the OS/2 loader finds that the Windows SYSTEM.INI file still resides in \OS2\SYSTEM (which means that the SYSTEM.INI file was not restored properly), the loader program copies the SYSTEM.INI file to the \WINDOWS directory.

Tips

This section provides several tips for effectively using the Trapdoor techniques covered in this article.

Hibernation and Trapdoor Sessions

Consider the following before performing hibernation or launching a Trapdoor session:

- *Saving data files*—When you work with applications that create files or modify data on the hard disk, it is very important to save your work often. Although hibernation remembers the state of your computer and all open files, it does not save your open files or data files to the hard disk.
- *Communication programs*—You should exit any communication program before using Trapdoor. When you use Trapdoor, all communication activity is stopped. The connection to the online service or host computer is broken and typically cannot be restored. Most communication programs will detect a communication error and notify you when you return to OS/2 Warp.
- *Networks*—If you are connected to a network, you should log off the network before you use Trapdoor. When you return to OS/2 Warp, log on to the network again. This helps to reduce confusion to the network server and increases computer security. Some network connections cannot be restored without rebooting OS/2 Warp.

Installing OS/2 Warp Over Windows 3.1

OS/2 Warp has always provided support for running Windows 3.1 applications. Simply install OS/2 Warp over your existing DOS and Windows 3.1 installation, and OS/2 Warp automatically migrates and runs your Windows 3.1 programs. It also sets up dual boot automatically, so you can switch between OS/2 Warp and DOS/Windows.

Installing OS/2 Warp Over Windows 95

When installing OS/2 on a system that already has Windows 95, be careful about

automatically migrating programs to the Workplace Shell desktop. While OS/2 Warp can run WIN32S applications, it cannot currently run Windows 95 programs. Messages such as "DOS Error 23" and "You need a new version of WIN-OS2" mean you're trying to run a Windows 95 application that does not run under OS/2 Warp.

When installing OS/2 Warp, instead of automatically migrating all applications to your Workplace Shell desktop, choose the "Select New Programs" option. This allows you to select which programs to add. Avoid migrating any applications in the \PROGRA~1 and the \WINDOWS directory (if that's where you installed Windows 95).

Installing Windows 95 Over OS/2 Warp

If your system already has DOS, Windows 3.1, and OS/2 Warp installed in a single disk partition, you can dual boot to DOS, load Windows, and run the Windows 95 setup program. Do *not* install Windows 95 in the \WINDOWS directory—you'll disable OS/2 Warp's capability to run Windows 3.1 applications (because Windows 95 overwrites Windows 3.1 programs to reuse disk space). Install Windows 95 in a separate directory.

After Windows 95 is installed, it won't allow OS/2's dual boot program (BOOT.COM) to run. There are two solutions:

- Shut down Windows 95 into MS-DOS mode, and then run \OS2\BOOT /OS2.
- Create a PIF file to run BOOT.COM /OS2, selecting the Advanced setting of "MS-DOS mode." (See the Windows 95 Setup section earlier in this article.)

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The Personals in OS/2 Warp 4

No, this article isn't about lonely people in search of the perfect mate. Here, the Personals are the IBM Personal Communications Entry (PCOMM-E) products, with the main focus on PCOMM-E's TCP/IP version. This article tells you how to use PCOMM-E(TCP/IP) to easily access your S/390 or AS/400 computer system from the OS/2 Warp 4 desktop.

IBM Personal Communications Entry (PCOMM-E) is a group of entry-level versions of the popular PCOMM for OS/2 32-bit product. It provides a subset of the functionality and connectivity available in the IBM Personal Communications for OS/2 family of full-function products, while preserving the same basic look and feel.

PCOMM-E comes in three versions:

- *Personal Communications/3270 - IEEE 802.2 Entry Level Version 3.4*, for interaction with S/390 applications through a native SNA LAN (IEEE 802.2) connection. PCOMM-E(IEEE) is shipped in the OS/2 Warp AttachPak.
- *Personal Communications/3270 - LUA Entry Level Version 4.0*, also for interaction with S/390 applications. Access to the S/390 is through IBM Communications Server's LUA API or the OS/2 Access Feature. PCOMM-E(LUA) is shipped with IBM Communications Server.
- *Personal Communications AS/400 and 3270 - TCP/IP Entry Level Version 4.1* provides up to two 5250 and/or 3270 GUI display sessions for interaction with AS/400 or S/390 applications, respectively. Access to the AS/400 or S/390 is through the TCP/IP Version 3.5 for OS/2 stack. PCOMM-E(TCP/IP) can take advantage of any transport for which the TCP/IP stack is configured, including LAN, SLIP, or PPP. PCOMM-E(TCP/IP) is shipped with OS/2 Warp 4.

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This article focuses on the PCOMM-E(TCP/IP) version. In the rest of this article, the term PCOMM-E specifically denotes PCOMM-E(TCP/IP).

PCOMM-E Highlights

PCOMM-E gives you access, at your OS/2 Warp 4 PC workstation, to 3270 and/or 5250 applications on host computers.

As shown in Figure 1, PCOMM-E supports up to two host GUI display sessions (called *WorkStation Sessions*). Each session is autonomous, enabling you to have sessions to different hosts, using different emulations, different color mappings, different languages, and so forth.

The 5250 and 3270 applications adhere to any of the IBM 3270 Display Station screen sizes—24x80, 32x80, 43x80, or 27x132—with no need for scrolling. In fact, PCOMM-E's automatic font-sizing capability scales fonts to fit within a session window whenever the window is resized.

PCOMM-E provides additional capabilities to users who have historically used the limited TN3270 and TN5250 emulators that came with IBM TCP/IP for OS/2 products.

For the rare occasion when you may need to resolve a problem, PCOMM-E comes with administration tools. With these tools, you can trace the communications

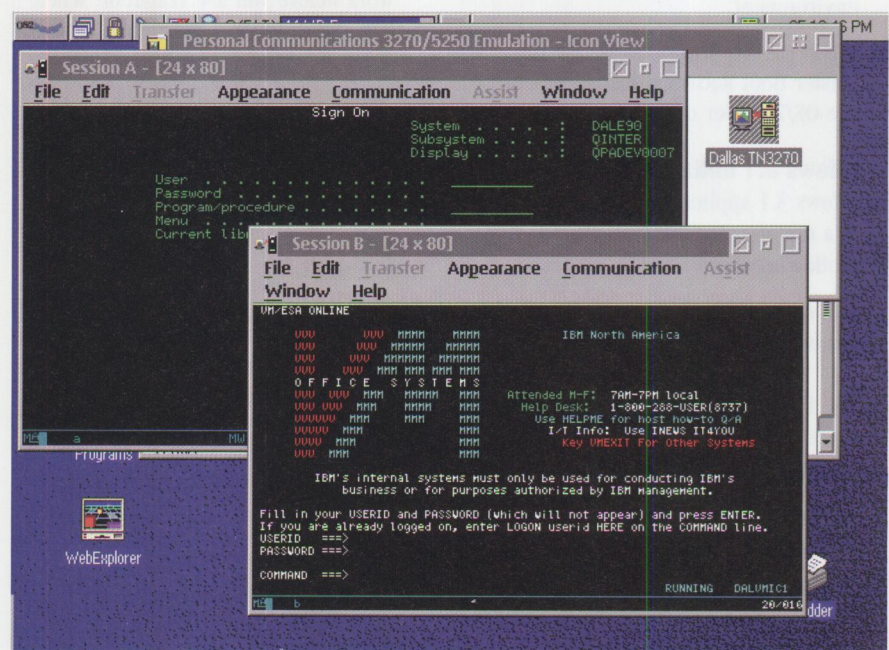


Figure 1. Two WorkStation Sessions (AS/400 and S/390)

between PCOMM-E and sockets, and apply Authorized Program Analysis Reports (APARs), Corrective Service Diskettes (CSDs), and device drivers. Figure 2 displays the tools within the Administration Tools folder.

Key Functions

PCOMM-E provides these major functions:

- 3270 display emulation
- 5250 display emulation
- Color mapping
- Maximum of two sessions
- Models 2 through 5 screen sizes
- Clipboard edit functions (Undo, Copy, Cut, and Paste)
- Printer Definition Tables (PDTs)
- Connectivity via TCP/IP Version 3.5 for OS/2, included with OS/2 Warp 4
- Automatic font sizing
- Trace setup utility
- Maintenance tools for applying CSDs, APARs, and device drivers

What You Need to Know

Prior to installing and configuring PCOMM-E for access to an S/390 or AS/400, you need to determine certain facts:

- Is your S/390 or AS/400 on the same network as your OS/2 Warp host? If not, you need to ensure that a router exists to provide the path between your network and the destination network.
- Is a name server available on the network, or is a host list available in the TCP/IP configuration at the OS/2 Warp host? If so, you need to know the host name of your destination. If not, you need to know its IP address.
- Is only a single interface being used for all sessions between PCOMM-E(TCP/IP) and the S/390 and/or AS/400? If two interfaces are required (for example, LAN to the S/390 and SLIP to the AS/400), you need to ensure that both are enabled.
- Is OS/2 Warp 4 Remote Access being used? If so, Remote Access must be properly configured with TCP/IP as a protocol.

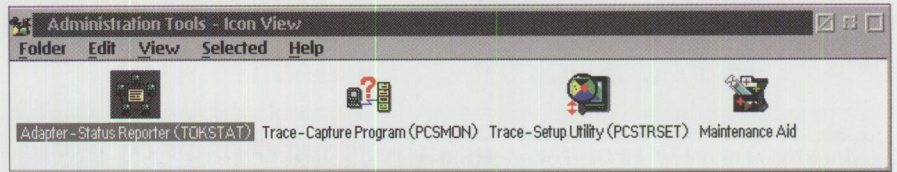


Figure 2. Administration Tools

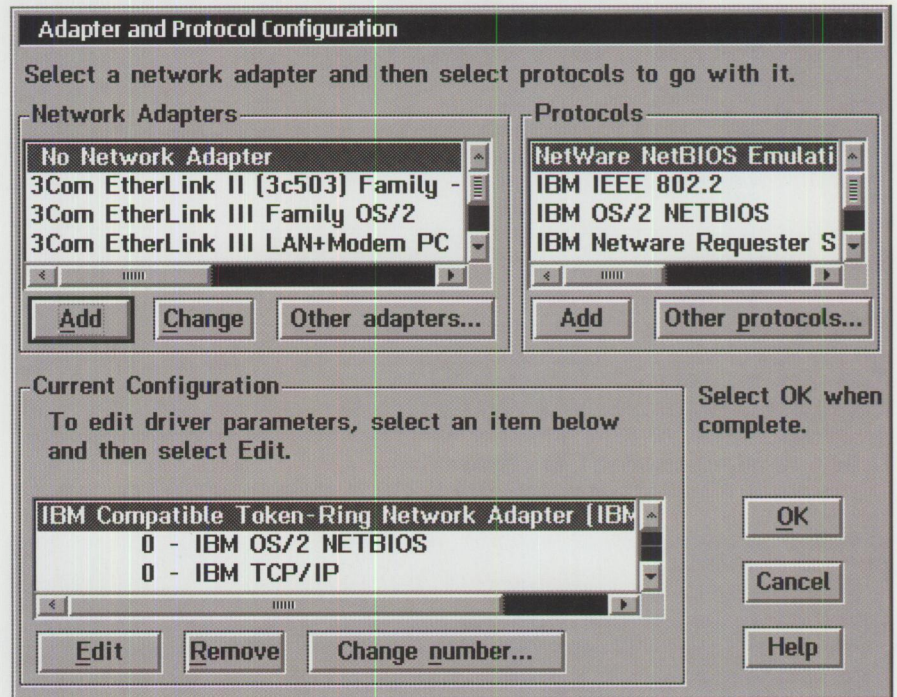


Figure 3. TCP/IP Protocol Bound to Token-Ring

Finally, you need to configure MPTS and/or TCP/IP to address all of these concerns.

PCOMM-E Interfaces

PCOMM-E supports native TCP/IP and TCP/IP encapsulated in NetBIOS. The interfaces available to the OS/2 Warp 4 workstation are:

- Serial Line Internet Protocol (SLIP)
- Point-to-Point Protocol (PPP)
- LAN (Token-Ring, Ethernet, PC Network, or FDDI)
- IBM Remote Access Client
- IBM 8235 Dial-In Access to LANs (DIALS) Client

IBM Dial-Up for TCP/IP lets you use SLIP or PPP through a COM port to connect to another TCP/IP host or to a service provider.

PCOMM-E also accommodates LAN connections supported by MPTS (Token-Ring, Ethernet, PC Network, and FDDI). Asynchronous Transfer Mode (ATM) LAN Emulation is also an option.

Finally, PCOMM-E is supported by the IBM emulated LAN solutions, IBM Remote Access (LAN Distance), and IBM 8235 DIALS. For both Remote Access and 8235 DIALS, PCOMM-E resides on the client machine. The client machine communicates through the workstation's COM port to a server that is physically connected to the local area network. For IBM Remote Access, the server is a software solution; for IBM 8235 DIALS, the server is a hardware solution. In either case, the server gives the remote client running PCOMM-E access to a S/390 and/or AS/400 host residing on the LAN.

When you use either LAN or Remote Access as the transport for the TCP/IP protocol, you must verify your MPTS configuration and modify it as needed.

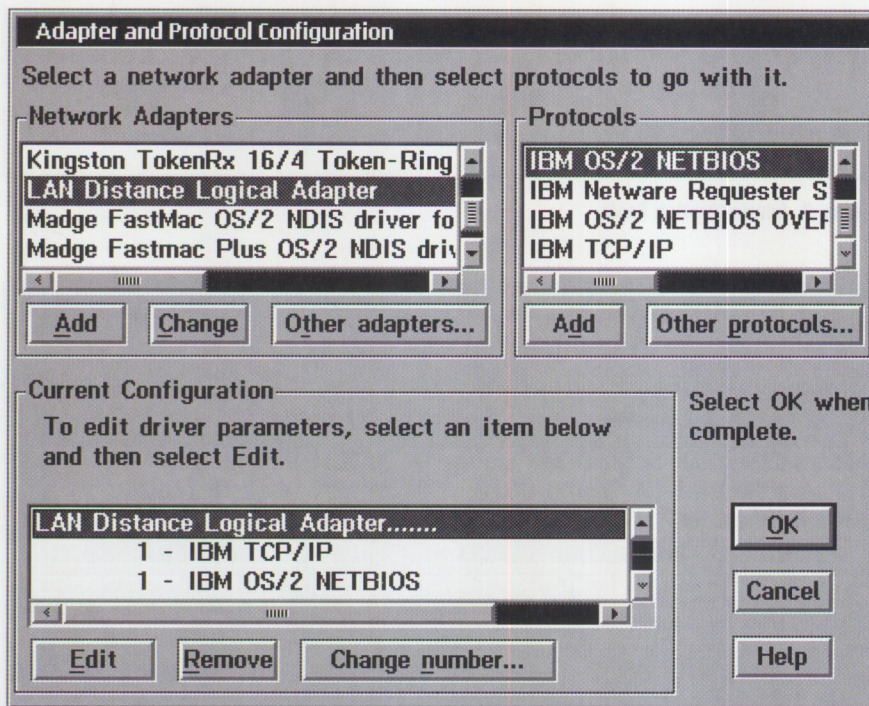


Figure 4. TCP/IP Protocol Bound to LAN Distance

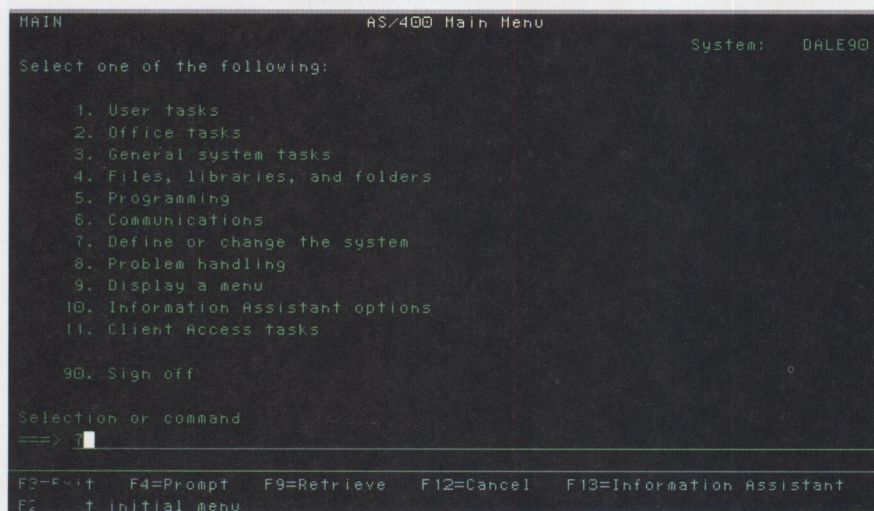


Figure 5. AS/400 Main Menu

You can do this in PCOMM-E's Adapter and Protocol Configuration screen, shown in Figures 3 and 4. In Figure 3, the TCP/IP protocol is bound to the physical Token-Ring adapter installed in the box. In Figure 4, the TCP/IP protocol is bound to the virtual LAN (LAN Distance) adapter provided with Remote Access.

TCP/IP Configuration

You may have to modify your existing TCP/IP configuration if it does not include the routes or name services that allow connectivity to your AS/400 and/or S/390. For the interface(s) that you have

configured and enabled under TCP/IP, confirm the following:

- Verify that the current router definitions will get you to the destination host network and address. If not, add the necessary routing statements to your configuration.
- If you want to use a host name rather than an IP address, make sure the host name exists locally or at the configured name server. Add the host name at either location if it does not exist.

For SLIP or PPP connections, you will need to use the IBM Dial-Up for TCP/IP utility to configure the connection to the destination TCP/IP host, either directly or through a service provider.

AS/400 Configuration

Since this connectivity is via TCP/IP, software running on the AS/400 must include TCP/IP Connectivity Utilities/400 (product number 5763-TC1) as well as OS/400 (product number 5763-SS1). These utilities support the standard TCP/IP utilities and protocols on the AS/400.

PCOMM-E provides access to the AS/400 through 5250 Telnet; optionally, you can use 3270 Telnet. During TCP/IP Connectivity Utilities installation and subsequent setup, the required communication objects are created within OS/400 to allow access by remote TCP/IP applications. AS/400 supports TCP/IP via several media: LAN (Ethernet and Token-Ring), X.25, SDDI, FDDI, and ISDN.

The key information required to configure TCP/IP in OS/2 Warp 4 PCOMM-E is:

- Host name and/or IP address
- A valid userid and password for AS/400
- Whether the TCP/IP daemons (servers) have been started on the AS/400

The next series of steps shows you how to obtain this information. It is important that you work with your information systems professionals to ensure easy, quick access to the AS/400. For example, they will have to set up a valid password and security access to applications and databases on the AS/400.

The first step is to sign on to the AS/400. To do this, find a workstation or terminal attached to the AS/400 with which you want to communicate, and power it on (for a PC, start up Client Access/400). A Sign-On menu immediately appears. After you sign on, you see the AS/400 Main Menu screen (Figure 5).

Next, perform the following steps to determine whether the TCP/IP Connectivity Utilities/400 are installed in the system:

1. In the AS/400 Main Menu, choose option 7, "Define or change the system." (To make this selection, enter 7 on the "Selection or command" line at

the bottom of the screen, then press Enter.)

2. In the "Define or Change the System" screen, select option 2, "Work with licensed programs."
3. In the "Work with Licensed Programs" screen, select option 10, "Display installed licensed programs."
4. In the "Display Installed Licensed Programs" screen, look for 5763-TC1, the TCP/IP Connectivity Utilities. If this program is not listed, you must install it before you can continue.

Once you know that the TCP/IP Connectivity Utilities are loaded, your next step is to gather the configuration information. Return to the AS/400 Main Menu by continually pressing F12 until the main menu is displayed. Then perform the following steps:

1. Enter the command CFGTCP at the main menu "Selection or command" prompt to display the "Configure TCP/IP" screen.

2. Select option 1, "Work with TCP/IP interfaces."

The "Work with TCP/IP Interfaces" screen appears (see Figure 6) and shows the subnet mask to use, plus the line description and line type (for example, *TRLAN = Token-Ring LAN) that the AS/400 is using to provide TCP/IP access.

Note that the Internet address (IP address) for this AS/400 is 9.19.138.5. Remember this address, because you will use it in step 5 to determine the AS/400 host name in the "Work with TCP/IP Host Table Entries" screen.

3. Now, refer to the AS/400 TCP/IP host table to determine the TCP/IP host name of the AS/400. To do this, return to the "Configure TCP/IP" screen by pressing F12.
4. Back on the "Configure TCP/IP" screen, choose option 10, "Work with TCP/IP host table entries."
5. The "Work with TCP/IP Host Table Entries" screen (Figure 7) shows the names and IP addresses of all the hosts that the AS/400 knows about. It also displays the AS/400's host name.

The IP address that you found in step 2 in the "Work with TCP/IP Interfaces" screen,

```

Work with TCP/IP Interfaces
System: DALE90

Type options, press Enter.
1=Add 2=Change 4=Remove 5=Display 9=Start 10=End

Opt  Internet      Subnet      Line      Line
     Address       Mask        Description  Type
-----
     9.19.138.5    255.255.240.0  TRNLIN    *TRLAN
     127.0.0.1     255.0.0.0     *LOOPBACK *NONE

F3=Exit  F5=Refresh  F6=Print list  F11=Display interface status
F12=Cancel  F17=Top     F18=Bottom
    
```

Figure 6. Work with TCP/IP Interfaces

```

Work with TCP/IP Host Table Entries
System: DALE90

Type options, press Enter.
1=Add 2=Change 4=Remove 5=Display 7=Rename

Opt  Internet      Host
     Address       Name
-----
     9.5.69.75     S310
     9.5.87.123    S1010551
     9.19.138.5    DAL90TCP
     9.19.138.6    DAL90TCP.SL.DFW.IBH.COM
     9.19.140.200  DAL61TCP
     9.19.141.241  DAL61TCP.SL.DFW.IBH.COM
     9.19.141.242  KERL
     9.24.1.9      AIXROUTER
     9.38.253.14   AIXROUTER.SL.DFW.IBH.COM
     9.117.32.9    NAMESRUR1
     9.117.32.9    NAMESRUR2
     9.117.32.9    DALUM41B
     9.117.32.9    RCHUMX2

F3=Exit  F5=Refresh  F6=Print list  F12=Cancel  F17=Position to
More...
    
```

Figure 7. Work with TCP/IP Host Table Entries

```

Work with TCP/IP Connection Status
System: DALE90

Local internet address . . . . . : *ALL

Type options, press Enter.
4=End 5=Display details

Opt  Remote  Remote  Local  Idle Time  State
     Address  Port    Port
-----
  *    *    *    ftp-con > 647:34:21 Listen
  *    *    *    telnet    266:26:43 Listen
  *    *    *    telnet    984:34:42 Listen
  *    *    *    smtp      988:35:17 Listen
  *    *    *    snmp      000:00:57 *UDP
  *    *    *    1033      000:00:56 *UDP

F5=Refresh  F11=Display byte counts  F13=Sort by column
F14=Display port numbers  F22=Display entire field  F24=More keys
    
```

Figure 8. Work with TCP/IP Connection Status

File Name (in VM)	Dataset Name (in MVS)	Purpose
PROFILE TCPIP	PROFILE.TCPIP	Main configuration
TCPIP DATA	TCPIP.DATA	Clients and servers configuration file
HOSTS LOCAL	HOSTS.LOCAL	Flat table for name-to-address translation
ETC GATEWAYS	ETC.GATEWAYS	External gateways description
NSMAIN DATA	NSMAIN.DATA	Name server configuration file
MASTER DATA	MASTER.DATA	Name server resource records

Figure 9. Major TCP/IP Configuration Files and Datasets for VM and MVS

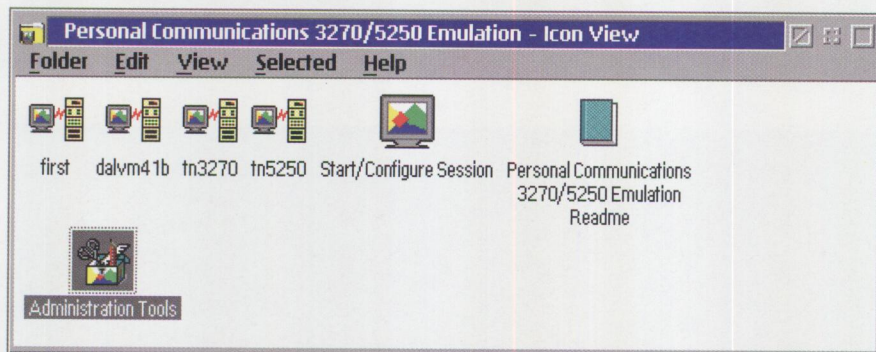


Figure 10. Personal Communications Folder

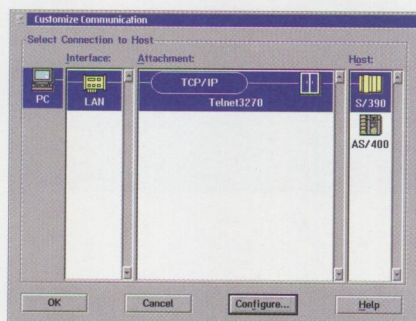


Figure 11. Customize Communication Window



Figure 12. Customize Communication - 3270 Host Window

9.19.138.5, is associated with two names in Figure 7: A simple host name, DAL90TCP, and a fully qualified name (including domain), DAL90TCP.SL.DFW.IBM.COM. These represent the host names and the IP address that you should configure on your workstation to communicate with the AS/400.

At this point, you have all the information you need for connecting to the AS/400 from another TCP/IP host.

The next step is to check which servers (e.g., TCP/IP daemons) are running on the AS/400. This is also where you can determine which other users are connected, and which sockets are being used.

The command to view the current connection status of the AS/400 TCP/IP is either NETSTAT or WRKCNNSTS. Return to the AS/400 Main Menu by continually pressing F12 until it is displayed. At the bottom of the main menu, at the "Selection or command" prompt, type either of these commands and press Enter. You see the "Work with TCP/IP Connection Status" screen, shown in Figure 8.

Before attempting to connect, make sure that your "Work with TCP/IP Connection Status" screen contains a row with the

entry "telnet" under Local Port, as shown in Figure 8. This entry indicates that the AS/400 TCP/IP Telnet server is listening for a remote host connection. If no such entry appears in your screen, then you must restart TCP/IP. To do that, from a command line, type STRTCP to start TCP/IP, or STRTCPSVR to start the TCP/IP servers, then press Enter. You can enter these commands on any screen that has "Selection or command" at the bottom.

S/390 Configuration

For the S/390 host, you need to verify and collect much of the same configuration data that you did for the AS/400 host.

To verify that TCP/IP is installed and configured on the host system, consult its systems administrator.

The system administrator configures IBM TCP/IP for VM and IBM TCP/IP for MVS by modifying configuration files and datasets. At startup time, the configuration parameters for TCP/IP and all its services (server processes) are read from these configuration files and datasets.

Figure 9 summarizes the configuration files and datasets that contain information pertinent to this article. These files are meant to be viewed and altered by the system administrator. For this reason, we will not go into detail about them. If you have system administration responsibilities, please read *IBM TCP/IP for VM V2R3: Planning and Customization* (SC31-6082) or *IBM TCP/IP V3R2 for MVS: Customization and Administration Guide* (SC31-7134) to build and tailor these configuration data sets.

PCOMM-E Configuration

PCOMM-E is installed alongside the base OS/2 Warp 4.

Configuring PCOMM-E(TCP/IP) is as simple as providing a host name or destination IP address. In fact, if both host GUI display sessions (WorkStation Sessions in PCOMM-E terminology) are connected to a single destination, you need to configure only one session, then use the "Run the same" option under File in the menu bar of the PCOMM-E WorkStation Session window.

When PCOMM-E is installed during the OS/2 Warp 4 installation process, a Personal Communications folder is

added to the OS/2 Warp 4 Programs folder. To configure a PCOMM-E WorkStation display session, open the Personal Communications folder (Figure 10) and do the following steps:

1. Double-click on the Start/Configure Session icon. When the Personal Communications welcoming message appears, click on OK.
2. In the Customize Communication window (Figure 11), select the host. The available options are S/390 (3270) or AS/400 (5250) *Note:* The only available attachment listed is the LAN adapter. Even though the adapter type in the configuration panel for Telnet3270 and Telnet5250 is LAN, the physical transport can be any adapter or port that is configured under TCP/IP.
3. Select Telnet3270 or Telnet5250 as the type of attachment, based upon your host selection. (This example uses Telnet3270.) Then click mouse button 1 on the "Configure. . ." button.
4. The "Customize Communication - xxxx Host" (where xxxx = 3270 or 5250) window appears. (Figure 12 shows the 3270 window.) In this window, specify the Session Parameters (Screen Size, Session Type, and Host Code-Page). Then click on the "Configure Link. . ." button.
5. The Telnetxxxx (where xxxx = 3270 or 5250) window appears. (Figure 13 displays the Telnet3270 window.) In this window, enter the Host Name or IP Address. If you have a name server defined in your TCP/IP configuration that has the host name for the S/390 or AS/400, you can enter the host name (simple or fully qualified).

6. To specify Port Number, LU Name, or Auto-reconnect, select "Advanced. . ." to see the screen in Figure 14. In that screen, set the required values. The defaults are valid in most environments. *Note:* Don't confuse Auto-reconnect (in Figure 14) with the Autoconnect option in the Communication menu bar in a WorkStation Session window (discussed below). Auto-reconnect re-establishes a session after a logoff or temporary disruption. Autoconnect pertains only to the initial connection following session configuration.

The default Port Number is valid except when the port is being used by some other application or when the listening

Port Number is different for the host to which you are trying to connect. The LU Name comes into play only when you are communicating through a TN3270E (extended) server.

7. Click on the OK buttons until the Customize Communication window disappears. *Note:* If you are reconfiguring an existing session (or configuring a second session, for example), a window appears asking if you are sure that you want to end the existing session and establish a new session using the new configuration. Click on Yes.

Customization is now complete. The WorkStation Session window is in view and ready to be placed in session with the host.

If you previously selected Autoconnect from the Communication menu bar, an immediate attempt is made to establish a session with the host. If you have not selected Autoconnect, then select Communication from the menu bar of the WorkStation Session window. You see the Communication pulldown menu (Figure 15). In that menu, select Autoconnect to make the connection. (For the difference between Autoconnect and Auto-reconnect, see the note in step 6 above.)

If you require a second session to the same destination, do steps 8a and 8b to initiate the session. If you require a second session to a different destination, do steps 9a through 9f.

Second session to the same destination

- 8a. Select File from the menu bar of the WorkStation Session window. You see the File pulldown menu in Figure 16.
- 8b. Select "Run the Same" from the File menu. A second WorkStation Session window appears.

Second session to a different destination:

- 9a. Select File from the menu bar of the WorkStation Session window. You see the File pulldown menu shown in Figure 16.
- 9b. Select "Save As. . ." from the File pulldown menu. You see the Save WorkStation Profile as window (Figure 17). Enter the file name and a description of the profile to be used as

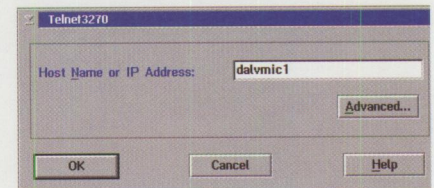


Figure 13. Telnet3270 Window

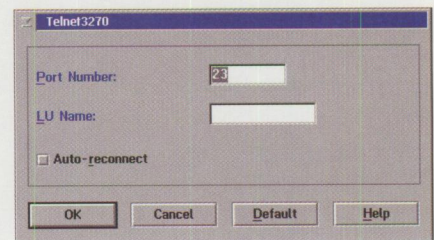


Figure 14. Telnet3270 Advanced Window

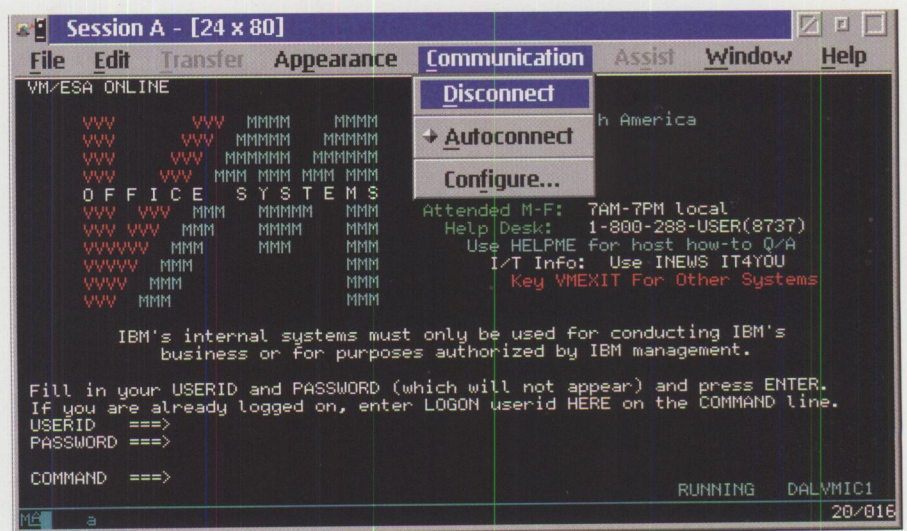


Figure 15. Communication Pulldown Menu

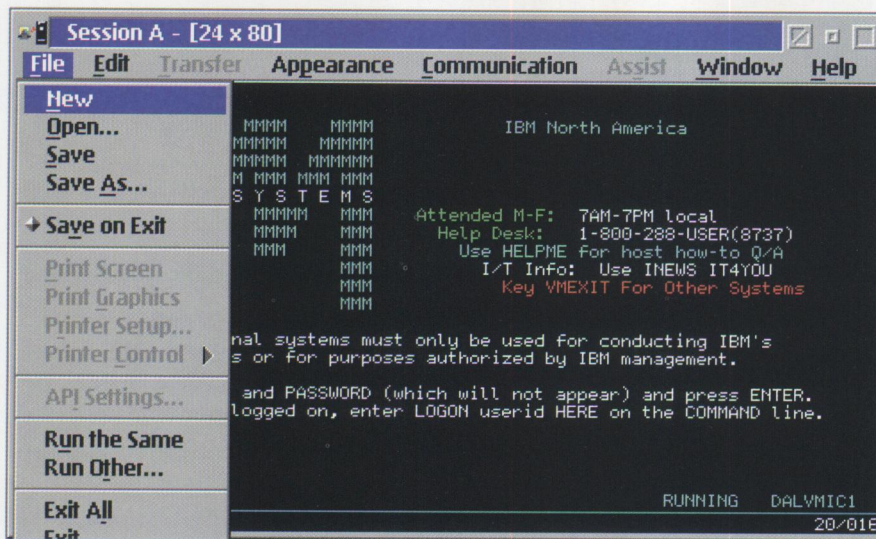


Figure 16. File Pull-down Menu

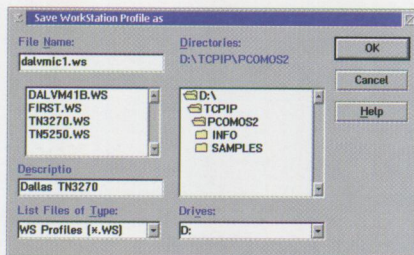


Figure 17. Save WorkStation Profile as Window

the icon name. (If you do not furnish a description, the file name is used as the icon name.) For the sake of simplicity, assume that all files are stored in the default drive and directory, so it is not necessary to enter information into the other fields in this screen. Click on OK.

- 9c. You are asked whether you want to add an icon for this WorkStation Session to the desktop. Click on Yes.
- 9d. When the PCSWS024 informational message appears, click on OK. You are back at the WorkStation Session window (Figure 1).
- 9e. From the menu bar of the WorkStation Session window, select Communication. In the Communication pull-down menu, select "Configure. . ." You see the Customize Communication window (Figure 11).
- 9f. Repeat steps 2 through 7 with the configuration information for the second session. Advanced configuration can be done by editing the PCOMM-E configuration file (*.WS). By manually

editing the file, you can specify the type of terminal emulation and associated functions. Refer to the online help provided with the product for further explanation of the advanced configuration options.

Limitations

Even with the wealth of features discussed in this article, PCOMM-E contains only a portion of the features available in the full-function IBM Personal Communications products.

The limitations listed below are based on a comparison with the PCOMM full-function product. PCOMM-E(TCP/IP) is not intended to replace PCOMM, so you must decide whether PCOMM-E(TCP/IP) fulfills your needs for 3270 and/or 5250 LAN and WAN connectivity.

Note: Functions that are available in the full-function PCOMM product, but not in PCOMM-E, appear in gray in the PCOMM-E menus.

Limitations in PCOMM-E(TCP/IP) are:

- All connections are through the TCP/IP socket interface
- No externalized API support
- Command line file transfer interface only
- No graphics support
- Font set is limited to the IBM3270 set
- Keyboard mapping is static
- No hotspot support

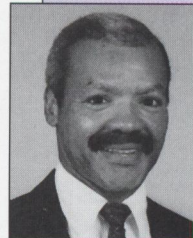
- No popup keypad support
- Menu bar is not customizable
- No tool bar
- No support for advanced edit functions ("copy append" and "paste next")
- No AS/400 PC Support/Client Access features (data transfer and shared folders)

PCOMM-E's limitations, however, do provide a benefit. Storage requirements are reduced, because the connection is TCP/IP only, with limited advanced usability features.



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and data warehouse planning, design, and implementation for the IBM AS/400. During his 28 years with IBM, James has provided technical assistance to customers who developed communication applications for AS/400 and System/3x systems, 3270 workstations and controllers, and host communication configurations. His Internet ID is kerl@vnet.ibm.com.

Corrective Service Information

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

To order all service packages—except for the OS/2 2.0, OS/2 2.1, OS/2 2.1 for Windows, and OS/2 2.0 Toolkit ServicePaks—call IBM Software Solution Services at (800) 992-4777. For the OS/2 2.0 ServicePak (XR06100), OS/2 2.1 ServicePak (XR06200), OS/2 2.1 for Windows ServicePak (XR06300), or the

IBM Developer's Toolkit for OS/2 2.0 ServicePak (XR06110) on diskettes or CD-ROM, call (800) 494-3044. Most OS/2 service packages are also available electronically from the following sources:

OS/2 Bulletin Board Service (BBS): In Software Library, select Option 2. (Corrective services are also listed under the General category on the IBMLink BBS.) To subscribe to the OS/2 BBS, call (800) 547-1283.

IBM Personal Computer Company (PCC) BBS: Call (919) 517-0001.

Service packages are located in Directory 4.

CompuServe: Download service packages from the IBM OS2 FORUM library (GO IBMOS2 IBM DF2).

Internet: Do an anonymous FTP from ps.boulder.ibm.com at /ps/products/. TCP/IP packages are located at software.watson.ibm.com at pub/tcpip/os2.

—Paul Washington,
IBM Corporation, Austin, Texas

Product/Component	Release	CSD Level	PTF Number	Change Date	Comments
OS/2 Standard Edition	1.3	XR05150	XR05150	02-10-93	
OS/2 Extended Edition	1.3	WR05200	WR05200	05-12-93	WR05200 replaces WR05050, which can no longer be ordered on diskette
OS/2	2.0	XR06100	XR06100	09-01-93	XR06100 replaces XR06055.
OS/2 2.10 ServicePak	2.1	XR06200	XR06200	03-01-94	This package is not for OS/2 2.1 for Windows.
OS/2 2.11 for Windows ServicePak	2.11	XR06300	XR06300	05-24-94	
OS/2 Toolkit	2.0	XR06110	XR06110	09-01-93	
	1.3	XR05053	XR05053	03-23-92	
OS/2 LAN Server/Requester ServicePak	2.0	IP06030	IP06030	04-25-93	
OS/2 LAN Server/Requester ServicePak	3.0	IP07060	IP07060	05-10-95	Supersedes IP07045.
IBM LAN Server/Requester OS/2 Warp Connect LS 4.0 ServicePak	4.0	IP08222	IP08222	05-14-96	Supersedes IP08152.
IBM Peer for OS/2 Public FixPak	1.0	IP08185	IP08185	03-21-96	Available electronically only.
Service Bundle CD-ROM	1.0	IP08250	IP08250	05-30-96	Includes IP08222, WR08210, UN00067, WR08150, IP08205, IP06200, IP08185, and XR_W017
LAN Server for Warp Server Public FixPak	1.0	IP08260	IP08260	08-02-96	
OS/2 Extended Services Database Manager ServicePak	1.0	WR06035	WR06035	11-18-93	Supersedes WR06001, WR06002, WR06003, WR06004, WR06014, and WR06015.
DB2/2 ServicePak	1.0	WR07042	WR07042	06-08-95	
DB2/2 FixPak	2.1	WR08090	WR08090	05-06-96	
DDCS/2 ServicePak	2.2	WR07046	WR07046	06-06-95	
	2.0	WR07041	WR07041	02-06-95	

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

Product/Component	Release	CSD Level	PTF Number	Change Date	Comments
Database Manager DB2/2	1.2	WR07047	WR07047	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	
SDK/Windows FixPak	2.1/2.1.1	WR08092	WR08092	05-06-96	
Extended Services Comm Mgr ServicePak	1.0	WR06025	WR06025	11-29-93	
System Performance Monitor (SPM/2) ServicePak	2.0	WR06075	WR06075	12-10-93	
OS/2 LAN Server Macintosh ServicePak	1.0	IP06200	IP06200	03-13-96	
LAN Distance ServicePak	1.1/1.11	IP08205	IP08205	04-17-96	Supersedes IP08175, which superseded IP07050.
OS/2 Network Transport Services/2 SelectPak	2.20.5/2.20.1 2.20.2	WR07060	WR07060	05-10-95	Must be LAPS 2.11 or above. If not, order WR07045 first.
LAN Server 4.0 MPTS ServicePak	4.0	WR08150	WR08150	10-18-95	
LS 4.0 MPTS Warp Connect/Server ServicePak	1.0	WR08210	WR08210	05-15-95	Supersedes WR08152. Requires UN00067 if using TCP/IP 3.0.
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	CTC0010	XR06190	09-15-94	
C Set C++ Utilities	2.01	CTM0006	XR06196	09-15-94	
	2.0	CTL0007	XR06197	09-15-94	
TCP/IP for OS/2 Warp Connect	3.0	UN00067	U200067	05-15-96	Requires WR08210 for TCP/IP to function properly.
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	UN87312	UN87312	03-06-96	
TCP/IP for OS/2 X-Windows Client	2.0	UN59374	UN59374	08-24-94	

Figure 1. Maintenance Release Levels

CSD Naming Conventions

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

All future LAN Server service will adopt the same naming convention for service that is used by OS/2, DB2/2, CM/2, and all the IBM Personal Software Product (PSP) line of products. *FixPak* will be used for all future LS and PSP service offerings; some will be Public FixPaks and some will be Controlled FixPaks. *Public FixPaks* may

be total cumulative service available both in diskette and electronically; or they may be available electronically only. *Controlled FixPaks* will not be generally available until they complete testing and will be available only by contacting Software Solutions Services.

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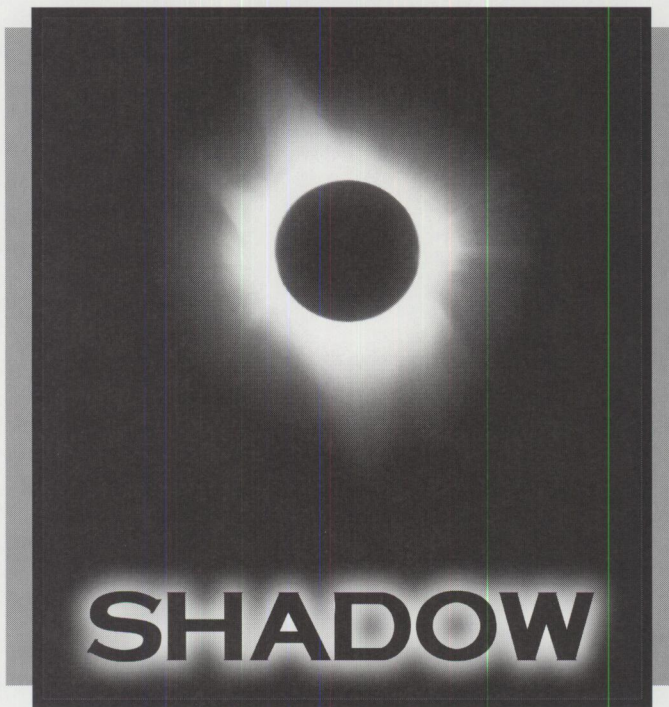
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