



Platform for the 90's!

IBM and Microsoft Software Newsletter

Statement of Direction

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On November 13, 1989, IBM and Microsoft announced a joint statement of direction which enables customers, software vendors and developers to plan for advanced personal computing platforms.

This announcement describes various hardware and software platforms to recognize the varying requirements of the end user.

Another important feature of the announcement is that fact that there will be one "way" to do the work — there will be a graphical user interface that will be consistent across the various platforms. This minimizes training and support expenses, and reduces confusion in the marketplace as to which platform to buy products or to develop software.

This statement of direction is the result of a joint planning effort with Microsoft. Within IBM, it took into consideration the results of various internal task forces which solicited field input and technical assessment of various product strategies and requirements.

A statement of direction is an indication that, although some product features may not be available today, those announced today will be made available at some point in the future.

This announcement represents a joint operating systems positioning by IBM and Microsoft, and we are confident that we have established the "right platform for today and tomorrow".

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Note: Section A of this document which includes the following sections: "Statement of Direction — Basic Information", "Why OS/2?", "Why Windows?", "Windows and OS/2 Positioning" represent joint operating system positioning by IBM and Microsoft. The remaining sections (Sections B and C) represent information developed or obtained by IBM from various sources. Information on products in this publication is based on information provided by the companies listed. IBM does not warrant the accuracy of the information nor endorse the listed products except products bearing the IBM logo. Listed applications may not be made available in every country. For more information about the products, contact the listed companies directly.

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Section A

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Statement of Direction

Basic Information

- Result of joint planning with Microsoft Corporation
- Result of internal task forces, soliciting field input and technical assessment of various product strategies and requirements
- Offerings affected:
 - DOS
 - Windows
 - OS/2 Standard Edition and Extended Edition
 - LAN (Local Area Network) Server and LAN Manager
- Allows a consistent graphical user interface offering for PS/2 product line (80286 and above)
- Protect customer investment in IBM hardware and software
- Statement of direction allows planning for tomorrow while making necessary product transitions and decisions today

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Statement of Direction

Key Messages

- Platform for the "90's"
 - OS/2 and Presentation Manager graphical user interface
 - 32-bit hardware systems with:
 - 386/486 microprocessors
 - 4 megabytes of system memory
 - 60 megabyte fixed disk drives
 - 16-bit hardware systems with:
 - 286/386SX microprocessors
 - 3 megabytes of system memory
 - 30 megabyte fixed disk drives
 - Windows graphical user interface
 - Hardware systems with:
 - 286/386 microprocessors
 - 1-2 megabytes of system memory
 - less than 30 megabyte fixed disk drives
- IBM's LAN Server and Microsoft's LAN Manager will be converged into identical products which will exploit 386 and i486 functions
- OS/2 Extended Edition functions will be available to all OS/2 users

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Statement of Direction

Key Messages (continued)

- Majority of IBM and Microsoft application and systems development resources will be applied to OS/2 solutions
- Beginning in second half of 1990, all IBM and Microsoft applications will be made available first on OS/2 Presentation Manager
- Software vendors who are starting new high performance or server applications targeted toward 386SX/4Mb or larger systems should use the 32-bit version of OS/2
- Acquisition of new hardware systems should be planned to exploit capabilities of OS/2
- OS/2 is the recommended operating system environment for new or existing 286/386 systems with 3Mb or more of memory.

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Statement of Direction

DOS and WINDOWS Basic Facts

- DOS
 - Entry level: 512Kb of memory, diskette
- DOS / Windows
 - Recommended for 80286/80386 systems with 1-2Mb of memory, less than 30Mb of fixed disk
 - Allows the user to run existing DOS or Windows applications
 - Entry graphical workstation
 - Enables multi-application support
 - Provides function for basic LAN client
 - Not intended to be used as server
 - Future releases will not contain advanced OS/2 features like:
 - full distributed processing
 - support for 32-bit flat memory model
 - threads
 - long file names
 - HPFS (High Performance File System)
 - extended attributes

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Statement of Direction

OS/2 (16 and 32-Bit) Basic Facts

- OS/2 (16-bit (80286) and 32-bit (80386, i486) architectures)
 - Minimum configuration: 3Mb of memory, 30 Mb of fixed disk
 - Commitment to continue to expand range of OS/2 capable systems
 - First step: memory in DOS "compatibility box" (approximately 512Kb) will be usable by OS/2 applications when DOS is inactive
 - Function to be available 4Q89
 - Concerted effort to enable OS/2 for 2Mb entry systems as a minimum entry point
 - 4Mb systems will allow customers to take full advantage of:
 - High Performance File System (HPFS)
 - Expanded LAN client features
 - Advanced applications
 - Recommended for server applications

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OS/2 (32-Bit) Basic Facts

- OS/2 (32-bit 80386/80486 architecture)
 - New version in 1990
 - Minimum configuration: 4Mb of memory, 60 Mb of fixed disk
 - Exploits capabilities of 386/i486 microprocessor (OS/2 1.2 exploits only the 286 microprocessor and does not take advantage of the 386/i486 instruction set which addresses a larger memory space)
 - Offers upward compatibility for applications written with today's Presentation Manager applications
 - Offers ability to execute multiple DOS applications concurrently
 - Allow applications to exploit 32-bit flat memory model
 - Further enhancements for server requirements
 - IBM and Microsoft will provide a common OS/2 development toolkit product (pre-release version available by year-end 1989)
 - Future 32-bit versions will offer:
 - Department of Defense security features
 - Full object-oriented capabilities
 - Intent to develop a system that is portable, along with applications, to other instruction sets such as RISC (Reduced Instruction Set Computing) platforms

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Local Area Network and OS/2 Packaging

- Local Area Network
 - Converge two products
 - IBM LAN Server
 - Microsoft LAN Manager
 - Designed to run under base Operating System in both Client and Server Configurations (like LAN Manager today)
 - Enhance converged product to exploit 386/486 functions
- OS/2 Extended Edition functions available to all OS/2 users including full participation in IBM's System Applications Architecture (SAA):
 - Database Manager
 - Communications Manager
 - LAN Requestor and Server

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DOS and OS/2 Operating Systems

Product Positioning

(Entry Points)

	8086	286 386SX 386	286 386SX 386	386
DASD	DISKETTE	<30MB	30MB +	60MB +
MEMORY	512KB	1-2MB	3MB +	4MB +
OPERATING SYSTEM	DOS	DOS / WINDOWS	OS/2	OS/2 32-BIT

The decision to target a given system (hardware) to a particular operating system (software) is generally driven by the type of work to be done on that system and the environment the system operates under. Generally, higher performance systems are purchased for users (or groups of users) expected to run applications in an enterprise or corporate-wide settings, multiple concurrent applications, client server (networked) applications, and compute-intensive applications such as CAD/CAM and desktop publishing.

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Why OS/2?

Today's Application Environment

OS/2 provides the environment and tools to handle:

- Multiple, related applications running concurrently (i.e. multitasking) such as:
 - Mail
 - Calendar
 - Data bases
 - Spreadsheets
 - Decision support
- A powerful, intuitive user interface (Presentation Manager)
 - Consistent interface across applications
- Data as a corporate asset
 - Single application files – shared between applications.
 - Single user database – shared among users
 - Files shared among users
 - Access to workgroup data for calendars, documents, etc.
 - Access to corporate data not on the desktop
 - For consolidation
 - For consistency
- Diverse communications requirements
 - Ability to run various protocols concurrently (i.e., SNA, asynchronous communications)
 - Supports various connection types concurrently (i.e., direct connection, remote, local area network)
 - Full range of connectivity support (i.e., 3270 (coax), Token Ring, Ethernet)
 - Multiple integrated terminal emulators (i.e., 3270, 5250, VT100)
- Reliability
 - Necessary for line-of-business, mission critical applications
 - Necessary for users dependent on workplace tools
- Ease of application development
 - To build complex modern applications
 - To verify reliability of applications
 - With tools, build applications in a shorter time frame with various skill levels

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Why OS/2?

OS/2 User Benefits/Applications

- User benefits
 - consistency of "look and feel" across applications
 - freedom from memory constraints
 - running several applications at the same time
 - extensive graphics usage
 - diverse communications/networking requirements
 - broad data-exchange capabilities
- Typical applications range
 - accounting
 - human resources
 - relational data base systems
 - CAD
 - desktop publishing
 - mission-critical applications
 - real-time, time-critical events
 - update intensive
 - involve many users
 - include distributed functions

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Why Windows?

- Provides a consistent, graphical interface for entry systems
- Provides an easy way to upgrade DOS users to the graphical environment
- Provides an environment where multiple, graphical applications "communicate" with each other
- Provides access to shared resources and services:
 - data base servers
 - mail servers
 - 3270 host connectivity
- Contains a large base of available applications
 - 600 applications shipping today

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OS/2 and Windows Positioning

The debate over the value of a graphical user interface is over. The issue for users and software developers alike is no longer if, but when, to make the move to the graphical environment, and how to manage the transition from the old world of character-based applications.

Many factors precipitated this change: the increasing power and video capabilities of standard PC hardware; the push toward more feature-laden applications, which simultaneously must be easier to learn; and the growing use of PC's for explicitly graphical tasks, such as publishing, CAD, and business presentations.

Finally, but not least, Microsoft Windows and OS/2 Presentation Manager, have established the SAA interface (Common User Access-CUA) as the PC standard, and it is rapidly becoming the most familiar user interface in the world.

For most businesses, the advantages of a common user interface for all of their applications — and in some cases, across systems — is sufficient to justify replacing old familiar programs with a new generation of software.

And the best is yet to come: twenty-eight of the top thirty software developers are writing applications for OS/2 Presentation Manager; and two of every three new PC applications are being written for OS/2 PM or Windows.

OS/2 - The platform for the 90's

OS/2 is evolving rapidly. OS/2 1.2 offers a more powerful user shell as well as the High Performance File System, and improved DOS support. With OS/2 memory requirements getting smaller and DOS compatibility increasing, OS/2 becomes the preferred operating system for 286 and higher systems with 3 megabytes of system memory and 30MB or higher fixed disk drives today. IBM and Microsoft are making a concerted effort to enable OS/2 for 2MB systems. For 386 systems with 3 megabytes of system memory, there should be no choice but OS/2.

Several major PM applications were shipping by year-end 1989, including Microsoft Excel, Aldus PageMaker, Micrografx Designer, and Describe Inc.'s Describe, as well as hundreds of character-based applications including IBM DisplayWrite 5/2, LOTUS 1-2-3 3.0, Information Builders PC Focus, Microsoft Word and WordPerfect 5.0. Every major applications category will be supported under Presentation Manager over time. (See Appendix C for a list of OS/2 PM applications).

More importantly, even among the early applications, many are taking advantage of OS/2-specific features to provide functionality beyond what is possible on DOS and Windows. PageMaker uses OS/2 threads to increase performance, allowing users to load a large document while editing another. There is no hourglass (an indicator that Presentation Manager pops up to signal that the system is busy) in PageMaker, either. The user interface remains active — responsive to the user — even when another task is running. The use of threads allowed Aldus to make the user interface extremely responsive to the user. While OS/2 carries forward DOS user conventions to facilitate the transition, OS/2 is a new operating system from the ground up, intended to replace DOS and serve as the platform for a new class of applications. OS/2 also enables a high degree of applications integration on the workstation, and via the network.

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Windows Enhances DOS

The success of Microsoft Windows over the past two years indicates that many users want a simple, low-cost entry point that provides a graphical interface — without burning their bridges to the familiar DOS world. Windows provides a bridge to OS/2 for new and installed 80286 and 80386 systems with 1-2 megabytes of memory or systems with less than 30 megabytes of fixed disk.

Windows and OS/2 may look a lot alike, but Windows is still a DOS-based system, and inherits many of the limitations of DOS. Windows, for example, retains the DOS FAT file system. The new High Performance File System gives OS/2 the edge in file system response time; plus offers support to large drive partitions, and usability features such as long file names and extended attributes.

Windows is essentially a DOS extender for Windows applications, allowing them to access memory beyond 640K while still running on DOS. Windows will be the catalyst to move large numbers of new and installed PC's to the graphical user interface, and as such, enhances DOS with a graphical user interface. Applications are available for Windows today and more are under development. (See Appendix C for a list of Windows applications).

Windows will continue to be optimized for 1-2 megabyte systems. Future enhancements will include access to protected mode memory for applications, improvements to the visual interface and shell that will look like OS/2 for consistency, and enhanced support for networks.

Customers have a choice

Windows presents customers with a choice: to move directly from DOS to OS/2, or to migrate some or all of their systems to OS/2 via a Windows transition. This determination depends on the hardware configuration and application requirements of the customer using the system.

Customers making key decisions today should consider the following:

System: If the system is 286 or a 386SX or 386-based, with at least 3MB memory and 30MB DASD or higher, the decision should be simple: OS/2. Clearly customers making decisions today should consider the long term technical performance benefits of 386 architecture and invest in an operating system which will fully exploit it.

OS/2 is aimed at more powerful machines: larger 286, 386 and 486 PC's where users require a high performance, multitasking graphical workstation.

Windows is targeted at the low end: the installed base and new users who purchase 286 and 386 machines (with 1-2 MB of memory or less than 30Mb fixed disk).

Applications: Most customers are making decisions based on purchased applications. In the applications section of this newsletter, is a list of available Windows and OS/2 applications. Most customers will want to develop their mission critical applications under OS/2.

Today, Windows and OS/2 offer similar functionality in key areas, such as the graphical user interface and DDE linking. Over time, the differentiation between Windows and OS/2 will become more pronounced as OS/2 is enhanced for high-end hardware and applications take advantage of OS/2 specific features.

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OS/2 Leaps Beyond DOS

Where Windows is optimized to work well within 1-2Mb, OS/2 is optimized for performance and functionality. Although OS/2 offers compatibility with DOS applications, and a nearly identical command syntax, it is not based on DOS or constrained by DOS I/O. OS/2 enables new kinds of applications which fully exploit the hardware and the network. OS/2 features such advantages as distributed processing, High Performance File System (HPFS), threads and files with long file names.

An entry OS/2 configuration requires 3Mb of memory. Working within this higher minimum memory requirement as compared to Windows, the role of OS/2 is to provide a platform for new kinds of high performance, high reliability applications, which exploit the power of the 286/386/486 platform and advance the strategic utility of corporate networks.

Where OS/2 Shines

The earliest examples of the unique kinds of applications which OS/2 makes possible can be broken into three broad categories: advanced network servers (LAN Manager and LAN Server) and server applications (such as SQL Server and OS/2 Extended Edition); high performance dedicated graphics workstations for CAD or publishing; and corporate development efforts for "mission critical" applications or process control. Saros FileShare is a good example of the kind of workgroup applications enabled by LAN Manager and OS/2.

The converged OS/2 LAN Manager and LAN Server uses OS/2 protected mode multitasking and large memory support to excel as a high performance network operating system. It also derives the greatest immediate benefit from the faster response time of the High Performance File System. Most significantly, it can function as an applications server, running the network and simultaneously supporting multiuser back-end applications — such as SQL Server — for front-end DOS, Windows or OS/2 clients.

For dedicated graphics workstations, OS/2 provides very high system throughput and sophisticated graphics processing capabilities that translate directly into greater productivity for the user. PageMaker's use of threads not only allow it to provide an instantaneously responsive user interface, but also to run time-consuming tasks, such as assembly of documents from a word processor or autoflowing, in the background. An OS/2 based editorial system from CText Inc. is being installed this year at the Chicago Tribune, which also chose OS/2 because of its multitasking and good response time. CAD programs such as AutoCAD and VersaCAD are also being extensively rewritten to provide new features and better processing under OS/2. PM's advanced features such as presentation fonts (which can be blown up to arbitrary point sizes), and ability to do transformations (tweak and rotate entire coordinate systems or fonts), paths and clipping, give developers a much richer set of graphics functions than exist in either Windows or on the Macintosh. OS/2's more sophisticated metafiles also enable drawing and presentation packages to share high complex graphical images.

Finally, OS/2 is being applied to a wide range of corporate applications that require large memory, pre-emptive multitasking, an integrated graphical user interface, and communication links to IBM large systems. American Airlines is using OS/2 for its inventory management decision support system. Ford is building its automotive diagnostic system on OS/2 and PM; and companies such as TRW Technar and Ralston-Purina are building factory floor process control systems using OS/2. A major New York financial services firm is converting all of its

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trading workstations from Windows to OS/2 because of OS/2's superior performance for multi-tasking applications, and it's greater protection against data corruption and system crashes. Travelers Insurance is developing a network management system using PM; and Delta Airlines has implemented a mailbag sorting system based on OS/2. The list of companies that have adopted OS/2 early to build unique solutions (Fireman's Fund, Bank of America, Merrill Lynch, Amoco, Kentucky Fried Chicken) is growing rapidly.

Many of OS/2 strengths -- pre-emptive multitasking, multithreaded architecture, hardware enforced protection between applications -- are invisible to the end user. But they are critical to building the kind of communications-oriented applications these customers require. On networks, OS/2 will be necessary for network management, remote processing, and for peer and distributed services. Again, OS/2 enables new kinds of applications.

Features that set OS/2 apart include:

Threads

The real advantage of threads is system throughput, more than the apparent utility to the end user of multiple simultaneous tasks within a single application.

Under Windows, DOS controls the file system, basic file management, and I/O. DOS limits the system throughput. OS/2 however, can overlap operations (keyboard/mouse and CPU, disk and CPU) -- resulting in better performance for the user and more efficient use of memory. All of the recent reviews of OS/2 PM PageMaker attest to the enormous performance and productivity gains afforded by the use of threads in an applications otherwise undifferentiated from its Windows version.

Threads also allow the system to respond quickly to asynchronous events -- critical for communications (3270) and server applications.

Better development environment

- Simpler due to larger address space and more memory.
OS/2 extends this advantage in its 32-bit release for the 386, where applications will have access to a 32-bit wide flat address space. This means applications can have access to up to 4GB of memory and are free from the restrictions of a segmented architecture (i.e. having to break applications up into less than 64k chunks.)
- System provides more information about program bugs, and constrains program misbehavior.
- SAA and the portability of applications across system architectures (PS/2, AS/400, 370)
- Asynchronous notification and support for priorities simplifies communications and control applications.

IBM & Microsoft recommend that all corporations starting mission critical PC development work write for OS/2, as it is a better programming environment and the strategic platform for the long term.

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The Future

With the 386/486 release of OS/2 next year, the case for OS/2 gets stronger. The following features will afford users significantly better performance, high reliability, greater ease of use and functionality.

- Support for multiple simultaneous DOS sessions; and protection for the rest of the system from DOS application failures
- The flat memory model and 32-bit APIs (application programming interfaces) will offer much better performance and simplify the development of new applications.
- Demand paging improves the performance of all applications (including 16-bit and DOS applications) and offers more efficient use of system memory.
- Increased system limits (threads, processes, pipes, file attributes, open files)

Windows and OS/2 will resemble each other over time with regard to the user interface. Some features introduced in OS/2 may eventually be migrated to Windows, as minimum memory requirements allow. To facilitate the transition to OS/2, IBM and Microsoft are fully committed to providing customers and ISVs with tools to help migrate from Windows applications to OS/2 applications.

Other features which enhance OS/2 functionality include:

- Object oriented enhancements and programming support
- Support for advanced hardware architectures, and multiprocessor systems
- Better system security
- Distributed processing

It should be noted that some of the above functions will be available only in the 32-bit version of OS/2.

Managing the Transition

Sooner or later you will be using OS/2.

It makes sense that for most organizations the transition will be gradual. In many cases, OS/2 will be phased in with new hardware purchases. Corporations should identify applications and/or specific groups of users which stand to benefit from OS/2, and begin implementation where the return is most immediate. In some instances, these applications will be executive information systems providing graphic representations of daily sales information to corporate officers; in other situations it will be the clerical support staff who most need multitasking and the ability to produce high-quality output.

Since OS/2 is the strategic platform for the long term, we recommend to companies developing their own applications in-house, that they begin developing now for OS/2. However, Windows should be considered an entry vehicle that provides a upgrade path to the OS/2 system.

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IBM and Microsoft strongly encourages all organizations to standardize on 386-based machines, with at least 2, and ideally, 4M-bytes of memory installed. For most companies the cost of buying the memory up front is substantially less than retrofitting the hardware later. The benefit of the 386 is not only increased processing speed, but the ability to run 386-specific software over the life of the machine. Moreover, experience has shown that the cost of investing in a graphical user interface is more than offset over time by reduced training and support costs.

OS/2 will be introduced into many organizations as the network server, providing database and other back-end application services to DOS, DOS/Windows and eventually, OS/2 client workstations. In this way, the network serves as a tool for migrating to OS/2, and for integrating DOS/Windows and OS/2 workstations.

The right solution is to acquire an operating system which will fully exploit the hardware technology. The choice is OS/2.

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Section B

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Graphical User Interface

Basic Views/Facts

- "They're the wave of the future"
- "Everybody needs one — or maybe a lot of us don't"
- "...is far from being universally accepted, but is still the core of a great idea"
- Definition — "a user interface that runs in a computer's graphics mode"

Source: PC Magazine - September 12, 1989

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Graphical User Interface

Basic Views/Facts

- Exploits bitmapped displays, offering true WYSIWYG screen representation of printed output
- Is a graphically oriented interface, making extensive use of icons
- Has good screen aesthetics, looks good and a pleasure to work with
- Allows direct manipulation of screen elements
- Embraces the object-action paradigm
- Offers standard expected elements to provide consistency (menus, window elements and dialog controls)

Source: PC Magazine - September 12, 1989

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Graphical User Interface

Additional Requirements

- Strong set of user-interface controls and tools to build applications
- Provide consistency across platforms and applications
- Ease of use and visual appeal, ease of installation and configuration, enjoyability
- Productivity (WYSIWYG) - information via graphics
- Flexibility - support for keyboard and mouse as well as peripherals
- User customization and personalization

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System Application Architecture (SAA)

Goals

- Increased programmer and end-user productivity
- Enhanced ease of use and support by providing consistency across applications
- Improved communications capability and usability for enterprise-wide solutions
- Increased return on customers' information systems investment via greater leverage of programmer resources and user experience

Operating System/2 meets the above goals

Source: IBM Systems Journal - Volume 27, No. 3, 1988

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System Application Architecture (SAA)

Components

- Common User Access (CUA)
 - End-user Interface
 - controls how the system, including the applications, interacts with a person at a terminal

- Common Communications Support
 - Interconnect protocols
 - deals with how systems work together to accomplish a job

- Common Programming Interface
 - Applications enabling
 - specifies how a programmer is to write and attach a new application to IBM's family of SAA systems

Operating System/2 features all of the above components

Source: IBM Systems Journal - Volume 27, No. 3, 1988

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OS/2 Version 1.2

Highlights

IBM has announced OS/2 Standard Edition V1.2 and Extended Edition V1.2. These announcements bring some exciting new functions and features to end users and to application developers. OS/2 Standard Edition V1.2 is available now.

Both OS/2 Standard Edition V1.2 and OS/2 Extended Edition V1.2 contain the following enhancements:

- **ONLINE COMMAND REFERENCE**
 - available as an online electronic book.
 - contains table of contents, topic pages, index
 - search facility for specific words or phrases
 - facility to establish electronic bookmarks
 - to easily return to a section that is used frequently
 - user can cut sections from the book and paste them to a file (to make a personalized abbreviated reference document)
- **OS/2 INFORMATION PRESENTATION FACILITY**
 - assists application developers in designing help panels
 - contains built-in function to service end-user help requests
 - panels can be developed by someone other than a programmer
 - used by Dialog Manager and Presentation Manager
 - panels and application code can be combined into the total application
- **NEW INTERFACE FOR FILE MANAGER**
 - allows the user to display files as icons instead of file name lists
 - DOS or OS/2 programs can be started by selecting an input file from the file list and "dragging" it to an icon of the program
 - files can be moved, copied, and printed by using a mouse to "drag" an icon of a file and "drop" it on an icon of a disk drive or the Print Manager
 - search capability allows search of file names/properties using "wild cards"

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- NEW INTERFACE FOR DESKTOP MANAGER
 - icon display for programs or group titles
 - user can choose to display more than one group of programs
 - programs can be moved, copied or added to a program group by selection from the File Manager or Desktop Manager using the "drag" and "drop" technique
- NEW INTERFACE FOR PRINT MANAGER
 - allows user to manage print requests
 - can direct print output to a specific print queue
 - user can configure printers/plotters and queues from the Print Manager instead of using the Control Panel
- DIALOG MANAGER
 - productivity aid to assist application developers in managing input / output between their applications and the end user
 - packaged with IBM OS/2 Programming Tools and Information V.1.2
 - allows efficient implementation of application dialogs that take advantage of Presentation Manager facilities
- HIGH PERFORMANCE FILE SYSTEM (optional)
 - manages large disk media in a fast and consistent manner
 - supports DASD with as many as 16 partitions
 - handles partitions as large as 2 gigabytes
 - less performance sensitive as file sizes and/or directories get very large
 - works with files that have either traditional file names or long file names
- NEW PRINTER DEVICE DRIVERS
 - all device drivers delivered with OS/2 V1.1 (either with the product or with its device support supplement) will be packaged as separate media and shipped with the V1.2 base operating system.
 - the following drivers are available with OS/2 V1.2:
 - a PostScript device driver to allow applications to output PostScript to the IBM Personal Page Printer II Models 4216-30, 31, and other printers with PostScript output capabilities
 - an Epson device driver that supports devices compatible with the Epson FX80 (9 wire) and the LQ1500 (24 wire) series of wire matrix printers
 - a generic Printer Control Language device driver that supports printers compatible with the Hewlett Packard LaserJet and LaserJet II series of printers will be available January 31, 1990

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- PRESENTATION MANAGER ENHANCEMENTS
 - Presentation Manager programs may now be written in IBM FORTRAN/2 and IBM COBOL/2 as well as the previously announced IBM C/2 1.1 and IBM Macro Assembler/2
 - takes full advantage of OS/2 Information Presentation Facility (described above)
- SYSTEM EDITOR
 - executes as a windowed Presentation Manager application
- IBM DOS COMPATIBILITY
 - additional memory will be available for DOS applications in OS/2 V.1.2 compared to the same environment in OS/2 V.1.1
 - DOS programs can be started directly from the Desktop Manager or the File Manager
- DUAL BOOT
 - allows the user to boot either OS/2 or DOS from the same fixed disk drive for systems configured with the File Allocation Table (FAT) file system
- RELIABILITY, AVAILABILITY AND SERVICEABILITY
 - improvements in collection, logging and reporting of detailed information should a system error occur
- DEVICE INDEPENDENCE
 - display and mouse device drivers rewritten for OS/2 V.1.2 to facilitate attachment of additional devices not normally supported

OS/2 Extended Edition V1.2 contains the following enhancements:

- INSTALLATION ENHANCEMENTS
 - all components of OS/2 Extended Edition V1.2 (OS/2 Standard Edition, Communications Manager, Database Manager, and the LAN Requester) use a common installation process
 - allows the ability to tailor the install process for other users
 - provides more flexibility in the choice of functions to be installed or disregarded
- BASIC CONFIGURATION SERVICES
 - enhances the ease of installing Communications Manager
 - intended to assist an end user who does not have the support of a systems administrator to install the program and have it running in a number of communications environments

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- BATCH CONFIGURATION SUPPORT
 - designed to assist a systems administrator supervising the installation of many similar end users, such as members of a department or multiple branch offices, e.g.
 - first, establish an individual prototype configuration file that is representative of the user set
 - then create a file that contains the essential differences between individual end users
 - finally, build a configuration file for each user, and the resulting file for subsequent installations
- IBM PROCEDURES LANGUAGE 2/REXX
 - allows the use of IBM Procedures Language 2/REXX in three ways:
 - to write command procedures and macros for OS/2 programs
 - to write programs with imbedded SQL statements to access data stored in the Database Manager
 - to write programs that call the Query Manager Callable Interface
- LAN REQUESTER ENHANCEMENTS
 - requires the IBM OS/2 LAN Server 1.2
 - uses the same User Profile Management (UPM) used by other components of IBM OS/2 Extended Edition V1.2
 - the same User ID and password can access resources controlled by both the Database Manager and the OS/2 LAN Server V1.2
 - when logged on to OS/2 LAN Server V1.2, the LAN Requester can operate with two additional LAN protocols:
 - Ethernet DIX V2.0
 - IEEE 802.3
 - supports several new categories of API's and additional calls to LAN API's for:
 - LAN interprocess communications
 - network management
 - network messaging
 - shared resource management
 - security
 - network services

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- **COMMUNICATIONS MANAGER ENHANCEMENTS**
 - allow OS/2 EE applications to access host applications using LU type 0
 - programming language support for interfaces include C/2, COBOL/2, Pascal/2, and Macro Assembler/2
 - links supported are X.25, Token-Ring Network, SDLC, and PC Network, either directly to a host or through an OS/2 EE SNA gateway
 - Ethernet support via DIX 2.0 or IEEE 802.3
 - provides SNA gateway that supports up to 254 devices
 - LU(0-3), LU 6.2, X.25
 - additional 3270 enhancements (host print, host graphics and PM support)
 - asynchronous enhancements (7/8 bit and additional modems)
- **DATABASE MANAGER ENHANCEMENTS**
 - supports X.25 connectivity
 - supports download of data from DB/2 and SQL/DS
 - provides ability to specify automatic table creation and automatic import of data at time command is issued
 - Presentation Manager support for Query Manager
 - Remote Data Services (RDS) support for local area networks
 - additional administrative services and languages (COBOL/2, FORTRAN/2)
 - additional SQL data integrity

With these enhancements, OS/2V1.2 and the OS/2 LAN Server V1.2 support your customers' total processing and communications environment. They are capable of supporting your customers' needs today and their growth for tomorrow.

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OS/2 LAN Server Version 1.2

Highlights

IBM OS/2 Local Area Network (LAN) Server Version 1.2 provides significant enhancements over previous IBM server products which allow users to share computer resources such as files, application programs, modems and printers over local area networks (LANs).

- **Basic Facts**

- servers provide the user with network resources just as if they were a physical part of the user's own workstation
- supports both DOS and OS/2 users
- runs on 4- or 16-megabit Token-Ring LAN, the IBM PC Network, or on Ethernet DIX Version 2.0 or IEEE 802.3 LAN
- Single Systems Image concept (IBM-unique)
 - resources of multiple servers, on the same or multiple LANs can be managed by a single administrator and accessed by any authorized user

OS/2 LAN Server Version 1.2 includes the DOS LAN Requester and LAN Support Program with the following enhancements:

- requesters allow individual workstations to access the server on a local area network
- the OS/2 LAN Requester is included in the OS/2 Extended Edition operating system
- the DOS requester was (until now) a separate program
 - multiple DOS workstations can access the server at a dramatic cost savings to the customer
 - in systems with extended or expanded memory, the DOS LAN Requester will allow 25-35K more space for applications in a DOS 4.0 environment (10-20K more space in a DOS 3.3 environment)
- LAN Support Program Version 1.1 is an interface between the LAN adapter card and the DOS LAN Requester
 - included in the OS/2 LAN Server Version 1.2 package for use with the DOS LAN Requester

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- OS/2 LAN Server Version 1.2 Performance Advantages
 - with the High Performance File System capabilities of OS/2 Extended Edition 1.2, server performance is enhanced, particularly for random operations such as queries
 - the number of open files allowed for a single server is now 8,000, up from 255 for the OS/2 LAN Server Version 1.0
 - this increase removes bottlenecks on LANs with multiple users simultaneously accessing many files.
- User Profile Management
 - permits workstation users to logon to both the OS/2 LAN Server Version 1.2 and the OS/2 Extended Edition Version 1.2 Database Manager with a single user ID and password
 - the combination of remote relational database access for retrieving information, along with server power to access applications, devices and other resources on the LAN, offer users new levels of efficiency and flexibility
- File Replication Service
 - allows critical files to be replicated from a server to the same server's fixed disk, or another OS/2 server or requester on an user-defined time-interval basis for file protection and data integrity
 - critical personnel documents could be replicated and be available on a back-up server should the primary server fail
 - control information describing the LAN server configuration may be backed up to another workstation to ensure network availability
- Other OS/2 LAN Server Version 1.2 Enhancements
 - a substantial increase in new application programming interface (API) categories, as well as additional LAN API calls already announced
 - gives the programmer a simplified method for creating applications involving: network management, network messaging, shared resource management, LAN interprocess communications, security and network services.
 - Enhanced Access Control allows increased granularity in defining resource access for a user or groups of users
- Migration Utility
 - Domain Control Database Migration Utility
 - assists with the migration of information regarding LAN users and resource access to OS/2 LAN Server Version 1.2 from IBM PC LAN Program Version 1.3 and IBM OS/2 LAN Server Version 1.0

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OS/2 Development Tools

Overview

This positions several of the OS/2 Presentation Manager Development Tools available on the market today.

This guide contains abstracts of seven PM Development tools in a summary fashion and attempts to position each in terms of the related skill level required to use the tool. The cover page displays the packages in relation to the required skill level. In ALL cases, you must use the OS/2 Programming Tools and Information Version 1.2.

Each product listed contains the following information:

- A Product Overview
- What User Group the software is targeted for
- Channels of Distribution - i.e., store, direct sales, etc.
- Price of the Product
- Education available for the product
- Support Available for the product
- What type of marketing programs the vendor does - if known
- What type of deliverable are available - if known
- References if available
- Vendor Contact Information

For more information on OS/2 Presentation Manager Development Tools consult the Fall, 1989 issue of "IBM Personal Developer," and the October 6, 1989 FTN videotape on OS/2 Development Tools for PM.

Also included is a copy of the "Microsoft Application Guide Shipping Update: Tools" which lists other OS/2 and PM application development tools including contact information.

Easel for OS/2 EE and Dialog Manager are IBM products and are the only products reviewed in this section which are sold and supported by IBM. As an IBM-logged product, Easel for OS/2 EE and Dialog Manager do comply with SAA standards. Although other products are being reviewed here, there is no implied or stated relationship between these vendors and IBM. We have tried to represent these products as fairly as possible. The intent of this information is to provide a initial source of information for available PM development tools. Dialog Manager is included in the OS/2 Programming Tools and Information Version 1.2 and is not sold as a separate product.

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OS/2 Development Tools

DEVELOPMENT TOOLS | USER

LOW LEVEL
SKILL

P
R
O
G
R
A
M
M
E
R
S

O
S
2

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APPLICATIONS
MANAGER

EASEL FOR
OS/2 EE

DIALOG MANAGER

CASE/PM
MIRRORS
MICRO FOCUS COBOL/2

C++
SMALLTALK/V PM

LANGUAGES --
C
MACRO ASSEMBLER

HIGH LEVEL
SKILL

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OS/2 Development Tools

Object Oriented Programming Systems

(OOPS)

Before listing each of the software programs one must understand about Objected Oriented Programming and the benefits that customers can achieve by its use.

Object Oriented Programming Systems (OOPS) is becoming the new standard in programming for OS/2 and is heavily used in PM development tools.

OOPS has different meanings to the end user and to the programmer:

To The End User: It is the ability to relate to the object one sees on the display, and make an action as a result. It is a real world representation which allows the user to understand and interact with the associated action. An example: to discard a file from the system, you would move it from the directory and place it on the icon that resembles a trash bin.

To The Programmer: An object is a collection of data, rules, interfaces, and code that once defined, allow for faster, more productive programming and systems documentation. Once defined, this object oriented program then can be accessed and replicated by others for a tremendous increase in productivity and cost savings in systems design and programming.

For a better understanding of OOPS, please refer to the articles that appear in the "In Depth" section of *Byte Magazine*, titled "Objected-Oriented Programming", March, 1989.

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OS/2 Development Tools

Easel for OS/2 Extended Edition

Overview:

This IBM logoed product is a full featured Presentation Manager Development toolkit. It contains specific support for the creation of SAA/CUA conforming interfaces as well as extensive graphical and communications capability. It is capable of serving both as a production application builder and a rapid prototyping environment.

The primary components of EASEL for OS/2 EE are its language compiler and associated runtime environment. Programs written in the EASEL for OS/2 EE language are compiled and then interpreted by the runtime environments.

Using the Layout/CUA™ design tool and the code generator provided in the toolkit, developers can interactively create CUA applications in a What-You-See-Is-What-You-Get (WYSIWIG) environment.

User Group: Programmers

Channels of Dist: IBM

Price:

Development System	\$7200.00
Runtime System	295.00
Additional licenses	170.00

Education: Available from Interactive Images for SE and Customers

Support: IBM - IBMLink, Equal

Marketing Programs: Demo diskettes available on HLF ASC's and some branches have live code

Deliverables: Presentation Guide
Product Brochure
Demonstration Diskette

References: Equitable Life Insurance
Continental Bank of North America
Amoco
REJIS

Additional Info: Participated in the October 6, 1989 OS/2 Tools
FTN

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OS/2 Development Tools

Applications Manager (AM)

Overview: High level software development tool for writing CUA applications that will run under PM. AM applications integrate with the communications and database service of OS/2 EE. The AM software package consists of the AM Development System, and the AM Delivery System.

AM provides a high level integration architecture for writing applications which access the three key software components in OS/2: PM, Database Manager, and Communications Manager.

AM is a structured, interactive programming tool. It uses free form text for logic description and has a PM based menu and command driven approach, combining programmer productivity, documentation and systems integration features.

User Group: End Users - Limited
Programmers

Channels of Dist: Vendor

Price:

Development System	\$5000.00
Delivery System	250.00
Evaluator	95.00

Education: Available from vendor as well as third party

Support: Available from the vendor

Marketing Programs: Planned demo distribution
FTN Participation

Deliverables: Brochure
Press Kit
\$95.00 Evaluator Copy

Additional Info: Presented in the October 5, 1989 OS/2 Tools FTN
Intelligent Environments
One Village Square
Chelmsford, MA 01824
(508) 256-6412

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OS/2 Development Tools

Case:PM

Overview:

CASE:PM is a complete development environment that permits the programmer to control the PM application development process - from application prototyping and program generation to quick look and testing.

From within the Case:PM environment, the developer can access the OS/2 Programming Tools and Information, Icon Editor, Font Editor, Dialog Editor, and up to 12 other user-configurable PM development tools. Developers can also define the parameters that control the compilers, linkers, and the program make utility. These parameters are also saved in the Application file, making it easy to modify the graphical user interface and application development parameters if the program is later changed or regenerated.

Case:PM includes a powerful Program Processor and Knowledge Base to generate expert-level C code of the prototyped graphical user interface. The C code generated includes all the files necessary for a PM program.

User Group: Programmers with a knowledge of C.

Channel of Dist: Direct from the Vendor, Dealers

Price: \$995.00

Education: Comes with tutorial

Support: Available from the vendor. Both voice and electronic support are available.

Deliverables: Brochures

Additional Info: CASEWORKS
1 Dunwoody Park Suite 130
Atlanta, GA. 30338
(404) 399-6236

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OS/2 Development Tools

Dialog Manager

Overview:	<p>A NEW tool for developing OS/2 applications included in the OS/2 Programming Tools and Information Version 1.2, Dialog Manager simplifies and speeds up programming by:</p> <ul style="list-style-type: none">• Controlling the dialog between the user and the application• Displaying panels and messages• Storing and maintaining variables that are used by panels and programs• Automatically managing help requests for the application. Dialog Manager implements the SAA Dialog Interface which defines elements that are consistent across the SAA Environments
User Group:	Programmers
Channels of Dist:	Software Dealers, IBM
Price:	Included in the OS/2 Programming Tools and Information Version 1.2 - \$650.00
Education:	Available from IBM
Support:	IBM - IBMLink, Equal
Deliverables:	Brochure Dialog Manager Reference, Dialog Tag Language Guide and Reference, Dialog Manager and Dialog Tag Language Reference Summary
Additional Info:	HONE Announcement Letter dated May 16, 1989 (289-219)

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OS/2 Development Tools

Smalltalk/V PM

Overview:

Digitalk's Smalltalk/V PM is a complete Object Oriented Programming System (OOPS) for OS/2 PM to aid those looking to develop user intensive applications as well as those looking for a fast, efficient prototyping and development environment. Smalltalk/V PM is a complete personal environment for OOPS under OS/2 PM that includes:

- Fully compiled Smalltalk code
- Dynamic Data Exchange Support
- Ability to call any DLL routine

User Group:

Programmers

Channels of Dist:

Dealers

Price:

\$499.95

Education:

Available from Digitalk, Inc. as well as third party companies.

Support:

Telephone and Electronic Bulletin Board

Deliverables:

Fact Sheet
Ad Reprint with Bill Gates Quote
Object Oriented Programming Brochure
Tutorial and Programming Handbook

Additional Info:

Digitalk, Inc.
9841 Airport Blvd.
Los Angeles, CA 90045
(213) 645-1082

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OS/2 Development Tools

Micro Focus COBOL/2

Overview:

COBOL, a language sometimes considered outdated and unsuitable for PC development, is the most widely used language for writing business applications. Micro Focus COBOL/2 allows programmers to produce full scale PM programs written entirely in COBOL.

Micro Focus COBOL/2 now includes new extensions that support PM programming, including recursion. The following five features, called the "Micro Focus Systems Programming Extensions" facilitate PM programming:

- Recursion and Local Data
- Parameters by Value
- Return Values from CALLs
- Procedure Addresses
- Call Conventions

These extensions are compatible with the IBM COBOL language bindings in OS/2 Version 1.2, and the two can be used together if desired.

User Group:

Programmers

Channels of Dist:

Direct from vendor, dealers

Price:

Base Compiler	\$ 900.00
Developer Toolkit	\$ 900.00
Workbench	\$3290.00

(Workbench is available only from Micro Focus)

Education:

Available at Micro Focus

Support:

Telephone and Electronic Bulletin Board

Deliverables:

Brochures

Additional Info:

Micro Focus, Inc.

2465 E. Bayshore Road, Suite 400
Palo Alto, CA 94043
(800) 872-6275

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OS/2 Development Tools

Mirrors

Overview: A set of software tools that greatly eases the task of porting Windows applications to OS/2 PM by means of a Micrografx Windows Emulation Library.

The Micrografx Windows Emulation Library is a set of OS/2 PM dynamic-link libraries which completely duplicate the function calls used by Windows applications to interface with Windows systems services.

Windows applications that are ported using Micrografx Mirrors automatically take advantage of many features of OS/2 PM including multi-tasking, memory access up to 16 MB, and protected mode support.

User Group: Programmers

Channels of Dist: Vendor

Price: User/Application Dependent

Education: Workshops for porting Windows applications

Support: Telephone

Deliverables: Press Release for Comdex
Brochure

Additional Info: Micrografx, Inc.
1303 Arapaho
Richardson, TX 75081-2444
(214) 234-1769

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OS/2 Development Tools

Software Developers Assistance Program

The IBM Developer Assistance Program provides technical information and assistance to ISV's to help them design and develop products for OS/2:

ON-LINE OS/2 APPLICATION GUIDE - allows developers the ability to publicize their OS/2 protect mode products. This information can be accessed via the on-line Bulletin Board Service(BBS) by using a standard PC ASYNCH modem. The communications software should be set to 8-N-1. The telephone number of the BBS is (404)988-2913. This BBS will also provide PC user group support including new announcements and user conferencing.

TECHNICAL SUPPORT - The IBM Personal Systems Technical Support Interface is a program that provides technical support via IBMLink to developers registered in the program. This support is like the version available to customers using IBMLink today (Equal for IBM SE's).

DISCOUNTS ON SOFTWARE PRODUCTS & DOCUMENTATION - Members of the Developers Assistance Program may order products and documentation directly from IBM through an 800 number or by mail. Members qualify for substantial discounts on selected IBM products that are used for development purposes.

REBATES ON HARDWARE PRODUCTS - A rebate is available directly from IBM to members who purchased selected IBM products for development, research, training, and business shows. A limited number of PS/2 per year may be purchased from IBM Authorized dealers under this program.

The IBM Developer Assistance Program is for developers working on products for commercial release who are not already an IBM Industry Remarketer. They are eligible to participate if they:

- Develop products that support IBM OS/2
- The company is a US company or a US subsidiary
- They are currently marketing their products

For more information, please contact IBM at the following address:

IBM Corporation
Developers Support
Internal Zip 4605
PO Box 1328
Boca Raton, FL 33429-1328
(407) 982-6178

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OS/2 Productivity Aids

On-line access to a repository of not-for sale OS/2:

- tools
- utilities
- sample programs
- demonstrations of commercially available development tools

This new service was announced and demonstrated at Comdex Fall '89 and will be available by year-end 1989. Members of the Software Developer Assistance Program will be receiving a mailing with further information soon.

On-line access is also available to download OS/2 device drivers. Refer to Appendix E for more information.

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OS/2 Education

This lists available education courses offered for OS/2. Note that they are offered in a variety of means (i.e., classroom, self-education, audio tapes).

Course Title	Type	Code	End User	Technical	Programming
Discovery/Education OS/2 Database Manager Intro. & Implementation	OL	DE013		X	X
Discovery/Education OS/2 Intro. & Implementation	OL	DE012	X	X	
Implementing OS/2 Communications Manager in the Enterprise	CR	G3586		X	
OS/2 Database Manager Workshop	CR	P1009		X	
OS/2 Database Design & Coding	CR	P1010			X
Programming for IBM Operating System/2 Presentation Manager	CR	P1011			X
Application Programming for the OS/2 Presentation Manager	CR	P1014			X
Introduction to OS/2 Presentation Manager Programming	CR	P1013			X
EASEL FOR OS/2 EE	CR-IBM ONLY	78179		Qualified Systems Engineer	
IBM PS/2 OS/2 Trends & Directions	Audio Cassette	Marketing Rep and SE Workstation Marketing			
Programming for the IBM Operating System/2 Dialog Manager	CR	P1012			X
OS/2 Communications Manager V1.2 Hands-On Workshop	CR & Lab	G3716		X	
OS/2 LAN Server Workshop	CR & Lab	G3713		X	
Operating System/2 Programming Functions & Procedures	IBM-Only CENET CR	77997			X
OS/2 Operation & Programming Interface	CR	G2569			X
OS/2 Hands-On Workshop	IBM-Only Workshop	77518			X

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Course Title	Type	Code	End User	Technical	Programming
Implementing OS/2 Extended Edition	IBM-Only CENET	91348		X	
Programming for IBM OS/2 Presentation Manager	IBM-Only CENET	91347			X
1989 OS/2 Seminars	IBM-Only	77943		X	
OS/2 OFFICE TRAINING IBM-Only ISEN/CENET	CR	77783		X	
SE: OS/2 EE AND LAN SERVER COURSE FOR SE'S	IBM ONLY CR	77773		X	
OS/2 LAN Server Implementation and Administration	CR	G3695		X	
Implementing OS/2 Communications Manager for SE's	CR	77181		X	
Implementing OS/2 Communication Manager in the Enterprise	CR	G3686		X	X
OS/2 LAN Office Systems Center	IBM-Only Internship 3 to 4 weeks	28123		X	
SE: Personal System/2 Enterprise Communications	IBM-Only CR	75513		X	

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Technical Coordinator Satellite Education Exchange

Video Club

These are videotapes addressing various OS/2-related subjects available for purchase.

Programming to the OS/2 Presentation Manager	89A1	\$68.50	1/18 & 20, 1989
OS/2 Standard Edition for System & Application Programmers (Part 1 of 2)	88A1	\$42.50	1/14/88*
OS/2 Standard Edition For System & Application Programmers (Part 2 of 2)	88A2	\$43.50	1/21/88
Introduction to OS/2 EE Database Manager & Query Manager	88E1	\$41.50	8/12/88
Developing Database Applications w/ the OS/2 Extended Edition Database Manager	88H1	\$41.50	10/5/88
OS/2 Extended Edition Communications Manager Advanced Program-to-Program Communications Application Program Interface (OS/2 EE CM Application API)	88I1	\$41.50	10/21/88
OS/2 Extended Edition Communication Manager Update	88J1	\$63.50	11/9-10/88
Introduction to OS/2 Presentation Manager	88L1	\$41.50	12/2/88
OS/2 LAN SERVER UPDATE	88M1	\$43.50	12/8/88
OPERATING SYSTEM/2 OVERVIEW (STANDARD & EXTENDED EDITIONS)	87A7	\$20.00	4/24/87
OS/2 LAN SERVER UPDATE	88M1	\$43.50	12/8/88

Note: Tapes are neither IBM Products nor IBM Educational offerings. Tapes are available to eligible organizations through VCA teletronics. To receive any video cassettes, a person must be a registered technical coordinator. Additional information is available through IBMLINK.

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OS/2 Reference Materials

Available by Subscription

The following publications and related material are available from IBM. They are orderable from the IBM Distribution Center. See your IBM marketing representative or IBM Authorized Dealer/Remarketer on how these can be ordered.

TITLE	SUBSCRIPTION	ORDER NO.
Personal Systems Technical Journal	System Library Sub. Service (SLSS)	GBOF-1229
Personal Systems Developer	Publication of IBM Developer Assistance Program*	G362-0001-01
MICROSOFT Systems Journal	CIRCULATION DEPARTMENT Microsoft Systems Journal P.O. Box 1903 Marion, OH 44305	Microsoft Systems Journal (ISSN# 0889-9932) 1-800-669-1002

*Note: IBM Developer Assistance Program is for developers working on products for commercial release who are not already IBM Industry remarketers. For more information contact:

IBM Corporation
Developer Support
Internal Zip 4605
P.O. Box 1328
Boca Raton, FL 33429-1328
Telephone: 407-982-6178

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OS/2 Reference Materials

Available from Mechanicsburg

TITLE	FORM TYPE	ORDER NO.
OFFICEVISION/2 License Information	Flyer	GH21-0423
OFFICEVISION/2 OS/2 Office DOS Feature	Flyer	GH21-0527
Personal System/2 Operating System Positioning Guide	Brochure	G320-6714
OS/2: Operating System/2 Extended Edition V1.1	Flyer	G360-2833
OFFICEVISION - OS/2 Office Feature	Flyer	GH21-0525
CICS OS/2 License Info.	Flyer	SC33-0598
EASEL for OS/2 Extended Edition Quick Ref. Guide	Summary	SC38-7036
CICS OS/2 License Info.	Flyer	SQ00-1152
EASEL for OS/2 Extended Edition General Info.	Brochure	GC38-7037
EASEL OS/2 Specification Sheet	Flyer	G221-2728
OS/2 Poster	Poster	G360-2834
OS/2 Image Support Fact Sheet	Flyer	G221-2661
OS/2 Image Support Fact Sheet	Brochure	G511-1233
OfficeVision Family OS/2 Series	Brochure	G520-6606
Office OS/2 Family	Brochure	G511-1219
OS/2 Standard and Extended Editions	Flyer	G360-2735
CICS OS/2 License Information	Flyer	SQ00-0598
SELF EDUCATION FACILITY ON PERSONAL SYSTEM/2	Flyer	GH12-5600

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TITLE	FORM TYPE	ORDER NO.
The Design of OS/2	Paper	G321-5312
Writing an OS/2 Application	Paper	G321-5315
Understand Device Drivers in OS/2	Paper	G321-5317
IBM Systems Journal Vol. 27 No. 2-1988	Paper	G321-0090
OS/2 EE Database Manager Overview and Technical Highlights	Paper	G321-5313
OS/2 Query Manager Overview & Prompted Interface	Paper	G321-5314
Discovery / Education OS/2 Intro and Implementation	Diskettes	SR20-6058 SR20-6059 SR20-5098 SR20-5099 SR20-6000 SR20-6004 SR20-6005 SR20-6006
Discovery / Education OS/2	Diskettes	SR20-6007 SR20-6008 SR20-6009 SR20-6012 SR20-6013 SR20-6014 SR20-6018 SR20-6019 SR20-6020 SR20-6021
"The Customer Speaks"	Videotape	NFN (To be announced via NATBOARD)

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Section C

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Appendix A – IBM/Microsoft Statement of Direction Ivory Letter

Note: Ivory letters are formal IBM announcements and are used to inform our field force and customers of the content of product and marketing announcements. The following ivory letter is the formal IBM announcement of the IBM/Microsoft development partnership

Number 289-625
Date 891114
Category WS00, WS20
Type Programming
Title STATEMENT OF DIRECTION FOR DOS, OS/2 AND LAN OFFERINGS
Abstract IBM and Microsoft¹ today announce a broadening of the scope of their development partnership and have agreed to develop jointly a consistent, full range of systems software offerings for the 1990s. These software offerings will include enhancements to DOS, OS/2² and local area network (LAN) products.

Overview STATEMENT OF GENERAL DIRECTION

IBM and Microsoft today announce a broadening of the scope of their development partnership and have agreed to develop jointly a consistent, full range of systems software offerings for the 1990s. These software offerings will include enhancements to DOS, OS/2 and local area network products.

This statement of direction will help customers choose the appropriate software solution for their requirements, and assist them in planning a smooth transition to the advanced personal computing platforms of the 1990s. Together, IBM and Microsoft view the "platform for the '90s" as hardware systems with Intel³ 386 and i486,² microprocessors, 4 megabytes (MB) of memory and 60MB fixed disk drives with OS/2 and the Presentation ManagerTM graphical user interface.

To reaffirm this, IBM and Microsoft announce that the majority of their application and systems development resources will be applied to OS/2 solutions. Beginning in the second half of 1990, IBM and Microsoft plan to make their graphical applications available first on OS/2.

Specifically, the companies jointly announce:

- The intent to deliver a version of OS/2 that exploit the advanced capabilities of the Intel 386 and i486 microprocessors in 1990. This version will have advanced features such as demand paging and the ability to run multiple DOS applications concurrently, and it will allow applications to exploit the 32-bit flat memory model. Today's emerging Presentation Manager applications will run unmodified on the new version of OS/2.

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¹ -Registered trademark of Microsoft Corporation.

² Registered trademark of International Business Machines Corporation.

³ Trademark of Intel Corporation.

TM Trademark of International Business Machines Corporation.

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- Availability of early development support for this new OS/2 version by year-end 1989 with a common development toolkit. Software developers starting new high performance or server applications targeted toward 386SX/4MB or larger systems should build directly on the advanced Application Programming Interfaces (APIs) of this forthcoming 32-bit version of OS/2.
- The intent to develop OS/2 32-bit technology that is portable, along with applications, to other hardware instruction sets, for example, RISC (Reduced Instruction Set Computing) architectures.

Today's OS/2 1.2 is recommended for systems with at least 3MB of memory and 30MB fixed disk drives. IBM and Microsoft are committed to continue to expand the range of OS/2 capable systems. As a first step, the companies announce that more than 512KB of memory used by the OS/2 "DOS Compatibility Box" will also be usable by OS/2 applications when the DOS program is inactive. This capability will be available this year. Both companies are making a concerted effort to enable OS/2 for 2MB entry systems, and customers should plan to use Microsoft Windows to implement graphical applications on platforms with less than 2MB of memory.

On systems with 4MB of memory, customers can take full advantage of advanced system features such as the High Performance File System, expanded LAN client features, and advanced applications. OS/2 is currently best suited for customers using or building data base applications, needing full multi-application and background processing support, or using distributed processing solutions requiring full LAN client support.

OS/2 is also recommended for all server applications. The new 32-bit version of OS/2 will be further enhanced for server requirements. In addition, certain advanced operating system features such as Department of Defense security, full object oriented capabilities, and symmetrical multi-processing will be available only in future releases of 32-bit OS/2.

DOS and Windows are recommended for systems with 1-2MB of memory or fixed disk drives smaller than 30MB. For these customers, Windows is an excellent entry graphical workstation, because it is an easy installation upgrade to DOS, allows the user to run existing DOS or Windows applications, enables limited multi-application support and provides function for a basic LAN client. While Windows will provide the Systems Application Architecture™ (SAA™) user interface, it is not planned to include the full range of SAA support that OS/2 will provide.

Microsoft's position is that Windows is not intended to be used as a server, nor will future releases contain OS/2 advanced features such as distributed processing, the 32-bit flat memory model, threads, or long file names. OS/2 is the recommended operating system environment for new or existing 286/386 systems with 3MB or more of memory.

IBM and Microsoft believe customers with OS/2 capable systems and software developers with Windows applications will want to migrate to OS/2. IBM and Microsoft will provide support through tools, seminars and technical assistance to help with the migration.

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IBM and Microsoft recommend that software developers implement for the platform that best meets their application system requirements. Software developers, other than those with current Windows projects under way, who plan to implement offerings for both environments, are recommended to begin with OS/2.

In addition to these announcements that focus on the desktop environments, IBM and Microsoft also announce:

- The two companies will work together to ensure that the Database Manager, Communications Manager, and LAN Requestor and Server functions of IBM's OS/2 Extended Edition are available to all OS/2 users. These functions of IBM's OS/2 Extended Edition continue to be primary participants in IBM's Systems Application Architecture strategy.
- For local area networks, the two companies intend to converge IBM's OS/2 LAN Server and Microsoft's LAN Manager. These LAN products will be designed to run on the base OS/2 operating system in both Client and Server configurations, as LAN Manager does today, and will exploit 386/i486 functions.

In summary, IBM and Microsoft are reaffirming their commitment to provide a graphical user interface on all platforms, and significantly extending the functions of OS/2 to provide a consistent systems software base for the hardware platforms of the '90s.

Actual plans are subject to review. Announcement of any product will be based upon business and technical judgment, and continuing review of customer requirements.

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Appendix B — PC Magazine Article Reprint

Reprinted with permission from *PC Magazine*, September 12, 1989 issue.

THE GUI An Interface You Won't Outgrow

by Jim Seymour

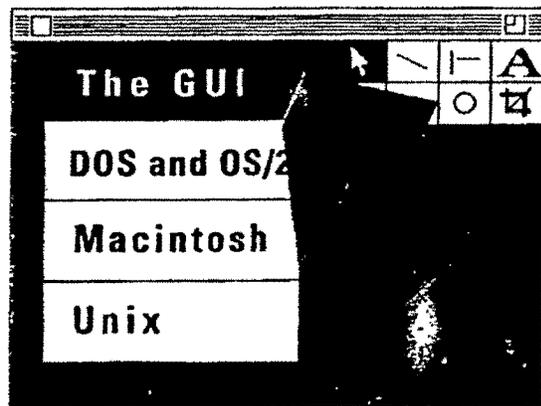
Graphical user interfaces. They're the wave of the future—or maybe they're already here. Everybody needs one—or maybe a lot of us don't. They run strictly in graphics mode on expensive, graphics-equipped PCs—except for the ones that run very nicely, thank you, on plain-vanilla character-only PCs. They eliminate typed commands by allowing users to point at little icons on-screen and click with a mouse to direct the computer to do something—except that most don't eliminate typed commands; don't use icons for everything, and have keyboard equivalents for all that mousing around.

Confused? Good. So were we.

Graphical user interfaces (GUIs, pronounced "gooeyz") have drawn the attention of computer scientists, computer programmers, computer users, and the computer press for a decade now. Out of pioneering work done at Xerox Corp.'s Palo Alto Research Center in the 1970s came the Xerox Star workstation, which



Graphical user interfaces are popping up all over the PC industry. This guide will help you make the move from today's command line interface to tomorrow's GUI.



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begat the Apple Macintosh, which begat *Microsoft Windows*, which begat Hewlett-Packard's *NewWave*, which begat Microsoft and IBM's OS/2 Presentation Manager, which begat Sun Microsystems' *Open Look*, which begat Open Software Foundation's *OSF/Motif*. Lawsuits were born along the way, too, but if you're looking for late-breaking news on who's suing whom, look elsewhere; we're far more interested in the products themselves.

REALITY BEHIND PRETTY PICTURES

Despite its long and tangled lineage, the GUI is still far from being universally accepted by users, still far from being a real marketplace standard. But somewhere in there is the core of a great idea. Many of us at *PC Magazine* are fond of graphical-interface operating environments and the application programs that run under them. We use GUIs with varying frequency— from occasionally to most of the time. We

The graphical user interface (GUI) is far from being universally accepted, but it is the core of a great idea.

have developed strong opinions about what's right and what's wrong with present-day GUIs. And most of us agree that, sooner or later, most PC users will work in graphical environments.

The big question for PC users today is, as executive editor Bill Howard puts it, "When do these things get real?"

For users of such popular PC programs as *PageMaker*, *Microsoft Excel*, *Micrografix Designer*, and *Ventura Publisher*, GUIs already are real—because those programs run only under specific GUI environments. And for users of such DOS extenders/environments as *Windows*, *GEM*, and *DESQview*, the concept of GUIs is not new, because to varying degrees those programs deliver a graphical user interface.

For the features section of this issue, the associate editor was Mary Kathleen Flynn, and the PC Labs project leader was Bill O'Brien.

For the rest of us, GUIs may still be a matter of some confusion. And that's why we put this special report together—to show you what GUIs have to offer the business user, what they'll cost you (both in cash and performance penalties), and where they're headed over the next couple of years. Since GUIs are cropping up all over the PC industry, we've included products that run on operating systems—such as Unix—which we usually wouldn't touch with a 10-foot pole.

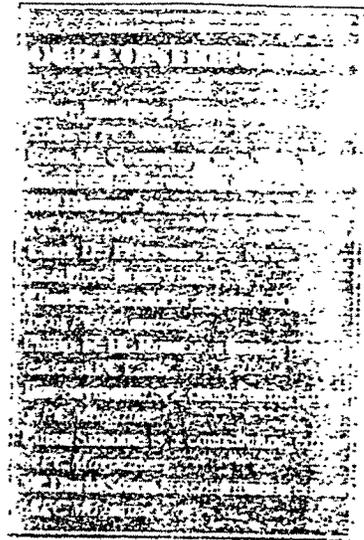
DRAWING THE LINE

So what is a GUI anyway? The working definition we've developed for this story is simple: a GUI is a user interface that runs in a computer's graphics mode. That means, for example, that as much as we like Quarterdeck Office Systems' *DESQview*, it doesn't count as a GUI. Similarly, Brightbill-Roberts's exciting new *HyperPad* interface didn't make the true-GUI cut. (Despite their lack of strict graphical operation, these two products offer some of the benefits associated with full-fledged GUIs. For more on these products, see the sidebar "GUIs Without Graphics.") It also means that, as much as we appreciate the audio aspects of systems from Apple, NeXT, and—most recently—Emerson Computer Corp., we're concentrating here on the graphical component of the user interface.

While researching this story, we asked Microsoft Corp. for its definition of a GUI. As the largest PC software company, the largest supplier of application programs for the Macintosh's graphical environment, the creator of DOS and *Windows*, and the primary developer (with partner IBM) of the *Windows*-like OS/2 Presentation Manager interface, Microsoft has become a center of development, and cheer-leading, for graphical user interfaces. Microsoft chairman Bill Gates has long been the loudest voice in support of the advantages of GUIs. By releasing its revolutionary Lotus-killer spreadsheet, *Excel*, for the PC almost 2 years ago in graphical-interface form only (running under a bundled, limited version of *Windows*), Microsoft has put its money, and a good chunk of its future, where its chairman's mouth is.

THE VIEW FROM REDMOND

As its competitors and detractors will be happy to shout, Microsoft doesn't know everything about everything—and certain-



ly not everything about GUIs. But more people at Microsoft have been thinking about and working with GUIs for longer than at just about any other company. The definition the folks at Microsoft penned is good but too subjective for our purposes. In Microsoft's terms, a true GUI satisfies these six requirements:

- It exploits bitmapped displays, offering true WYSIWYG screen representation of printed output.
- It is a graphically oriented interface, making extensive use of icons.
- It has good screen aesthetics: it looks good and is a pleasure to work with.
- It allows direct manipulation of on-screen elements, allowing word processor users, for example, to grab and drag left and right document margins rather than having to calculate and type in specific measurements.
- It embraces the object-action paradigm, so that the user chooses an object first, then selects the action, freeing up the user from an action sequence that must be completed before moving onto the next task.
- It offers standard expected elements—such as menus, standard window elements, and dialog controls—to provide consistency across applications.

Additional elements Microsoft thinks GUIs should incorporate are

- Application support: a strong set of user-interface controls and tools to build apps.
- Consistency across platforms as well as across applications.

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- Ease of use and visual appeal, ease of installation and configuration, enjoyability.
- Productivity: WYSIWYG, information communicated through graphics.
- Flexibility: support for a keyboard or mouse as well as for a range of devices and peripherals.
- User customization and personalization.

Microsoft also identifies multiple-application support as essential to a successful GUI. The good GUI can run multiple graphics applications at once and support interapplication communications with such tools as dynamic data exchange, messages, and clipboards.

Unfortunately, Microsoft's own GUI products, as issued so far, fall short of this criteria.

THE GOODS ON GUIs

For PC users, the issue isn't how GUIs work, nor who makes them, nor what Bill Gates thinks of them. The real issue is what they can do for you. Save time? Make programs easier to use? Reduce the learning curve? Make programs more powerful? The answers are yes, yes, and yes.

Because it offers standardized commands from one program to the next, a good GUI will save you time in both the learning and the use of applications. For example, the steps involved in printing a text document created with a word processor or a financial statement created with a spreadsheet ought to be the same if both programs run under the same GUI. This way, you'll already know how to print when you install a new app, and you can spend your training time on learning the nifty features that persuaded you to buy the program.

A QUESTION OF STYLE

GUIs can also make applications more powerful. In theory, the programmer's choice to design a program with a character-oriented interface or one with a graphical-oriented interface shouldn't determine its features and depth. In practice, however, many power-user features are so complicated that they're impractical in command-line-driven programs. Scrolling through an on-screen dialog box of *Excel's* mathematical functions and clicking to insert one in a worksheet, for example, is certainly technically possible with programs that ask users to type commands into character-based displays. But without

Excel's graphical interface and style of working that GUIs inspire, it would be messy at best and hideously complicated at worst. The services required to drive that interface are provided by the underlying *Windows* code, and the impetus for both programmer and user to implement that feature comes from the rich tools built into that graphical interface.

The GUI style of working is one benefit that has sometimes been underestimated. When Apple released the Macintosh in 1984, a number of software developers rushed out hasty conversions of their DOS hits; they didn't take time to rethink how users would want to work with those programs in the Mac's graphical universe. Many of these vendors finally pulled the failed products off the market in embarrassment. Software developers do well to

The issue isn't how GUIs work, nor who makes them. The real issue is what they can do for you: save time, make programs easier to use, and make them more powerful.

remember that a program that retains its old command and interface structure when ported to *Windows* or the Presentation Manager from DOS can hardly be called a graphical application. Instead of being easier to use, it will feel clumsy to users, who are likely to stay away in droves.

PM IN THE DRIVER'S SEAT

In addition to the PC community's increasing awareness of the benefits of graphical user interfaces, the release late last year of Version 1.1 of OS/2, with its Presentation Manager graphical interface, has given a new urgency to the GUI question. Whatever you may think of OS/2 in its present form, its substantial advances over DOS—from much larger available memo-

ry to almost-crashproof multitasking—mean that OS/2 is going to become the next major standard in the PC world. Without the PM interface, that probably wouldn't be possible.

But operating systems and user interfaces aren't worth anything to users until applications written for them appear. We don't work with operating systems, whatever flavor the interface may be; we work with applications. Never fear, PM apps are here, and more are coming (see the chart "Where the Apps Are and Where They're Going").

The slick look and feel of the Presentation Manager, combined with the extensive "services" available to programs running under it, have already made it popular with application software developers, who are pouring their resources into a new round of OS/2-PM programs that will finally form that class of "next-generation" products we've been expecting for the last 2 or 3 years. At presstime, Microsoft, Micrografx, Aldus Corp., Borland International, and other software houses are finally shipping, or about to ship, OS/2-PM applications.

It's time to take GUIs seriously.

POWER HUNGRY

It's impossible to separate the question of the validity of GUIs from the cost of the hardware they demand. Let's face it: GUIs are computing resource hogs that sop up all the CPU power they can find.

Reasonable GUIs would never have been possible on the PCs and PC-XTs of yesterday: the slow CPUs, limited RAM, and (usually) low-resolution monitors of those days would have made GUIs seem . . . gooey. Indeed, many people argue today that only the fastest 80286-based PCs can reasonably support *GEM-* and *Windows*-based applications, that in fact it takes a 20-MHz 386 to make a happy *Windows* user.

The demands on the hardware that result from writing all those pixels to the screen, dot by dot, and redrawing (or refreshing) the screen image as you scroll up and down are enormous. Even today's medium-high-resolution video graphics array (VGA) standard puts 307,200 pixels, or points, on the screen. To redraw that many individual pixels in anything like real time, as you type or scroll or jump from the top of a file to the bottom, stretches the ability of even fast CPUs. (Of course, the computing power demands that the feet of GUIs are the result

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of adopting a graphical interface—operating systems themselves take up plenty of computing resources.)

HELP FROM HARDWARE

Fortunately for GUIs, video adapters, displays, and graphics coprocessors are improving steadily. The days when character-based displays were the norm on PCs and graphics-capable displays the exception are clearly over.

As the IBM video standard has ratchet-

ed up from the abysmal CGA to the tolerable EGA and now to an acceptable VGA, we have gradually moved to on-screen resolutions that are capable of supporting GUIs. The widespread adoption of the 640- by 480-pixel VGA standard, fostered by IBM's inclusion of it without additional charge (and without the loss of an extra expansion slot) on Micro Channel-bus PS/2s, has brought economies of scale in

production to a graphics standard that has been the first to deliver reasonable GUI performance.

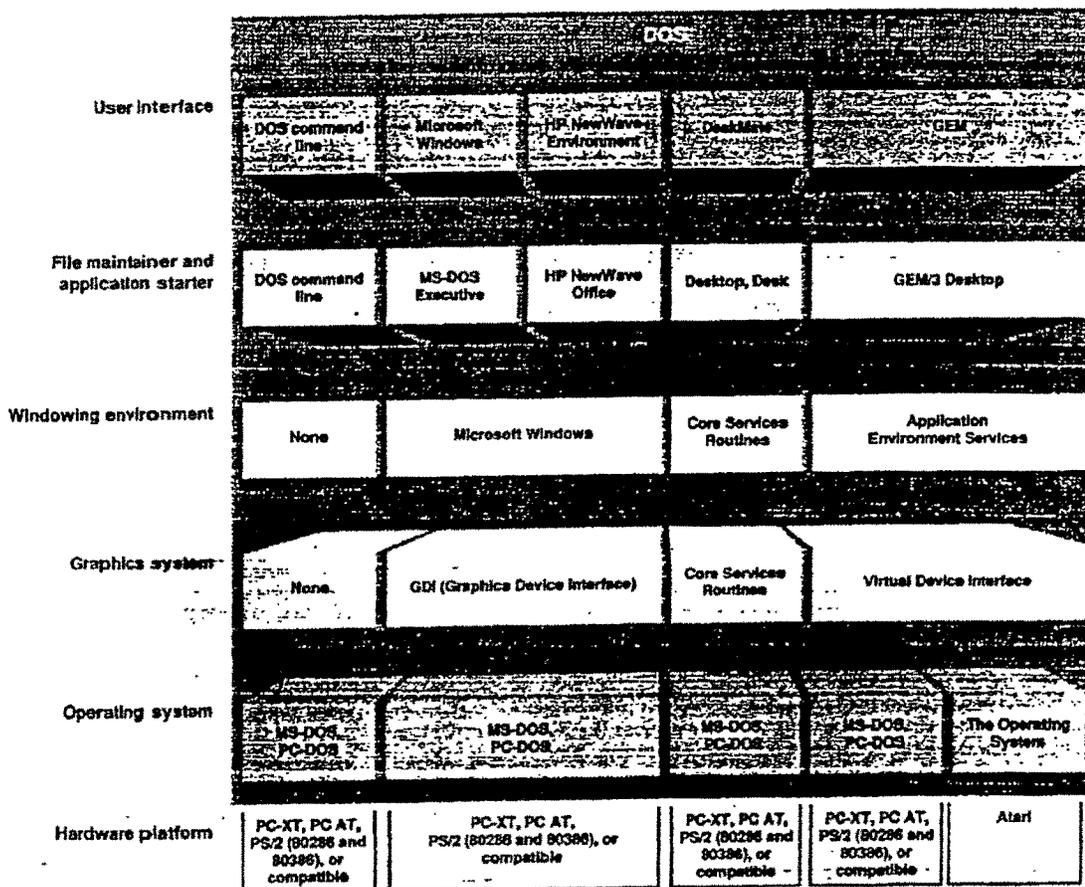
IBM's promotion of the still-higher-resolution (1,024- by 768-pixel) 8514A standard has put an emphasis on graphics performance that will continue today's advances toward higher resolution and more colors on-screen. Although the 8514A has flaws (flicker, for one), it offers a very nearly ideal display environment for GUIs.

THE FIVE LAYERS OF USER INTERFACES



Graphical user interfaces, which promise to take over the C> prompt on your desktop, are sprouting up on operating systems all over the PC industry. From the Macintosh desktop to the Presentation Manager, these

GUIs share a similar structure. To see how they compare with the DOS command-line interface you're used to, take a look inside the five layers of user interfaces.



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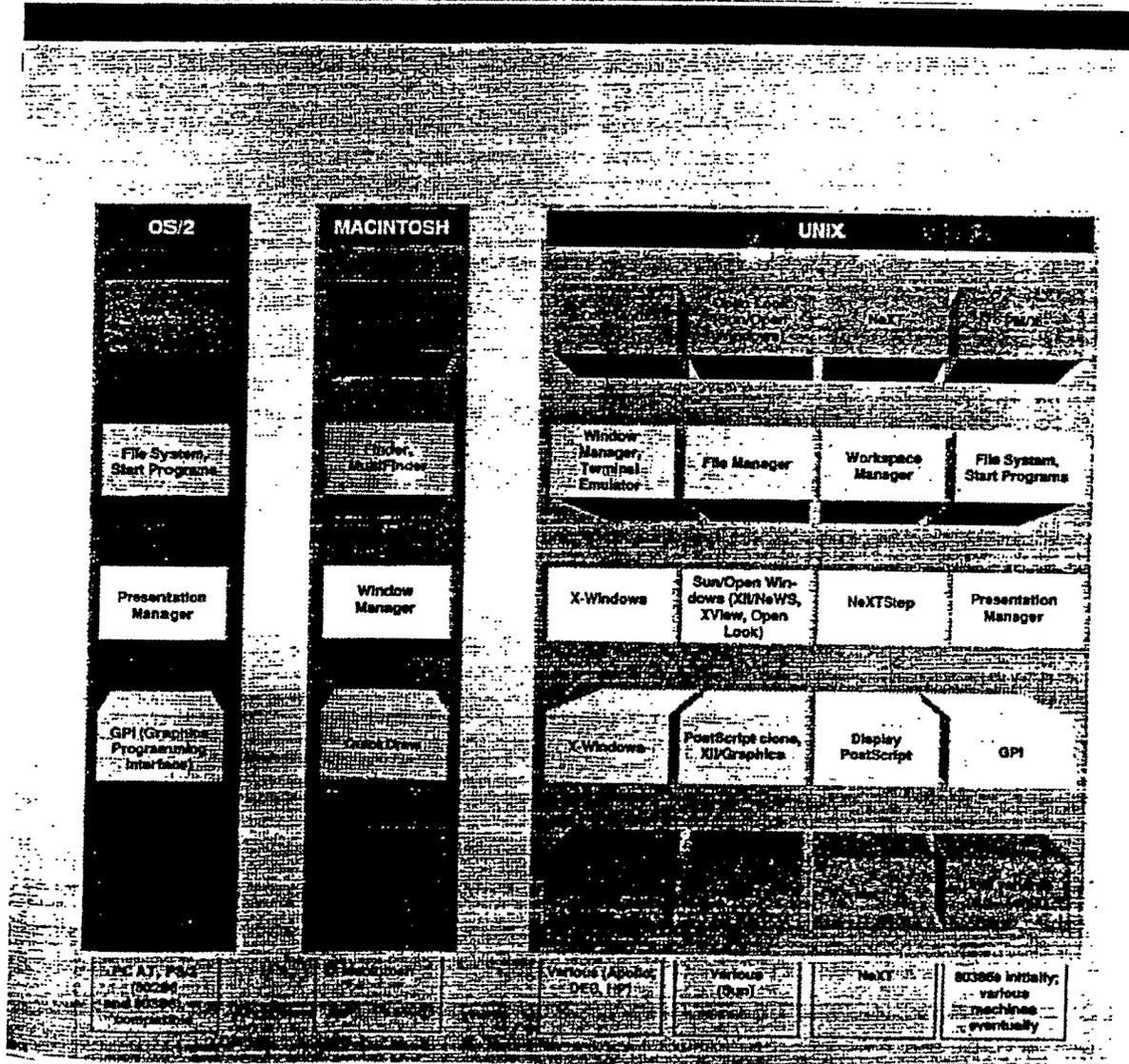
At the same time, the PC industry is rallying around the 800- by 600-pixel "Super VGA" (SVGA) standard, also called the VESA standard after its industry boosters, the Video Electronic Standards Association. Super VGA can be achieved on much of the installed base of multiscanning monitors simply by replacing the video card. Super VGA looks a lot better than regular VGA, and with two or three windows open and processes under way concurrently, the higher-resolution display begins to

show why GUIs are so important and so useful.

Help is also on the way in the form of graphics coprocessors from Intel Corp., Texas Instruments, and Hitachi. The newest generation of video boards can take over management of the screen-redrawing process without putting such a load on the CPU. Thus these boards allow faster graphics performance, make GUIs accept-

able on a wider range of PC power levels, and help any PC make the most of its computing power.

The cumulative effect of these hardware developments is to fuel the boom in GUIs. For many PC users, gaining satisfactory GUI display performance means simply upgrading to a new video card. For all PC users, it's likely that your next system will be delivered right out of the box with enough display power to handle GUIs easily.



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STAYING BEHIND

Not everyone agrees that superpowered operating systems with power-hungry graphical interfaces are needed for most of what we do with PCs. I've often heard this argument: "Most of the PC work in my office is pretty mundane: production typing, for example, of standard text-only documents under *WordPerfect*; or plugging the new month's figures into tried-and-true *Lotus 1-2-3* spreadsheets; or keeping customers' accounts straight with our PC-based bookkeeping system. We use a mix of mainly 8088-based PCs, with some 6-MHz and 8-MHz ATs. There's not a mouse in the office. We wouldn't gain a thing from going over to a fancy GUI."

The secret: that argument is correct. Not everyone needs, wants, or is willing to pay the tab for GUIs. And that's perfectly OK. If most of the word processing in your office is straightforward—a 1980s update of the 1950s "typing pool" model—then moving to GUI-based software won't do much for you. Or if you're happily using 1-2-3 for expense accounts and other two-dimensional rows-and-columns stuff, and if you don't care much about graphs, or consolidating results from several work-

sheets into roll-ups, or turning out prettified hard copy, then moving to GUI-based software won't offer much to you, either.

While it's almost inevitable that you will move to a graphical system at some point in the future, there's no need to make that move till you're sure the payback will justify the effort and cost. There's nothing wrong with staying in a backwater of computing—as long as you know that that's what you're doing and as long as you know why you're doing it.

NOT FOR ARTISTS ONLY

But consider the experience of users of Apple's Macintosh. The first widely available, reasonably priced GUI computer system, the Mac changed how a lot of PC users thought about their work. There's a misconception that the typical Mac user is someone who was already predisposed toward the graphical world—maybe an artsy type, maybe a designer. That view would make some of the gruff bankers, securities traders, engineers, and others who rely on Macs laugh out loud.

Mac business users discovered that the

ease of cutting data out of one application and pasting it into another—one that, because it ran under the same highly standardized GUI, knew the form the incoming data would take and could make use of it immediately—led them to take computing a step or two further, getting more quickly to better results. They found that there's nothing frivolous about turning out a few graphs to help sell an idea to management or a client. And they discovered that, when it's easy to fold graphics into text passages in reports, you can make a point more quickly and more persuasively than by using words alone.

These are the lessons that *Windows* and *GEM* users are learning now, and that Presentation Manager users will learn in the near future.

MICROSOFT'S OFFERINGS

Long in the habit of looking to IBM and Microsoft for leadership, most PC users and developers are focusing their GUI sights on *Windows* and the Presentation Manager. Are those products ready for prime time? Is *Windows* just a bridge product from today's limited DOS world to the multitasking, multithread, multimegabyte

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world of tomorrow? Will the PM ever get its rough edges smoothed out? Where will each go from here?

Though the current version of *Windows* falls short of Microsoft's own definition of a graphical user interface in some ways, it has become the standard GUI in the DOS world. (See the sidebar "What's Wrong with *Windows*?") Since its initial release in November 1985, *Windows* has come a long way—especially in the jump from the slow and clumsy Version 1.x to the not-quite-so-slow, not-quite-so-clumsy version 2.x. It gained in the move to 2.0, and now to 2.1 (also known as *Windows/286* and *Windows/386*), more and better display and printer drivers, better use of memory, and the ability to display overlapping—not merely side-by-side (tiled)—windows. In the process, it evolved from a curiosity to a working tool.

Windows/386 is a far more complex, robust, and useful product than *Windows/286*—but only if you have a 386 PC. If you do, the program's ability to manage several concurrent windows, each displaying a different program running in its own virtual PC, is a true productivity booster. And *Windows/386* can free you from the

tyranny of pop-ups that don't pop up: you can run your most-important pop-up utilities as freestanding, non-memory-resident applications, each in its own window.

Windows/386 lets you create standard

The current version of *Windows* has become the standard GUI in the DOS world.

sets of programs that otherwise cannot run together. You might have *WordPerfect*, 1-2-3, *Crosstalk Mk.4*, and *Hot Line II* all active at once. Normally *Crosstalk* won't run in the background with other DOS programs, but under *Windows/386*, it isn't running in the background: it has its own window to its own virtual PC.

All that takes a lot of memory, of course. Though memory prices are falling, multimegabyte upgrades still aren't cheap. But then, neither is your time.

GETTING READY FOR TOMORROW

What's coming? Look for new versions of *Windows* this fall. They promise faster performance, more intelligent use of system memory, and easier file management than current versions. The visual components of the shell will be more graphical, more intuitive, and more interactive.

The Presentation Manager is also getting an overhaul, the results of which should show up in the next release (1.2) of OS/2, due by year's end. The PM shell will be cleaned up visually; convergence between the look of *Windows* and the Presentation Manager will be evident.

OS/2 itself is due for a new file system in Release 1.2; the new system will support long filenames and extended attributes. Still in the future are the truly object-oriented file system Microsoft has promised and the 386-specific version of OS/2, which will finally take advantage of today's fast 386 hardware. A developers' version of OS/2 (now called OS/2, Ver-

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sion 2.0, internally at Microsoft) is expected to be shipped this fall, and the version intended for end users should be shipped sometime in the first half of 1990.

OTHER DOS CONTENDERS

In the meantime, *Windows* isn't the only DOS-based GUI available. *GEM/3 Desktop*, from Digital Research, offers a similar environment, and *DeskMate*, from Tandy Corp., is a good GUI solution for beginning and/or home computer users.

GEM, which has been out since March of 1988, is a useful product. However, it's spawned few significant applications. Since graphical operating environments are only as useful as the applications that run under them, the future for GEM does not look especially bright. Xerox's *Ventura Publisher* is the only major application that runs under GEM; a few scanner control programs and a line of interesting but not widely used applications from Digital Research—the best of which, *Arline*, is a superb desktop publishing aid—round out the dim picture.

DeskMate, Tandy's entry in the GUI sweepstakes, was originally a character-mode GUI-like entity that came free with Tandy's low-end Model 1000-series PC compatibles. Since then, *DeskMate* has grown up into a true graphical-mode environment that Tandy sells separately.

DeskMate may be the easiest-to-use, shortest-learning-curve graphical interface ever designed. It includes a few so-so mini-applications and is now beginning to attract full-fledged applications support from vendors of introductory-level PC software.

Tandy has further enhanced the value of *DeskMate* by developing an extended-capability add-on product, *Workgroup*, that brings Tandy's easy-to-use GUI to LAN users. Running on 3Com, Tandy and many so-called "zero-slot" LANs that use PCs' RS-232 serial ports, *Workgroup* offers superb telephone messaging, very good electronic mail, group calendaring, and more.

THE OBJECT OF HP'S AFFECTION

In all the talk about new graphical interfaces for PCs, one product not yet delivered, from a company that has never made much of an impact in PCs or PC software, holds almost-mythic status in the minds of programmers and the few PC users who have actually seen demo versions. To see it is to be captured by a vision of computing as it has never been.

WHERE THE APPS ARE AND WHERE THEY'RE GOING

The best PC applications are on their way to graphical user interfaces. Whether they began life on DOS, the Macintosh, or *Microsoft Windows*, these products will grow up on the OS/2 Presentation Manager.

After Fall Comdex, it's unlikely that you'll see a single major application introduced that doesn't run on *Windows* or PM. Ashton-Tate, for instance, will migrate its Macintosh software to PM, leaving some DOS apps to die.

The accompanying diagram includes the products *PC Magazine* editors consider the best in each category. The icons and arrows show where these packages are today and where they're headed.

Predicting the future is always tricky. We've based our forecasts on product announcements and general statements of direction. As a package migrates, its name and features often change. For the sake of simplicity, we've used the product's original name.

	Macintosh	DOS	Microsoft Windows	GEM	OS/2 character mode	OS/2 Presentation Manager
WORD PROCESSING						
WordPerfect						
Microsoft Word						
SPREADSHEET						
Microsoft Excel						
Lotus 1-2-3						
DATABASE						
Paradox						
COMMUNICATIONS						
Relay Gold						
HyperAccess						
GRAPHICS						
Persuasion						
PowerPoint						
Adobe Illustrator						
Micrografx Designer						
DESKTOP PUBLISHING						
Ventura Publisher						
PageMaker						
CAD (COMPUTER-AIDED DESIGN)						
AutoCAD						

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The product is the *HP NewWave Environment*, from Hewlett-Packard Co. *NewWave* is in effect a shell on top of a shell, sitting atop *Windows* (and someday, HP says, the Presentation Manager) and bringing to these current and future standards the enormous advantages of object-orientation. *NewWave*—the *Windows* version of which HP says will be available by press-time—proves that, despite Microsoft's delays, it's possible to run an object-oriented file system on top of the famously kludgy file systems of existing versions of *Windows* and DOS.

What's so important about object orientation?

Consider this scenario. You sit at your PC, seeing what looks remarkably like a *Windows*/Presentation Manager display. But instead of the usual long, dreary lists of obscure filenames, you see rows of named icons. One might be called APCO LTR, another APCO GR, another APCO SS. Click with your mouse on the APCO LTR icon. Immediately your *Windows*-compatible word-processing program loads, then opens that text document, APCO LTR. Scroll through the letter. Notice that table near the bottom of the first

page? That's a patch from an *Excel* spreadsheet, APCO SS. Notice the graph near the top of the next page? That's APCO GR, also from *Excel*—or maybe from another *Windows* graphics program; it doesn't matter. Click on that spreadsheet patch, or on the graph, and the program associated

The PC will never be as easy to use as the Mac because of demands placed on PC GUIs.

with it pops up so that you can edit it. Make a change anywhere and it will ripple back through all of the associated documents—without intervention by you.

That's what's so important about object orientation.

Object-oriented design has been showing up in applications as well as in operating environments. One application that has taken object-oriented design to its logical extreme is Wang's *Freestyle*. Visually attractive, metaphorically consistent, and very easy to use, *Freestyle* is a DOS application that starts with a GUI and adds workgroup communications tools—such as voice addendums and handwritten messages to files. It promises a taste of tomorrow's environments today. (For more on *Freestyle*, see the sidebar "Beyond the GUI: Wang's *Freestyle*.")

STATE OF THE MAC

Any discussion of GUIs isn't complete without a look at the Apple Macintosh's System and Finder duo, the most fully realized graphical user interface in general use. With 5 years under its belt, the Mac interface has outgrown most of its original shortcomings, and in the process has provided an ongoing field laboratory for interface-design specialists trying to determine what we really want.

Apple's experience with the Mac's operating system has led to a rewrite of the system from the bottom up. It will look

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much the same—the human interface qualities of the Mac's system are by now both well proven and widely accepted—but will provide more-robust services beneath that surface, to better support application programs.

Apple also hears footsteps coming from the PC-compatible world and is rewriting the Mac's System/Finder to help stave off the huge leaps and commensurate marketing advantages coming in PC-compatible GUIs and operating systems.

APPLES AND ORANGES

A comparison between the Mac's interface and PC GUIs is certainly tempting but not very productive. Charles Petzold—the proprietor of *PC Magazine*'s Environments department, a recognized expert on OS/2-PM, and one of the reviewers for this article—puts it simply: "The PC will never be as easy to use as the Mac, period. This isn't because of any intrinsic failings in the PC's GUI. It results from certain demands placed on PC GUIs that Apple doesn't have to deal with.

"First, the PC is an open-architecture machine; the Mac is not. A GUI that can potentially support every graphics video

display and every graphics printer ever made for the PC is going to be more complex than one that needs to support only one video display and two printers, as was the case with the original Mac.

"Second, because Apple didn't achieve much early penetration into corporate America, it can ignore compatibility with existing systems. *Windows* and OS/2 have to run DOS programs, and they have to work with the existing DOS file system. I guarantee you, if Apple had put complete Apple II compatibility into the Mac, it would have lost a lot of its simplicity.

"IBM has been much more successful than Apple, so IBM is bound by much tighter constraints."

UNITING UNIX

While Mac users enjoy the most intuitive GUI out there, and while DOS and OS/2 users can choose from a full palette of GUIs, the Unix user must wait for the arrival of GUIs that are still in the labs.

Long seen as capable and powerful but variegated and hostile to users, Unix is now becoming more standardized and

more friendly. Efforts are being made to convert the many incompatible versions into one binary code standard, which will make possible true cross-system compatibility of Unix applications. In addition, Unix supporters have recently recognized that, if it is to go head-to-head with OS/2-PM in the high-end networked-office-systems market, Unix must put on a kinder, gentler face. So the Unix community is also pointing toward delivering Unix with one standard graphical interface.

Although the Unix community seems relatively united on the binary-compatibility issue, when it comes to the user interface turf, the Unix industry is split into two warring camps—Sun and AT&T vs. The Rest of the World. So far, the outcome has been to delay the standardization of the "look" of Unix. The Sun group has advanced *Open Look*, an aesthetically appealing and highly functional graphical user interface, as the proposed Unix standard interface. At present, *Open Look* exists only on the new SPARCstation computers from Sun. The rest of the Unix vendor community has rallied around the Open Software Foundation's *OSF/Motif* graphical interface. *Motif* has two big

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backers and one huge advantage: Microsoft and IBM support *Motif* over *Open Look*; and *Motif* is a near-twin of the *Windows/Presentation Manager* interface.

NUMBERS WILL TELL

The question, perhaps sadly, isn't which is better (remember how the superior Beta-max standard lost out to the inferior but much more widely supported VHS standard in consumer video cassette recorders?) but which gathers the widest support most quickly and thus overwhelms the other by sheer numbers. Whether or not *Open Look* is used more widely in the near future, it seems increasingly clear that *Motif* will win this war—in large part because of its strong family resemblance to the dominant graphical interface in the PC-compatible world today (*Windows*) and the interface almost certain to dominate the PC-compatible world tomorrow (the *Presentation Manager*).

The resemblance also offers an appealing glimpse of the future for computer users: a world in which the interfaces on virtually every small to medium-sized computer system—from standalone DOS machines up through networked OS/2 and Unix machines—would have essentially identical interfaces. That would mean sharply reduced training costs for corporations employing a mix of the three systems, more options and less grief for those buying and mixing systems, a broader base of applications, and a much easier time for computer users who must move from one platform to another.

RIGHT FOR TODAY

All this paints an enticing picture of tomorrow. But what about today? While more-advanced operating systems, such as OS/2, still haven't hit their stride, let alone their peak, you can get a lot of value and productivity out of GUIs in their present forms.

If you're persuaded of the advantages of a graphical user interface and have a medium-power PC—say, a 12-MHz or faster AT clone—look at *Windows/286*. It's a good real-world answer that will fit your existing hardware. Remember, though, that you'll want at least 2MB of RAM in the machine, a VGA or better display and video card, and a mouse to get *Windows* off the ground.

If you use an 80386 or 386SX PC, first consider *Windows/386*. It's a big leap up in functionality from plain-vanilla DOS, and virtually all of your current application

programs will work just fine with it. Again, add to the cost of the *Windows/386* software any display or memory upgrades you'll need—and consider buying at least 4MB of RAM.

The new releases of both flavors of *Windows*, due by year's end, will show dramatic improvements. If you're wavering, *Windows 3.0* will change your mind. As executive editor Bill Howard quips, "It's that good."

FAITH IN THE FUTURE

If you have a 386 PC, lots of memory, and an abiding faith in the future of power-PCs and power-GUIs, invest in IBM's OS/2, Version 1.1, with the *Presentation Manager*. Or look for an OS/2-PM release from

**GUIs are here now.
They deliver real value
and show where
personal computing is
headed. We think you'll
decide that this is
going to be a graphical
user interface world.**

the maker of your PC compatible. (You can't buy OS/2-PM from Microsoft directly; it sells the product only through its hardware-vendor licensees.) Buy plenty of memory.

And keep an eye out for early PM-compatible application software releases. (See the chart "Where the Apps Are and Where They're Going.") You can run your existing DOS applications, one at a time, in the creaky DOS-compatibility box of OS/2-PM—but why would you?

GUIs are here now. They deliver real value and show clearly where personal computing is headed. In the in-depth reviews that follow, you'll meet all the contenders and a couple of the pretenders. And we think you'll decide, as we have, that this is going to be a graphical user interface world.

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GUIs for DOS and OS/2

The graphical user interfaces that PC users care most about are the ones that run on DOS: *Microsoft Windows*, Tandy's *DeskMate*, and Digital Research's *GEM/3 Desktop*. You'll find in-depth reviews of these GUIs on the following pages.

First, contributing editor Charles Petzold reviews *Windows*, the most popular GUI in the DOS world. *Windows* boasts the largest installed base and support for the most applications on today's PCs. (See the chart "Where the Apps Are and Where They're Going.")

Contributing editor Luisa Simone then shows that Tandy's *DeskMate* is a good option for users of 8086-based PCs, but that it may have a limited usefulness for anyone tempted by business apps, most of which have yet to move to *DeskMate*. Tami D. Peterson takes a look at *GEM/3 Desktop*—a powerful package with a less-than-certain future. The best reason to use *GEM/3 Desktop* today is for Xerox's *Ventura Publisher*.

For a glimpse of a DOS GUI that looks promising, see Petzold's review of Hewlett-Packard's *HP NewWave Environment*, due out by the time you read this. *NewWave*, which will run on *Windows* plus DOS and eventually on PM plus OS/2, offers an exciting implementation of object orientation.

The star of our GUI show is the Presentation Manager, also reviewed by Petzold. PM, which comes with OS/2 1.1, will be the primary application environment for OS/2 and the GUI of choice in the years to come.

If you're wondering what to do until then, turn the page. You'll see that *Windows* provides the best path to PM.

Microsoft Windows is the right interface for PC users today, but the *Presentation Manager* will be tomorrow's GUI of choice.



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Microsoft Windows is the most popular graphical user interface for DOS. According to Microsoft Corp., over 2 million copies of Windows have been sold and distributed since its original release in November 1985. Windows, Version 2.1, is available in two flavors—Windows/286, priced at \$99, and Windows/386, which costs \$195.

Although application support for Windows was initially sparse, it has been increasing in recent years and is quickly approaching critical mass. To encourage application support, Microsoft licenses a runtime version of Windows to developers free of charge; they in turn make the program available to end users. The runtime version allows you to use the application you've purchased, although it doesn't give you the benefits—such as context switching—that the full Windows environment provides.

The primary purpose of Windows is to run programs especially written for the GUI, such as Microsoft Excel, Aldus Corp.'s PageMaker, Micrografx Designer, and Samna Corp.'s Ami. Windows runs these programs in overlapping rectangular windows on the video display and allows the user to switch among them with keyboard and mouse. This gives users a flexibility in moving among applications that is more akin to the way people actually work.

For these programs, Windows provides a wealth of user interface components (menus, scroll bars, dialog boxes, buttons, and list boxes) that help give the applications a consistent interface. Microsoft also publishes a Windows Style Guide that instructs programmers on recommended standards. The result is that every Windows program that stores documents as files has a File menu with an Open option that opens an existing document file. Once you've learned how to use one Windows program, you know how to use them all.

DEVICE INDEPENDENCE

Windows also has a device-independent graphics interface known as GDI (Graphics Device Interface). Programs use GDI to display graphics and text on the screen and on hard copy devices such as printers,

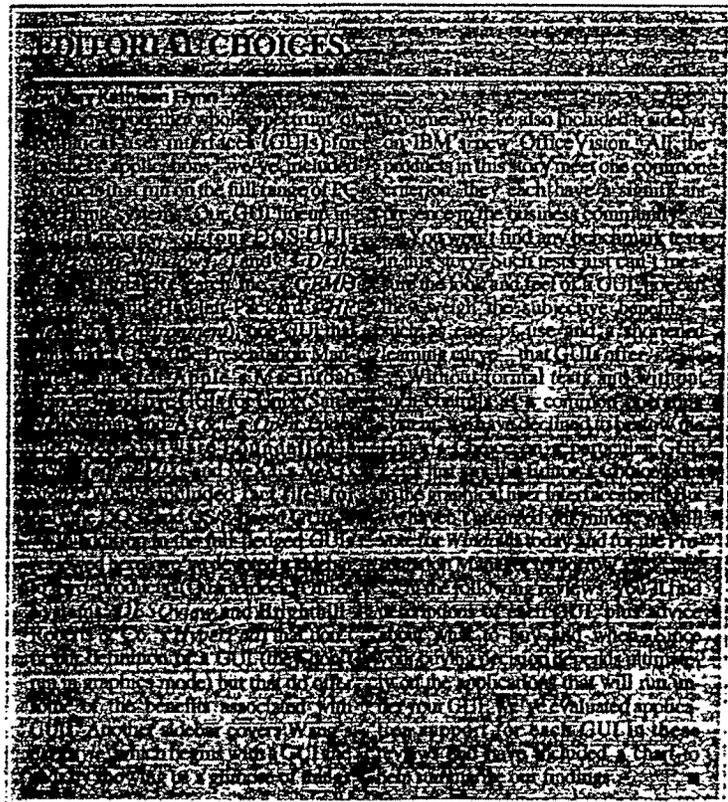
plotters, and digital cameras. Windows is shipped with device drivers that support many popular video display boards and printers, shifting the burden of supporting various graphics output devices from the application to the operating environment. Thus the disks full of printer drivers commonly shipped with DOS applications are not required for Windows programs. Moreover, most Windows programs are written so that they treat the screen and printer in a device-independent manner. When new video boards become available, all that's needed is a Windows device driver; existing Windows applications can take advantage of the new hardware without any modifications.

Programs written for Windows can share and exchange data through the Windows clipboard. A protocol known as DDE (Dynamic Data Exchange) allows programs to transfer data through interactive links. For example, a bar graph displayed in Micrografx's Graph Plus can

reflect changes to data in another application, such as a spreadsheet in Excel.

Perhaps the most sophisticated aspect of Windows is its memory management. Although Windows runs in real mode under DOS, the memory management uses techniques normally available only under protected mode. Windows can move code and data segments in memory, discard code segments from memory and reload them from .EXE files, and allow programs to share code and data located in dynamic-link libraries. For example, the code that handles the menu logic in Windows is located in a dynamic-link library. Only one copy of this code need be present in memory for all Windows applications to use it. This sharing of code helps decrease the memory requirements of individual Windows applications. (Dynamic linking is one of several concepts originally developed for Windows that have been carried over into OS/2 and the Presentation Manager.)

The primary difference between the two versions of Windows 2.1 lies in the



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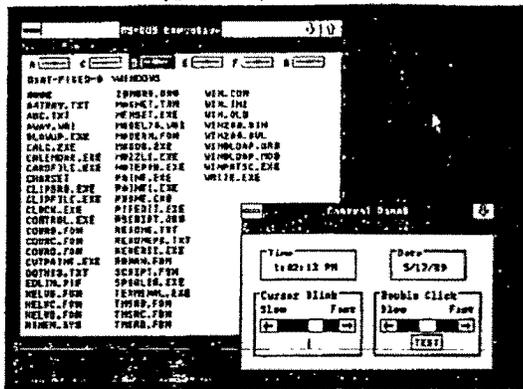
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giving them much more elbowroom and significantly improved performance.



In the current versions of *Microsoft Windows*, the MS-DOS Executive is the user's interface to the file system and the applications; it's also in charge of application launching. The Control Panel handles system configuration and printer installation.

PRODUCTIVE DOS

Although many observers expect the OS/2 Presentation Manager to eventually replace *Windows* as the GUI of choice on PC-compatible machines, *Windows* will help make DOS tolerable and more productive during its last few years of widespread use. Furthermore, judging from the improvements expected in *Windows 3.0*, it's obvious that Microsoft is not abandoning *Windows* and will continue to make it better.

When is the time right for you to put *Windows* on your machine? As with any operating system or environment, a decision to move to *Windows* should be based on the availability of desirable *Windows* applications. If the only two DOS applications you run are *Lotus 1-2-3* and *WordPerfect*, there is little reason to even think about *Windows*. But if you want to fire up *Excel* and *Ami*, then you should be using at least a runtime version of *Windows* (whether you want to or not!).

way they run DOS programs that were not written for the *Windows* environment. Under *Windows/286*, *Windows* usually has to step out of the way and give a DOS application the full screen. *Windows/386* uses the "virtual 8086" mode of 80386 microprocessors to window and multitask virtually all DOS programs.

equivalent of a DIR command. For people who know how to use DEL, COPY, and RENAME, performing these functions under the MS-DOS Executive is more difficult than using the DOS command line. (Several utilities from other software manufacturers—such as Publishing Technologies' *PubTech File Organizer*, Wilson WindowWare's *Command Post*, hDC Computer Corp.'s *hDC Windows Express*, Matesys's *Simple Win*, and Romberg & Romberg's *Smart Win*—provide friendlier environments for maintaining files and/or starting programs. And if you want to write your own utilities, Softbridge's *Bridgel286* and *Bridgel386* offer a full-fledged batch language for *Windows*.)

Perhaps the most serious problem with *Windows* is the operating system under which it runs. DOS was not designed for multitasking and is limited to 640K memory. *Windows* provides support for expanded memory. But, like any bank-switched memory scheme, expanded memory cannot be used by applications as transparently as normal addressable memory. Using expanded memory can degrade program performance.

Windows 3.0 (to be released later this year) is expected to address these two problems. The MS-DOS Executive is being replaced with a more sophisticated and intuitive interface for starting programs and performing file management. To conquer the memory limitations under real mode, *Windows 3.0* will use protected mode to run well-behaved *Windows* applications. Support for protected mode will allow *Windows* programs to transparently use memory above the 640K DOS limit,

DeskMate

by Luisa Simone

DeskMate, from Tandy Corp., challenges most of our assumptions about the high cost of graphical user interfaces. Not only does *DeskMate* work efficiently on an 8086—or even an 8088—but it's also fully functional with only 384K RAM. And *DeskMate*, which comes with several *DeskMate* applications, is priced at \$99.95—the same price as *Windows/286* without any apps.

You might think that all of this does you no good if you don't own a Tandy Computer. While it's true that *DeskMate* is shipped in ROM with all Tandy 1000SL and 1000TL computers, it's also available as standalone software for any PC compatible.

Installing *DeskMate* entails copying all of its files to your hard disk and typing the word DESK. Once you've loaded the program, you will have a common look and feel for all *DeskMate* apps. The slightly clunky interface takes advantage of drop-down menus, dialog boxes, radio buttons, and yes, even function-key substitutes for the mouseless among us. An entire suite of programs is bundled with *DeskMate*: Telecom, Test, Draw, File, Address, Mail-

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PC MAGAZINE FACT FILE



Microsoft Windows, Version 2.1
Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073; (206) 882-8060.
List Price: *Windows/286*, \$99; *Windows/386*, \$195.
Requires: *Windows/286*: 512K RAM, graphics adapter, DOS 3.0 or later; *Windows/386*: 80386-based PC (2MB RAM recommended), graphics adapter, DOS 3.1 or later.
In Short: The most popular graphical user interface for DOS, *Windows* promises to make DOS more productive during its last years of widespread use. New versions, due out this fall, are expected to address memory limitations and replace the less-than-intuitive MS-DOS Executive.

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CRACKS IN THE WINDOWS

Windows currently has two major failings. (For information on other frustrations with *Windows*, see the sidebar "What's Wrong with *Windows*?") The first is the MS-DOS Executive, a file-management program that compares unfavorably with many DOS shells. The MS-DOS Executive is almost entirely nongraphical; the main window provides little more than the

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WHAT'S WRONG WITH WINDOWS?

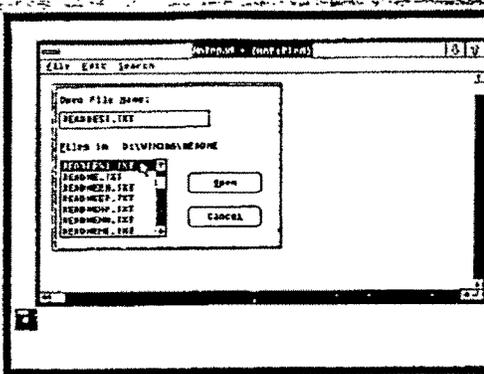
by Bill Howard

What's wrong with *Windows*? Like the Mac, it's bitmapped, somewhat slow, and gives you access to some great applications. Unlike the Mac, it doesn't make a computer any easier to use. But that's about to change.

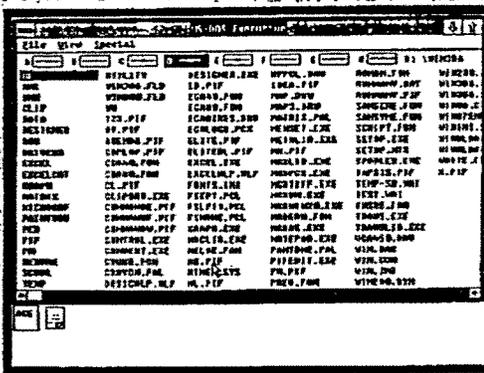
If the graphical interface has been slow to take off on the PC, it's because *Windows* has been something of a graphical in-your-face for the last 4 years: slow, klunky, not very graphical, and not much easier to use than DOS. Not a very pretty picture for the vanguard of PC-compatible GUIs. Most users who've adopted *Windows* have done so because it gives them access to the originally small (but now rapidly growing) and powerful collection of *Windows* apps. *Microsoft Excel*, *PageMaker*, *Micrograft Designer*, and *Graph Plus* are some of the very best programs that you can buy for the PC, and they all run under *Windows*.

Take a look at the rogues' gallery of screen shots accompanying this sidebar. They're just three examples of how *Windows* lets you down if what you're expecting is the MS-DOS equivalent of the Mac. There are many, many others, among them:

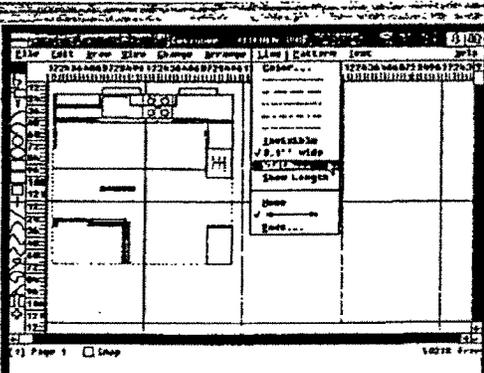
- You can't grab a file with your mouse and drag it from one directory to another.
- You can't zero in on everything related to one application. If you're running *Excel*, for example, you might want an MS-DOS Executive session that shows all .XLS, .XLM, .XLW, and .WK1 files on all subdirectories. It can't be done.
- *Windows* lacks DOS-extending utilities—such as MOVE, the intelligent equivalent of COPY-then-DELETE—that are available on every Tom, Dick, and Harry DOS shell.
- Dynamic Data Exchange (DDE), the *Windows*-approved method of transferring data streams among *Windows* apps, will drive you to tears with its complexity. While the Clipboard is far easier to use, your fonts and line widths may be altered when you clip and paste data between apps.
- WIN.INI, the *Windows* parameters



Trying to find the file you need in the current versions of Microsoft *Windows* is like admiring the countryside from the gun slit of a tank. A list box is typically only eight filenames long and lacks even the information you'd expect from the DOS DIR command, like file size and date.



Microsoft *Windows* MS-DOS Executive has none of the intuitive ease of use that you find in the Macintosh. Do you see anything on this screen that looks easier than DOS? Or, for that matter, that couldn't be done with a character-based interface?



Most Microsoft *Windows* pull-down menus aren't sticky, meaning that if you wanted to change three attributes from this one, you'd have to pull the window down three times. Only a handful of *Windows* programs lets you keep the window down until you're done.

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file, and arcade, and if you want to tweak *Windows* for performance, you're likely to find modifying advice. You compare READ ME notes in *Windows* and in *Windows* apps.

The *Windows* software installer can get you into an apparent lose-lose situation in which your only choices are to reload the apps you've already down-loaded (and waste 20 minutes) or deactivate the fonts or exit by rebooting the system.

Then there's *Windows 3.0*. Some users find that it crashes too often to be a preferred operating platform. You can fix a *Windows 3.0* to improve its reliability, but you may not like the terms. *Windows 3.0* accessories that use

Windows gives you access to some great applications. Unlike the Mac, it doesn't make a computer any easier to use. But that's about to change.

merge, and Worksheet provide the most basic of computing capabilities. These applications are also very closely tied to the accessories that come with the product. The Address program and the phone list, for example, both use the same data files—so you have to enter the information only once. A pull-down menu that is a standard part of the interface makes the full complement of accessories available from within any *DeskMate* application.

SWITCHING TASKS
 When you invoke the accessories menu, in addition to the expected phone list, calculator, or clipboard, you will also see an option called Task Switching. *DeskMate* is indeed a graphical environment, but it has no capabilities for either true multitasking or windowing. Context switching moves you between any two applications, but that's all it does. Even the accessories are limited in this regard. The "windows" in which they appear cannot be resized or moved, and you must close an accessory in order to return to the current application.

Like all graphical environments, *DeskMate* provides device independence to the programs running under it. *DeskMate* supports Hercules, CGA, EGA, and VGA displays. The program also supplies generic drivers for the following printers: an IBM graphics printer, an ASCII printer, a daisywheel printer (for Tandy and IBM daisywheels), and the HP LaserJet Plus. Don't expect the long list of specific drivers that come with *Windows*, and don't expect PostScript support.

However, you'll be grateful for the way in which *DeskMate* handles other peripherals—like mice. Similar to GEM's approach, adding a mouse is as simple as accessing the setup menu and telling *DeskMate* to look for one. Try that in the current version of *Windows* and you'll discover that the only way to add a mouse is to reinstall the program.

DeskMate also incorporates some DOS shell features. You can view your files in a tree structure or you can list them in menu boxes that appear on a metaphorical desktop. The tree gives you a more intelligent look at complicated directory structures. But in either case, double-clicking on a category header or on a filename will invoke the associated program. Of course, *Windows*, and even DOS, allows you to do the same thing, either by modifying the WIN.INI file or by passing a filename as a

PC FACT FILE

DeskMate, Version 3.0
 Tandy Corp., One Tandy Center, Fort Worth, TX 76102; (817) 390-3700.
 List Price: Software, \$99.95; Workgroup Comparison, \$149.95; Developer's Kit, \$250 (no royalty).
 Note: *DeskMate* is free (and stored on ROM) with the purchase of the Tandy 1000SL or Tandy 1000TL. Other Tandy models require that you purchase *DeskMate* as software.
 Requires: 512K RAM, graphics adapter, DOS 3.2 or later.
 If Short: If you own an 8086, want a graphical environment that emphasizes ease of use, or just don't feel like hassling with DOS anymore—by *DeskMate*. For \$100 don't expect high-end functions, but do expect consistent, reliable performance.
 CIRCLE 118 ON READER SERVICE CARD



parameter. *DeskMate*, however, creates the same sort of connections through the courtesy of a simple-to-use dialog box.

Unfortunately, you'll find that you often shell out of the *DeskMate* environment in order to run favorite DOS programs. Although 14 software companies have announced support for *DeskMate*, so far there's still a rather narrow range of business products; only a handful of programs—*Quicken* from Intuit, *Memory-Mate* from Broderbund Software, *Instant Pages* from Electronic Arts, and *PFS: First Publisher* from Software Publishing (which says it expects to port over other apps later)—have taken advantage of the free license that Tandy offers to *DeskMate* developers. And the only graphics program to provide resolution-independent art is Tandy's own low-end, vector-based Draw program, which comes bundled with the operating environment.

WHEN LESS IS MORE
 It would be easy to say that *DeskMate* occupies a niche as the graphical user interface for 8086 computers. But, in a world where 80286s are quickly becoming the entry-level machine, *DeskMate* may have to compete more directly with *Microsoft Windows*.

DeskMate has less overhead than *Windows*, and that results in a faster response time. *DeskMate* also traps some common operator errors. For example, if *DeskMate* can't find a program in the current directory, it won't give you a cryptic error message. Instead, you'll be asked if you want

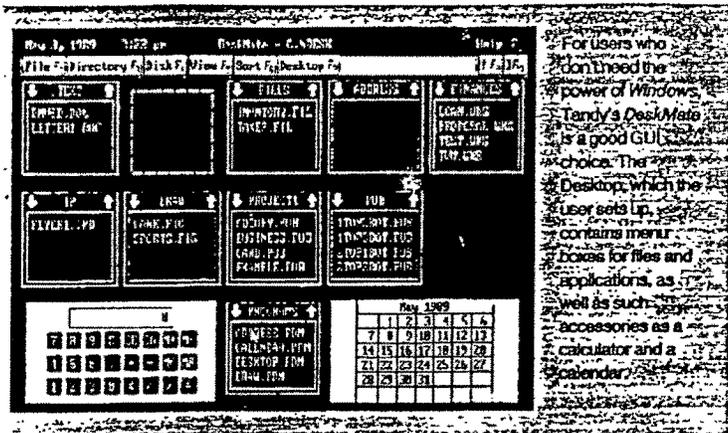
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For users who don't need the power of Windows, Tandy's DeskMate is a good GUI choice. The DeskMate Desktop, which the user sets up, contains menu boxes for files and applications, as well as such accessories as a calculator and a calendar.

to scan the entire hard disk in order to locate the errant program.

The next version of *DeskMate* (due in the third quarter of this year) will further distinguish itself with context-sensitive help that relies on event logs and extensive databases. If it works as promised, *DeskMate* will take its best guess at what you're doing wrong and assist you with specific information. Tandy also markets a \$149.95 supplement to *DeskMate* called *Workgroup Companion*, which gives messaging, group-calendaring, and printer-sharing capabilities to users on 3Com, Tandy networks, and RS-232-based LANs.

Anyone seeking high-performance programs will ultimately succumb, not to *Windows* per se, but to the programs that run in the *Windows* environment. *DeskMate* poses a unique question in this power-driven, features-intensive market: Do you really need all the power of *Windows*? If the answer is no, you'll find *DeskMate* a useful companion.

GEM/3 Desktop

by Tami D. Patterson

GEM, or Graphical Environment Manager, is exactly what its name suggests. And *GEM/3 Desktop* is the application equivalent to *Windows*' MS-DOS Executive; both manage applications and files for DOS from within their respective graphical user interfaces.

Digital Research Inc. (DRI), the developer behind GEM, began shipping the

product in March of 1988. At last count, DRI claimed to offer over 500 different GEM-based applications worldwide. The most significant of these—and some argue that it is the only significant GEM app—is Xerox's *Ventura Publisher*. Some applications ship with only runtime GEM. Others are packaged with *GEM/3 Desktop*, which can also be purchased separately for \$49.95.

Like other present-day GUIs, GEM is a descendant of the early Xerox PARC operating environments. Those familiar with the earliest incarnations, including the Macintosh interface, will perceive *GEM/3 Desktop* as falling very near to the tree. DRI has maintained the essence of the original desktop metaphor in its product. A routine DOS command such as COPY is obsolete in the *GEM/3 Desktop*. It is replaced with the more-object-oriented method of clicking on an icon that represents the document (file) or folder (directory) to be copied, then dragging it onto the document or folder icon it is to replace or combine with.

INTELLIGENT LOGOS

All GEM-based applications will run from within the *GEM/3 Desktop*. So will any other DOS application, including *Windows*—assuming that you have enough memory. The only difference in using a *GEM/3 Desktop*-installed application is the precustomization. For example, *GEM Arline*, a GEM-based professional graphic designer's tool, displays an *Arline* logo in its *GEM/3 Desktop* application icon. All file-types recognized as *Arline*-compatible have immediate application-execution

capability. This means that double-clicking on an *Arline* file will automatically open the *Arline* program at the same time.

You can easily adapt the same features to any non-GEM application. DRI has already done half the work by automatically recognizing .EXE and .COM files as application files. Thus, the proper generic icon imagery is displayed. To open your favorite word processor from within the *GEM/3 Desktop*, just double-click on its corresponding icon. To customize the icon, *GEM/3 Desktop* supplies a library of various pictorials to suit most any application. For example, when installing *Lotus 1-2-3*, you might choose an icon depicting a page with numbers.

GEM's device independence is outstanding, providing tremendous flexibility to anyone using a GEM application. You can exchange mice, monitors, scanners or printers at any time with a quick device-only install. By comparison, changing a monitor in the current versions of *Windows* requires a full reinstallation.

IF YOU CAN'T BEAT 'EM...

While GEM is presently a competitor of *Windows*, DRI intends to migrate it into OS/2 and the Presentation Manager. To the GEM user, this means uninterrupted application usage. To the GEM developer, this means purchasing DRI's *GEM System Layer Presentation Manager (GSL-PM)* programmer's kit. In it are the tools to

PC FACT FILE



GEM/3 Desktop
Digital Research Inc.,
P.O. Box DRI,
Menlo Park, CA 94025
(415) 949-3000
List Price: \$49.95
Requires: 512K RAM,
graphics adapter, DOS
2.1 or later.

In Short: An alternative to *Windows*, GEM boasts 500 applications, but only one, Xerox's *Ventura Publisher*, is a major player. DRI will be releasing the *GEM System Layer Presentation Manager*, which will provide tools to port GEM apps to the *Presentation Manager*.

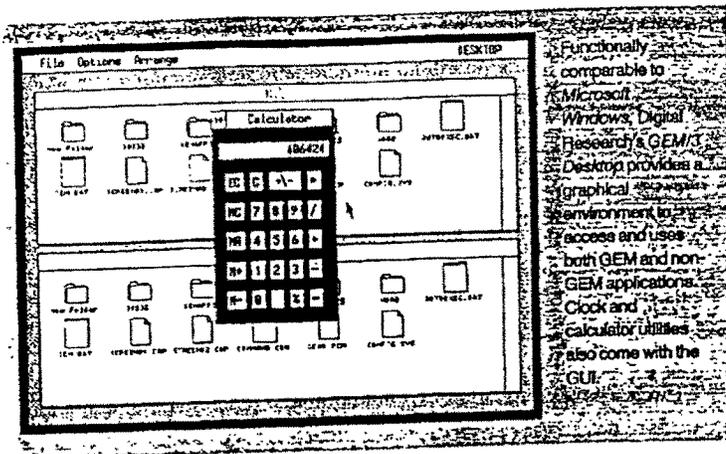
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"plug" any GEM application into the PM interface. The *GSL-PM* acts as a redirector, translating GEM calls into appropriate PM functions and displays—all the way down to menus and dialog boxes. At presstime, the price for the kit was expected to be approximately \$2,500.

Of course, the success of DRI's strate-

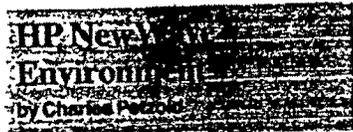
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gy depends on applications making the move to PM with GEM. DRI itself will release products for *GSL-PM*; *Artline* appears to be the likely first candidate, and *Chart*, *Draw*, *Graph*, *FirstWord Plus*, *GEM Desktop*, *Publisher*, and *GEM Scan* will all follow. DRI claims that a dozen ISVs are seriously interested in writing *GSL-PM* apps; two that have announced such applications are Precision Software—developer of *Superbase*, a popular database running in GEM—and Delrina, the maker of *Per:FORM*, a forms generation package.

GEM offers many immediate benefits to the end user, and DRI's strategy of moving GEM applications into PM makes GEM a good present-day solution for users committed to *Ventura Publisher* and *Artline*.



Hewlett-Packard Co.'s *HP NewWave Environment* is an alternative application program for Microsoft *Windows*. Just as *Windows* runs *Windows* applications, *NewWave* runs *NewWave* applications. But because *NewWave* itself runs under *Windows*, you can run *Windows* apps and *NewWave* programs on the same screen and switch among them. The icon-based *NewWave Office* is the user interface to *NewWave*.

At presstime, *NewWave* is scheduled for release this summer at a price of \$195. (A developer's kit costing \$895 has been available since 1988.) A Presentation Manager version of *NewWave* is also in the works.

Several *NewWave* applications are expected this year, including *Microsoft Excel* and Micrograf's *Graph Plus*. As you can probably guess, *NewWave* applications usually begin life as *Windows* applications. The programs are then modified by the manufacturer to include *NewWave* extensions to the *Windows* application program interface.

DATA + CODE = OBJECT

To understand how *NewWave* is different from *Windows*, it is necessary to delve into concepts of object-oriented design.

Over the past few years, programmers have been discovering how object-oriented design can simplify common programming tasks. Conventionally, programmers have worked with data and code. The code (organized into procedures) manipulates the data. Each procedure that can manipulate a particular data type must know how the data is stored in memory.

In object-oriented programming, a programmer works with objects. An object is a combination of data and code. More precisely, an object is an instance of a particular data type called a *class*. The class is defined not only by the way in which the data is stored in memory but also by all the operations, called *methods*, that may be performed on the data. To manipulate an object, the program sends the object a

message that tells the object to perform a particular method on itself.

Some elements of object-oriented design are already present in *Windows*. In particular, a *Windows* program creates various windows that are treated as objects within the program. But the *HP NewWave Environment* brings object-oriented design principles directly to the user in the relationship that occurs between application programs and the documents that they manipulate.

Under more-conventional environments—and for this comparison, *Windows* is certainly conventional—users work with applications and documents. (Applications and documents correspond to the procedures and data of traditional programming.) To work with a particular document file, the user must start up the application, load a document file into memory, use the application to manipulate the document, and eventually print the document and save it. The application can then be terminated.

Within *NewWave Office*, a user works with objects—the document files that are linked to particular application programs. *NewWave Office* displays these objects using the name of the document and an icon that represents the application program. To work with one of these objects, the user

PC FACT FILE

HP NewWave Environment
Hewlett-Packard Co.,
Personal Software
Division, 3410 Central
Expressway, Santa Clara,
CA 95051; (800) 752-
0900.
List Price: \$195
Requires: 80286 or 80386-based PC, Microsoft
Windows 2.0 or later, 2MB LM 4.0 expanded
memory recommended, 20MB free disk space,
EGA or VGA, mouse (Windows compatible),
DOS 3.2 or later.
In Short: Planning on top of *Windows*, *NewWave*
is an alternative application environment.
Due this summer, *NewWave* brings object-
oriented design principles directly to the user. A
Presentation Manager version is in the works.
CIRCLE 421 ON READER SERVICE CARD

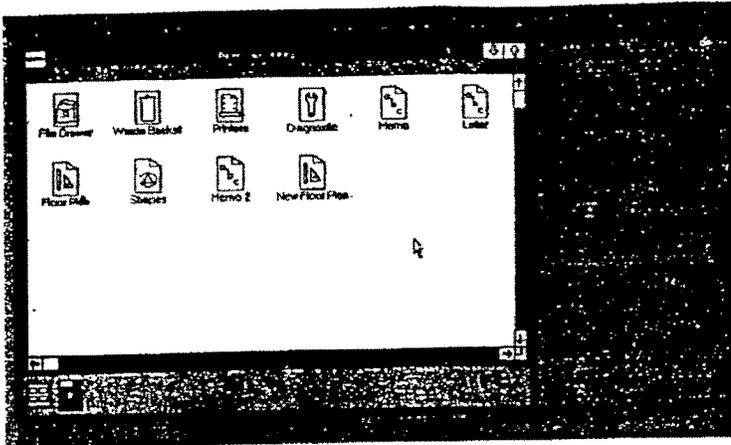
simply selects the object. *NewWave* then invokes the application.

TRANSPARENT APPLICATION LAUNCHING
Of course, you can do something like this in *Windows* today. *Windows'* MS-DOS Executive can start up particular applica-

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tions based on a filename extension, but in all cases, a *Windows* application is started up to create a new document or to load an existing one into memory. A *NewWave* application, on the other hand, can be started up transparently (and invisibly) to perform certain specific tasks on an object.

For example, to print a document in the *NewWave Office*, you need only move the document icon to the printer icon. The document is printed without any further user interaction. (Using object-oriented terminology, the user is sending a message to the object to print itself.) The application is obviously started up in some way (because only the application knows how to print the document), but the application need only print the document and then terminate. The application doesn't get in the way. The user doesn't even have to know which application is printing the document.

If you're still not impressed, consider this: *NewWave* objects need not be associated with only one application. For example, you can extract part of a spreadsheet to insert into your word processing document. This is a common practice in both DOS and *Windows*, but usually the spreadsheet fragment is converted to a simple ASCII format and no longer retains any formula or formatting information. In *NewWave*, the object remembers which application is associated with the spreadsheet fragment. If you select the spreadsheet fragment within the word processing document, *NewWave* will invoke the spreadsheet application to allow you to make changes. Both the word processing

and spreadsheet applications share in the display and printing of such a document.

The bad news (at least for the programmer) is that *NewWave* doesn't make *Windows* programming any simpler. A *NewWave* programmer needs to have a good background in *Windows*—itself certainly not an easy system—before attempting to deal with the *NewWave* extensions.

I won't venture a prediction about the success of *NewWave* in the *Windows* and (eventually) the Presentation Manager markets. But even if *NewWave* turns out to be merely a feasibility study, it is of extreme importance. *NewWave* shows a future direction for graphical user interfaces that is just too powerful to be ignored.

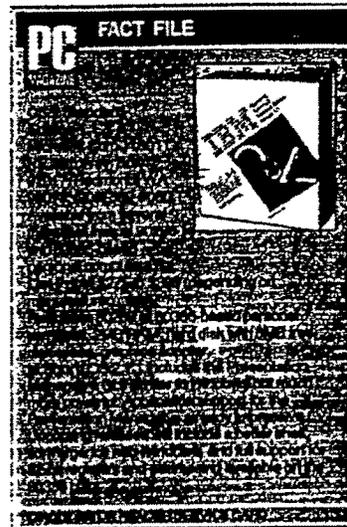


OS/2 was developed by IBM and Microsoft Corp. to succeed DOS as the standard operating system on 80286- and 80386-based PCs. OS/2 Standard Edition 1.1, released in October 1988, adds a graphical user interface known as the Presentation Manager to the OS/2 kernel that came out in December of 1987. (See "The Truth About Presentation Manager," *PC Magazine*, April 11, 1989.) Both OS/2 1.0 and 1.1 are priced at \$325 and are sold by manufacturers of PC compatibles. For the same price, IBM sells Extended Edition versions of both OS/2 releases; these ver-

sions have been optimized for IBM equipment.

Presentation Manager programs have a look and feel virtually identical to those written for *Microsoft Windows*. This similarity will allow a near-seamless transition when users move from the DOS/*Windows* environment to OS/2. In addition, the Presentation Manager API (application program interface) is similar in structure (if not in detail) to *Windows*. Many of the first Presentation Manager programs to become available will be programs originally written for *Windows*.

Although it's taken almost 4 years for *Windows* to accumulate a critical mass of applications, the Presentation Manager is on a much faster track. Significantly, many software companies that had little interest in *Windows* have either released or are currently developing Presentation Manager programs. (See "Where the Apps Are and Where They're Going.") Among these companies are Borland International (with *SideKick* for Presentation Manager), Xerox (*Ventura Publisher*), Autodesk (*AutoCAD*), and WordPerfect Corp. (*WordPerfect*).

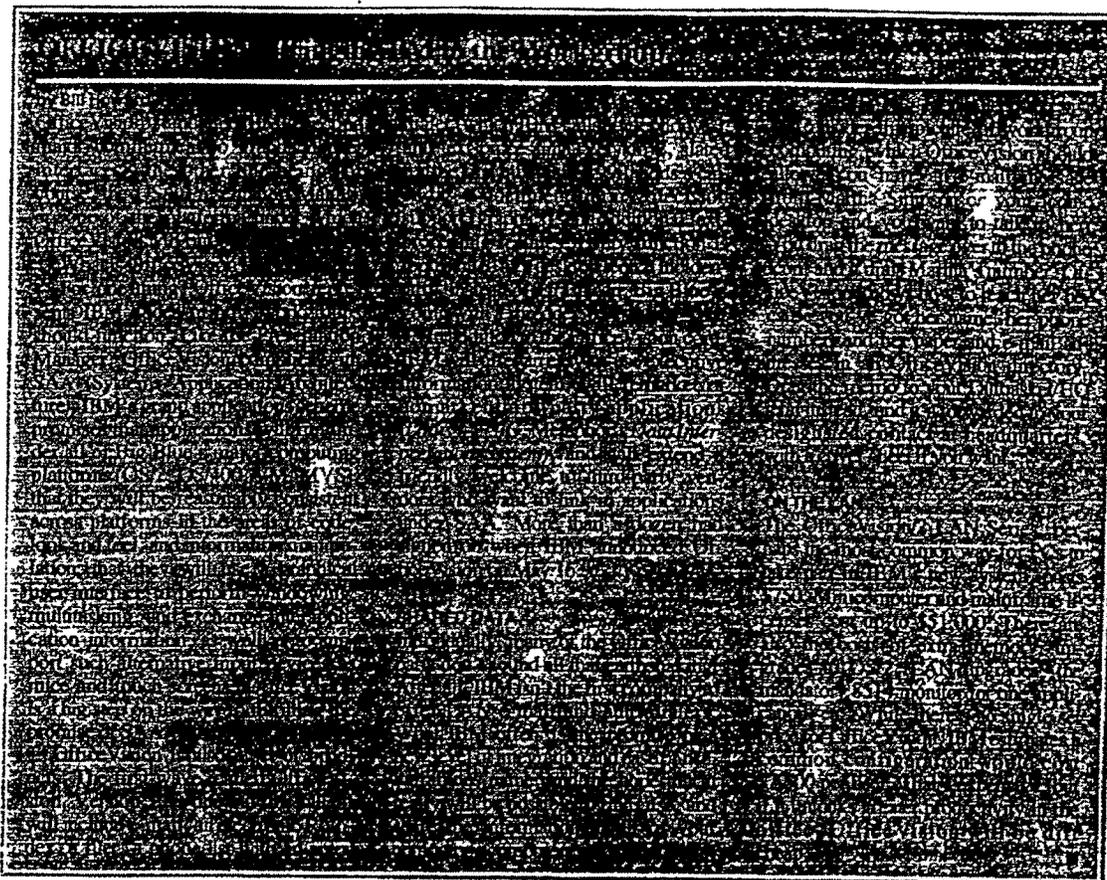


OS/2 and the Presentation Manager provide programmers with a more robust environment than that available under DOS and *Windows*. OS/2 uses the protected-mode operation of 80286s to give programs access to memory beyond 640K and to implement preemptive multitasking. Many programmers find the Presentation

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Manager API to be superior to the *Windows* API. In particular, the graphics system in Presentation Manager (called the Graphics Programming Interface, or GPI) is much better than the *Windows* GDI.

NEXT STOP: REPAIR SHOP

OS/2 and the Presentation Manager are relatively new and have several problems that must be fixed by Microsoft and IBM. Many of the more important fixes will show up in the next two OS/2 releases.

One of the weakest parts of OS/2 is the antiquated file system inherited from DOS. A new file system for OS/2 (called the High Performance File System, or HPFS) is promised for OS/2 1.2, to be released before the end of the year. HPFS will support long filenames (up to 256 characters) and extended attributes (which will allow ASCII or binary data to be asso-

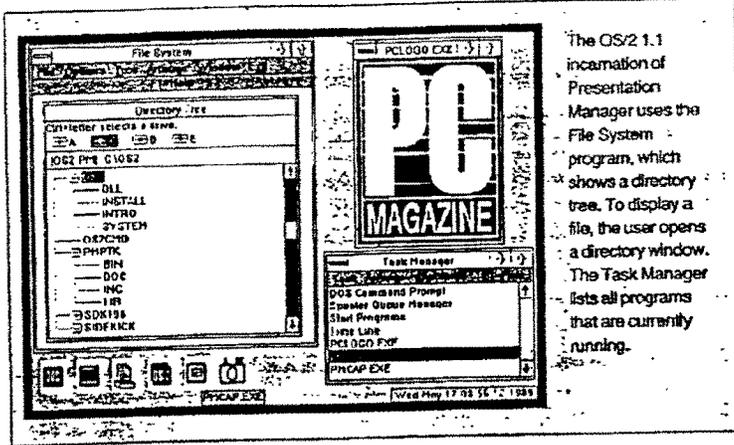
OS/2 and Presentation Manager provide the user with a more robust environment than that available under DOS and Windows. The graphics system in PM is better than Windows' GDI.

ciated with a file via keywords similar to DOS environment strings). To take advantage of the new file system, you will have to reformat your hard disk. Of course, you won't have to do anything if you don't care about the new file system; it will be backwards compatible.

Also expected in OS/2 1.2 is a better Presentation Manager shell. The existing shell consists of a Task Manager, a Start Programs window, and a file-management program called File System. Although this is a sensible way to divide shell functionality, the Version 1.1 implementation is hopelessly confusing, unattractive, and not very graphical. The goal of the new shell is, of course, to give users an easy interface to manage files and start up applications. This may be facilitated somewhat by the new file system: one role of the new extended attributes is to identify the appli-

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The OS/2 1.1 incarnation of Presentation Manager uses the File System program, which shows a directory tree. To display a file, the user opens a directory window. The Task Manager lists all programs that are currently running.

cation that created a particular document file. This would allow a more object-oriented approach to file management and program starting. Eventually, the *Windows* shell and the Presentation Manager shell will be very similar.

POSTSCRIPT A PRIORITY
Current printer driver support for OS/2 1.1 is very weak; Hewlett-Packard Co., for instance, has not yet finished a driver for the LaserJet. These drivers are necessary for

Windows, but are more complex due to the increased responsibilities of the driver. One of the highest priorities is a driver for PostScript printers; this will very likely be included in OS/2 1.2.

Perhaps the most critical problem with OS/2 is its inability to take advantage of the 32-bit registers and addressing available on the 80386 microprocessor. The 80386 version of OS/2 (which will probably be called either OS/2 1.3 or OS/2 2.0) is scheduled for release sometime in 1990. It will support multiple DOS sessions, run existing OS/2 programs, and offer new applications a flat, nonsegmented, 32-bit address space.

Another area of the Presentation Manager API that still needs work is font selection and generation. Although GPI supports scalable and transformable vector-based fonts (such as those in PostScript), these fonts have significant legibility and performance problems when used on the video display. Microsoft is working on these problems and plans to correct them; however, the details of these plans have not yet been revealed.

IBM and Microsoft intend OS/2 to be the dominant personal computer operating system of the 1990s. It is encouraging that they seem aware of the problems that could inhibit this development and are ready to fix them.

Of course, for users, the transition from DOS to OS/2 is a big move and will be justifiable only when an adequate collection of PM applications becomes available. It is likely to be 1991 or 1992 before most users even consider the move.

IBM and Microsoft intend OS/2 to be the dominant PC operating system of the 1990s—and they seem ready to fix any problems that could inhibit this goal.

Presentation Manager programs to display graphics on printers and plotters. Microsoft is pursuing several approaches to getting these drivers written and distributed. Presentation Manager device drivers are similar in concept to those in *Microsoft*

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Appendix C – OS/2 and Windows Applications

OS/2 Presentation Manager Applications

COMPANY NAME	PRODUCT	AVAIL
<u>BUSINESS</u>		
Comshare, Inc.	Commander for OS/2 EE	
North Winds	Formz	
PeopleSoft Inc.	Payroll/Personnel System	4Q89
SoftView, Inc.	SoftView FormSystem	4Q89
SoftView, Inc.	SoftView FormCreator	Avail.
SPSS Inc.	SPSS Advanced Statistics	
SPSS Inc.	SPSS Tables, Trends	
Tesseract	Liberty	Avail.
Time Manager Int.	TMI Key Results	4Q89
<u>GENERAL ACCOUNTING</u>		
Comp. Associates Int Inc.	ACCPAC Plus	
Rice Consultancy Co.	General Accounting System	
Timberline SW Corp.	Medallion Gold series V2.0	Avail.
TLB, Inc.	Solomon II Accounting Series	
Woodstock Comp Cnslts.	Woodstock Accounting V1.0	
<u>NETWORKING AND COMMUNICATIONS</u>		
3COM	3+Open LAN Vision	Avail.
3COM CSI div.	Maxess SNA Gateway	
Applied Sys. Technlgs.	NEXSYS	
Cawthon Software Grp.	ChipChat 1.1	Avail.
Consumers Software	Network Courier	
Future Soft Engineering	DynaComm	
Hilgraeve Inc.	HyperACCESS-PM	
IBM Corp.	OfficeVision/2	Avail.
IBM Corp.	OS/2 EE 1.2 3270 & Async emul	4Q89
IDEAssociates	IDEAcomm 5251/OS	Avail.
Miramar Beach Sys Inc.	QulkEase	
New Jersey Inst. of Tech.	Personal TEIES	4Q89
Novell	NetWare	
Pathway Design, Inc.	COAXGATE (5, 20, 40 sessions)	
Pathway Design, Inc.	Netpath SNA-3270	
Ungermann-Bass, Inc.	Net/One OS/2 LAN Manager	Avail.

Note: No indication in availability column means that the product has been announced as supporting OS/2 Presentation Manager without a specific date of availability. Some products do not use PM (i.e. tools), but support the development of PM.

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OS/2 Presentation Manager

Applications

COMPANY NAME	PRODUCT	AVAIL
<u>DATABASE</u>		
Answer Software Corp.	STRETCH (DBMS)	4Q89
Ashton-Tate	dBASE	
Borland	Paradox	
Borland	Reflex	
Blyth Software	Omnis 5	4Q89
DataEase Intl. Inc.	DataEase OS/2	4Q89
DataEase Intl. Inc.	DataEase SQL	
Gupta Technologies Inc.	SQLWindows	1Q90
IBM Corp.	OS/2 EE 1.2 Query Manager	4Q89
Lotus Developm't Corp.	Lotus/DBMS	
Microrim	Vanguard	1Q90
Microsoft	Q + E	1Q90
Novell	Btrieve	Avail.
Novell	Xtrieve	
Solutions By Design, Inc.	Designers Visual SQL	4Q89
<u>MISCELLANEOUS</u>		
Alloy Comp Prods Inc.	ALLOY ResQ 2.0	4Q89
S2 Corp.	Wall Street	
<u>DESKTOP PUBLISHING</u>		
Aldus Corp.	PageMaker	Avail.
Digital Research Inc.	GEM DesktopPublisher	1Q90
Digital Research Inc.	GEM Artline	1Q90
IBM Corp.	OS/2 Image Support	1Q90
Manhattan Graphics	Ready, Set, Go!	4Q89
Xerox	Ventura	1Q90
ZSoft	Publisher's Type Foundry for PM	
<u>DESKTOP ACCESSORY</u>		
Borland	Sidekick for PM	Avail.
Polaris Software	Polaris PackRat 3	Avail.
Sundial Systems Corp.	NOW 1.1	4Q89
TimeStar Systems	TimeStar	Avail.

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OS/2 Presentation Manager

Applications

COMPANY NAME	PRODUCT	AVAIL
<u>GRAPHICS</u>		
Autodesk	AutoCAD	
Comp. Associates Inc.	graphics product	
Computer Aided Plng.	CAP/2 CAD	
Computer Support Corp.	Arts & Letters Composer	
Computer Support Corp.	Arts & Letters Editor	
Digital Research Inc.	GEM Presentation Team	1Q90
Digital Research Inc	GEM Draw Plus	1Q90
Hammerlab Inc.	ScanDo	4Q89
IBM Corp	Pers. Application Sys.V2	2Q90
Logitech	ScanMan	
META Software Corp.	Design/2.0	1H90
Micrografx	Designer	4Q89
Micrografx	Graph Plus	
Micrografx	Draw Plus	
Number Nine Comp Crp	NNios Developer Toolkit	
Three D Graphics	Perspective	
Zenographics	Pixie	
ZSoft	PC Paintbrush for PM	1Q90
	VersaCAD	
<u>LANGUAGE ENVIRONMENT/COMPILER</u>		
Arity Corporation	Arity/Prolog Compiler & Intprtr	Avail.
Borland	Turbo C, Basic, Pascal	
Digitalk Inc.	Smalltalk V for PM	4Q89
IBM Corp.	IBM C/2 V1.10	Avail.
JPI	TopSpeed Modula 2	Avail.
Lattice	C Compiler	Avail.
Logitech	Modula OS/2	Avail.
mdb's Inc.	Object/1	Ctd.
		Avail.
		Avail.
MicroFocus	Cobol/2 for PM	
MicroFocus	Dialog System	
MicroFocus	Cobol/2 Workbench	
Microsoft Corporation	Microsoft MASM, C, Fortran,	Avail.
	Pascal	
Tweedy Associates	ADAware	4Q89
Whitewater	Actor	4Q89

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OS/2 Presentation Manager

Applications

COMPANY NAME	PRODUCT	AVAIL
<u>UTILITIES</u>		
Publishing Tchnlgs, Inc.	PubTech File Organizer for OS/2	
R Company	HELP, JAWS	
Cyco International	AutoManager	Avail
<u>PROJECT MANAGEMENT</u>		
Comp. Associates Inc.	SuperProject Expert/PM	
<u>ENGINEERING/SCIENTIFIC</u>		
Decision Systems Supt. EEsot, Inc.	DSM	
Iconnex Corp.	E-Syn, OmniSys	Avail.
META Software Corp.	Mech Engineering Workbench Design/IDEF	4Q89
Structural Msrmnt. Sys.	STAR series (3 Products)	
<u>INDUSTRY SPECIFIC</u>		
Comp Aided Plng Inc.	CAP/2 SALES	
Comp Aided Plng Inc.	CAP/2 DESIGN	
Comp Aided Plng Inc.	CAP/2 FM	
Computer Catalysts Inc.	APEX	
Computer Catalysts Inc.	GATS	
DATAPOL	DATAPOL MCIF	
Etreby Computer Co.	Etreby Pharmacy System	
InmarkDev Corp.	QUOTCHART	
Mayo Clinic	PC Analyze	
Nat. Financial Comp Sys.	BANCstar	
Nevis Technologies	NIBAS	4Q89
Noumenon Software Inc.	PolyNest Grading & Marking Sys.	
RAM Dynamics, Inc.	Orchestra series	
Renaissance Software	The Rialto	4Q89
Scientific SW-Intercomp	INTERPRET/2	Avail.
Scientific SW-Intercomp	TGNET	Avail.
Timberline SW Corp.	Medallion Gold Property Mngmt	4Q89
<u>SPREADSHEET</u>		
Comp. Associates Inc.	SuperCalc	
Lotus Developm't Corp.	Lotus 1-2-3/G	
Microsoft Corporation	Excel	Avail.

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Note: No indication in availability column means that the product has been announced as supporting OS/2 Presentation Manager without a specific date of availability. Some products do not use PM (i.e. tools), but support the development of PM.

OS/2 Presentation Manager

Applications

COMPANY NAME	PRODUCT	AVAIL
<u>WORD PROCESSING AND HYPERTEXT</u>		
Borland	Sprint	
DeScribe Inc.	DeScribe	Avail.
Owl International	Guide	1Q90
WordPerfect	WordPerfect	1Q90
Microsoft	Word	2Q90
Caseworks	Case:PM	Avail.
DMB Electronics	CASDS	Avail.
Future Tech Systems	Envision V3.0	
Graphics Software Syst.	Graphics Development Toolkit	
IBM Corp.	EASEL for EE	Avail.
IBM Corp.	OS/2 Tools & Information	Avail.
Intelligent Environments	Applications Manager	Avail.
Interactive Images Inc.	EASEL	Avail.
Logitech Inc.	MultiScope Debugger	Avail.
META Software Corp.	Design/OA	4Q89
Momentum Software	XIPC	4Q89
Neuron Data	NEXPERT OBJECT	Avail.
Programming Concepts	FM (Field Manager)	
SYSCORP Intl., Inc.	MicroSTEP/2	3Q90
Visual Software Inc.	vsDesigner, vsSQL	Avail.
Xian Corp.	WINPRO/PM Version 2.2	Avail.
Young Software Eng.	OS/Tools	
Young Software Eng.	PM/Edit	

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Microsoft Windows

Applications

List as of Spring, 1989

COMMUNICATIONS/CONNECTIVITY

Alien Computing
Automated Design Systems, Inc.
Computer Mail Services, Inc.
Connect, Inc.
Connections Telecommunications
Da Vinci Systems
DB/ACCESS, Inc.
Digital Analysis Corporation
Distinct Corporation
Emerald Systems Corporation
Eon Systems, Inc.
Ergonomics Software, Inc.

Future Soft Engineering, Inc.
Information Technologies, Inc.

Micro Decisionware
Micro Tempus Inc.
MLM
Pacific Image Communications
R.D. Software
Retix
Systems Interface, Inc.
Tri-Data Systems, Inc.
arnlabs Corporation
VG Systems, Inc.
Windows Connection

ENGINEERING APPLICATIONS

Advanced Systems for Power Engineering
Data I/O Corporation
Engineered Software, Inc.
Microworkshop, Inc.
Modern Computer Aided Engineering
National Instruments
Premise, Inc.
Pritsker Corporation
RFF Electronics
Structural Measurement Systems
Varian
OP Software

Faxit Driver & Faxit Manager
Windows Workstation Menu
MailPlus
Governet
Connections Telecommunications
Da Vinci eMAIL
View/PC
ENQUIRE
Network Windows & File Manager
EMSAVE LAN
ProbeView
ACES (Advanced Communications Environment Support)
DynaComm Asynchronous Edition
LinkUp 3270 Coax Workstation Coax Workstation Plus
PC/SQL-link
Tempus-Access Windows Interface
WINH19/WINH19K
Image Processing System
Net Magic
RetixMail
TransActor
PCNetway 3270
Session for Windows
VG FFx Fast File Exchange
IBM

ASPEN
MESA-I In-Circuit Verifier
FLO-SERIES, ORI-FLO, PUMP-FLO
In-Circuit Development Environment
Inertia
NI-488 MS-DOS Handler
DesignView
Slamsystem
RFFlow
STAR System
Star LC Workstation
OpAmp Designer & Windows Printer SDK

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Microsoft Windows

Applications

List as of Spring, 1989

ENTERTAINMENT APPLICATIONS

E.F. Dickey & Co., Inc.
Electronic Music Co., Inc.
FAMware
Mindscape, Inc.

Windows Backgammon Deluxe
EM Arranger
Family Reunion
Balance of Power

GENERAL BUSINESS APPLICATIONS

Access Softek
Accounting By Design, Inc.
Affinity Microsystems Ltd.
Blyth Software, Inc.
Bumblebee Software, Inc.
Cleveland Consulting Associates
Current
Facts on File, Inc.
Financial Feasibilities, Inc.
Gupta Technologies, Inc.
HandS Corporation
hDC Computer Corporation
IMRS, Inc.
K&H Professional Management
LatiCorp, Inc.
ManageWare, Inc.
Micro Planning International
Microsoft Corporation
Okna Corporation
Open Books, Inc.
OptiGraphics Corporation
Palantir, Inc.
Strategic Software Planning
Teradata
University of Minnesota
ViewStar Corporation
Xerox Corporation
Personal Library Software
Pioneer Software
Polaris Software
Publishing Technologies, Inc.
RAM Dynamics, Inc.
Conference Manager, EverAlert
Samna Corporation

Dragnet 1.1
Bookkeeping by Design
Tempo/Windows
OMNIS Quartz 2.0
dBFast/Windows
Optimal Scheduler
IBM
Facts On File News Digest CD-ROM
CFO Advisor
SQL Windows
HandS Project
hDC Windows Express
Micro Control
I/CSCS (Integrated Cost/Schedule Control System)
TEXTBASE
Compete
Micro Planner
Microsoft Excel version 2.1
The DeskTop Set
Open Books
View Station
WinTimeNetTimeWinTextWindowsSpell
Project OUTLOOK
Teradata Excel Interface
Feasibility Study
VS*Retrieve
FormBase
Personal Librarian
Q&E
Packrat
PubTeck File Organizer
Orchestra, Market Maestro
Graph View
Aml

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IBM 7510238987

Microsoft Windows

Applications

List as of Spring, 1989

PUBLISHING/GRAPHICS APPLICATIONS

Adobe Systems, Inc.
Advanced Technology Center
Ajida Technologies, Inc.
Aldus Corporation
Bitstream, Inc.
Brilliant Image, Inc.

Cadlogic Systems Corporation
Communication Intelligence Corp.
The Computer Group
Computer Presentations, Inc.
Computer Support Corporation
Corel Systems Corporation
Destiny Technology
Dynamic Graphics, Inc.
Enabling Technologies, Inc.
Hammerlab Corporation
Inforite Corporation
Lasertools Corporation
Mechatronix International, Inc.
Micrografx, Inc.
Ocron, Inc.
Palantir, Inc.
Roykore Software, Inc.
SoftCraft, Inc.
The Software Shop, Inc.
Springboard Software, Inc.
SWFTE International Ltd.
T/Maker Company

TeleVision Laboratories, Inc.
Xerox Corporation
Xenographics, Inc.

SYSTEM SOFTWARE/UTILITIES

Access Development Corporation
Answer Software Corporation
Canaan Analytics
Caseworks, Inc.
Eikon Systems, Inc.
Emerald City Software
Fairpoint Systems Corporation
Future Tech Systems, Inc.
Glenco Engineering, Inc.
Information Builders, Inc.
IntelliCorp, Inc.

Adobe Illustrator
GRAFPAK-GKS
Plotview
PC/PageMaker
Fontware Installation Kit
Computer Picture Service & Image Screen Shot Service

INSTINCT 2.0
Write-On PageMaker
Typesetter's Connections
Windows ColorLab
Arts & Letters Graphics Composer
Corel Draw
Page Styler
Desktop Art
Pro2D/PC Version 1.1
ScanDo
EASYL PC
LaserTORQ
SoftBack
Micrografx Draw Plus
Readpro
WinScan
OPUS
WHSIfonts
KERN-RITE
Springboard Publisher
Glyphix Font Software
EPS Illustrations, Scrapbook + , Business Images, Personal Graphics, Publications, Holiday Images, Christian Images
TVL Executive & TVL Producer
Xerox Presents
Pixie 1.02

FormLink
ICD286
Windows Chronometer
Case:W
Eikon Tools Control Pak
Lasertalk PC
Scriptview
Envision
Padlock II & Coupon Disk
Level5 Expert System Software
KEE

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Microsoft Windows

Applications

List as of Spring, 1989

Knowledge Garden, Inc.
KnowledgeWare, Inc.
LogicWorks
Mark V Systems Limited
Meta Systems, Ltd
Neuron Data
Objective Systems
Optima, Inc.
WaveTeck Corporation
The Whitewater Group
Wilson WindowWare
R Company
Romberg & Romberg, Inc.
Softbridge Microsystems
Software Mart, Inc.
Timenetics, Inc.

Knowledge Pro
IEW/CWS
ER win
Adagen
QuickSpec Version 1.0
Nexpert Object
C&O
Design Vision
WAVE TEST
Actor
Command Post and Browser
Hammer and Vise
SmartWin
Bridge Tool Kit
Media-Mixer
Application Window Manager

VERTICAL APPLICATIONS

a la mode, Inc.
Analysis, The Appraisal
A-T Financial Information, Inc.
Accounting By Design, Inc.
Active Software Corporation
American Financial Systems, Inc.
ArrowHead Technologies
Barron Software
BioScan, Inc.
Burrell Business Systems
Canberra Industries, Inc.
Clark & Associates, Ltd.
Da Vinci Systems
Dacis Software
Data Techniques, Inc.
Datametrics Systems Corporation
Datapac
Digital F/X
Dimensional Concepts
Dionex Corporation
Eastern Language Systems
Elan Software Products, Inc.
Electrocon International, Inc.
Electrotek Concepts, Inc.

General Property Income
Tools, Multi-Family Income Analysis
Opening Bell
Client Write-Up
On Trake/The Information Organizer
AFS MicroSystem
Downloader II
MK Phonemate Plus
OPTIMAS
Masterpiece
System 100 Multichannel Analyzer
EDAAS Automation System
ESP_COMM
CAMPS
Alphasign
Viewpoint
Performance System
DF/X 200
Procoder
Autolon 450
ALKaatib International
VM Operator Workstation
Transmission 2000
PQVIEW, HARMONI, HARMONIZHARMFLO+,
LOADVIEW, SKYLINE, EMTPOUT, POWERCALC
Publishers Business Manager
SUSS PA 200
Patient Simulator II
Powers System 600 Insight-AT
Voyager

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Microsoft Windows

Applications

List as of Spring, 1989

Maxus Systems International
Microlabs
Electrotek Concepts, Inc.
Galorath Associates, Inc.
GeoGraphix, Inc.
GEOVISION, Inc.
Gilson Medical Electronics, Inc.

Honeywell, Inc.
Net, Inc.
Nielsen Marketing Research
OGment Group
Osborne & Paddock, Inc.
Portland Cement Association
Prism Associates, Inc.
Quant Systems
Quantum Consulting
Railstar Control Technology
Sadtler Research Laboratories
Schlumberger Well Services
Soft Systems
Soft Systems Engineering, Inc.
Spectral Synthesis, Inc.
Telement America, Inc.
Townsend Analytics, Ltd
Travis DataTrak, Inc.
Verity Software House
Visatex Corporation
Vixcom Microsystems, Inc.

Capri
Multitrace System
EGRAPHIC
SEER-SEM
SeisMap
Windows/On the World
12 and 714 HPLC System Controller
Software
DeltaNet Graphic Central
Adstart
INF*ACT
ServiceStar Plus
Windows Banker
PCACOL
Berthold ImmunoprocessingSystem
Adventures in Statistics
COMET, DESIGN2 & AGEND
Scantrack Vehicle ManagementSystem
Sadtler PC Search Software
Schlumberger Quick LogAnalysis
WindowsDent
WHIPS Communicator
Spectral SynthCARD
Discover/RE
Option Risk Management
TelePro
Verity Modlit
Compusketch
MedExcel Plus

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Appendix D – LAN Requester Access to LAN Server Resources

Supporting Information

Any mix of OS/2 Extended Edition V1.2, V1.1, DOS LAN, or PC LAN Program V1.3 requesters may be active on a single OS/2 LAN Server V1.2 (see Figures 1 and 2).

The following describes the IBM requester access of server resources over a LAN. This description focuses on three specific areas:

- logon to a domain (a domain is a logically defined server or group server machines including the resources and definitions of the resources and users controlled by the servers)
- administration of a domain
- cross domain access of resources (i.e., that are in a domain other than the domain logged on to by the user)

Supported combinations of logon and administration are defined in Figure 1 below. The three domains addressed are those that consist of IBM PC LAN Program V1.3 (PCLP) Servers, IBM OS/2 LAN Server V1.0 (LS1.0), and OS/2 LAN Server V1.2 (LS1.2). The requesters addressed are the PCLP Extended Services Requester, the IBM OS/2 Extended Edition V1.1 (EE1.1) Requester, the IBM OS/2 Extended Edition V1.2 (EE1.2) Requester and the DOS LAN Requester (DLR). An "X" in the figure indicates the stated function (logon/administration) that is supported from the Full Screen Interface. For example, a user can use a PCLP Requester to log on to a domain consisting of OS/2 LAN Server V1.0 servers and access all domain resources available to that User ID, but will not be able to perform any administration tasks in that domain. Note that within a domain, only like server types may be defined.

Requesters	LAN Requester Functions	Server Domains		
		PCLP	LS1.0	LS1.2
DOS PCLP	Domain Logon	X	X	
DOS PCLP	Domain Administration	X		
OS/2 EE 1.1	Domain Logon		X	
	Domain Administration		X	
OS/2 EE 1.2	Domain Logon			X
	Domain Administration			X
DOS LAN Req.	Domain Logon			X
	Domain Administration			

Figure 1

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Access of all server resources on a LAN can be accomplished through external resources definitions, which is a Full Screen Interface function, or through the use of API's, or by using explicit NET SHARE and NET USE commands. Accessing external resources via external resources definitions is defined in Figure 2. Specifically, once a user has logged on to a domain, accessing resources in another domain is supported through the external resource definition function. For example, for an EE 1.1 user logged on to an LS1.0 domain requiring access to resources in an LS1.2 domain, the desired resource in the LS1.2 domain must be shared.

On: Requesters	Domain Logged	Accessing Resources		
	On To:	PCLP	LS1.0	LS1.2
DOS PCLP	PCLP	X	X	X
	LS1.0	X	X	X
OS/2 EE 1.1	LS1.0	X	X	X
OS/2 EE 1.2	LS1.2	X	X	X
DOS LAN Req.	LS1.2	X	X	X

Figure 2

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Appendix E – Enhanced-DOS

Most applications running today on PC's and PS/2's run under DOS. But we really ought to put DOS in quotes, because often the 'DOS' that is used is not really 'plain-vanilla' DOS. The real DOS is there all right, but in fact it is often supplemented by a variety of either obvious, or not so obvious, extensions – giving it much more capability than the original DOS operating system by itself. These enhancements, together with the original DOS, should be recognized for what they are: new 'Enhanced-DOS' operating systems. Some have names many people immediately recognize, such as Microsoft Windows, DESQview or Carousel, while others are less familiar, such as A.I. Technologies or 386/Multiware.

These Enhanced-DOS environments were created in response to application and user needs. These needs in turn generated four broad categories of Enhanced-DOS operating system services:

1. Larger memory support
2. Multi-application / Multi-tasking
3. Windowing / Graphics
4. Shared-Resource / Multi-User

There are many packages, or 'under-the-covers' application extensions, that provide these services. The problem is the tremendous variety and number of these packages, and the fact that the wide range of techniques they use often cause them to be in conflict with one another. The following is an attempt to provide a basic conceptual road-map to how these services are provided, and to contrast them to a degree with the more orderly and architected world of OS/2.

Larger Memory Support

The over-riding problem that Enhanced-DOS packages need to solve is how to provide larger memory support – either to support large individual applications (spreadsheets, graphics packages, publishing packages, etc.), or to provide enough memory to support other 'Enhanced-DOS' capabilities (multi-application environments, windowing services, etc.). All these things strain the basic memory management services provided by 'plain-vanilla' DOS and the original 8088 or 8086 PC hardware.

There are two basic classes of large memory support:

1. Under 1 Megabyte Overlaid (note: applications normally use only the range between 0 to 640 Kilobytes)
2. Over 1 Megabyte Non-Overlaid

In the first 'under 1 megabyte overlaid' class are found all Enhanced-DOS memory management techniques that support 'normal' DOS programs. Such programs only have the capability of addressing up to 1 Megabyte of memory, as in the original PC. This is a hardware restriction that '20 bit data addressing' of the 8088, 8086, or so called 'Real Mode' of both the 286 and 386 hardware enforces on these programs. However, such programs may use standard overlay techniques to effectively gain more memory area, successively bringing in portions of code or data from disk. Microsoft Windows supports a very sophisticated method for managing this type of overlaid program. But there are also 'hardware-assisted' ways to do this program overlaying much faster.

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- Bank-switched Memory Cards - The dominant example is the LIM (Lotus/Intel/Microsoft) EMS (Expanded Memory Standard) Memory Cards, such as Aboveboard. These require an extension to DOS that controls the special memory hardware. This extension basically allows very quick hardware mapping of blocks or 'banks' of memory from the card so that they almost instantly 'appear' in the normal 1 megabyte address range of the PC (or the Real Mode address range of a 286 or 386 class machine).
- 286 Extended Memory - While not as fast as Bank Switching, a special XMS DOS extension (Extended Memory Standard by Lotus/Intel/Microsoft/AST) allows the memory area over 1 megabyte addressable by the 286 hardware to be treated as very fast disk. Overlaying is accomplished by fast memory moves between the over 1 megabyte area and the under 1 megabyte area of the 286 machine memory. There are even packages that emulate the LIM EMS bank switching, but these are not anywhere near as fast as the LIM EMS specialized hardware solution, since memory moves are required.
- 386 Virtual Memory - the 386 has hardware features that let it emulate more than one 'DOS Machine' at a time, so that each one appears to be operating in it's own 1 Megabyte PC. In reality each 'virtual DOS machine' partition may be anywhere within the large memory area that the 386 hardware can address. Also, it is possible to emulate LIM EMS memory in this environment. In this case, though, unlike 286 LIM EMS emulation, no memory moves are required, so that it is just as fast as the original LIM EMS memory cards. The XMS memory management technique can also be supported on a 386.

The second class of larger memory support utilizes memory hardware features of 286 or 386 class machines to actually execute code, rather than just emulate fast disk storage. Applications can be larger than 1 Megabyte and without overlays. The Enhanced-DOS services used to create such programs are called 'DOS Extenders'. Due to differences in hardware architectures, these DOS Extenders are quite different for 286 class machines and 386 class machines. Often they are bundled with single applications so that one is hardly aware that they exist, except that the shrink-wrapped package says that the application must be run on a 286 or 386 class machines.

Enhanced-DOS packages that provide these services are not commonly known by the user community. However, application developers of large memory applications like IBM's Interleaf, AutoDesk's AutoCad, Borland's Paradox and many other power applications all use one of the DOS Extenders provided by companies like Phar-Lap, Rational Systems, or A.I. Architects. These DOS Extenders are very sophisticated extensions to DOS. They supplement the DOS API or Application Programming Interface extensively. In some cases they use DOS calls, but in many cases they rewrite or replace DOS functions. Thus, these application, while they appear to run under DOS, are actually using a variety of changed, or entirely new services provided by the DOS Extenders, to take advantage of the large memory capabilities of the 286 or 386 class machines.

A new standard, originally set up by Phar Lap and QuarterDeck, has now been pretty much adopted by all the companies providing DOS Extenders for 386 class machines. It is called 386 VCPI (Virtual Control Program Interface) and allows the coordination and coexistence of the variety of memory techniques the 386 can support. VCPI allows programs written using DOS Extenders to coexist with programs that use LIM EMS, XMS, and Virtual DOS Machines in the 386 environment. This is particularly useful for Enhanced-DOS environments that provide multi-application or multi-tasking services.

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Multi-Application / Multi-Tasking

Multi-application / multi-tasking Enhanced-DOS packages can be roughly categorized into the following four categories.

1. **TSR Pop-Up's** — There are literally hundreds of these packages on the market. TSR means 'Terminate and Stay Resident', and that is exactly what they do — sit in memory dormant until a special key sequence causes them to 'pop-up' on the screen and be active. These TSR Pop-Up's can be invoked at any time, and so can be used to temporarily interrupt an application to get to the function they provide. When finished, another key sequence puts you right back where you left off in your interrupted application. TSR Pop-Up's provide a wide variety of handy services, such as calendar management, phone lists, memo pads, editors, DOS 'Shells' and even complex functions like 3-dimensional spread sheets! They often have sophisticated windowing, seen in Borland's SideKick, a widely used Pop-Up, and many similar packages. They sometimes take advantage of the larger memory support techniques discussed before to reduce their impact on main application memory needs. People often install multiple TSR Pop-Up's in their systems, but this can cause conflicts and system crashes, since each TSR Pop-Up is 'fooling' DOS by temporarily intercepting some of it's functions in order to operate. Since each TSR Pop-Up is 'unaware' of others like it in the system, they can interfere with each other or the main application.
2. **Context Switchers** — These represent a more orderly implementation of the TSR Pop-Up concept. Again, the user switches between multiple applications by using special key sequences. The difference is that ALL applications to be switched are managed centrally by the Context Switcher control program, so that one doesn't get the kind of conflicts that arise with TSR Pop-Up's. In fact, most TSR Pop-Up's can be run as regular applications under control of a Context Switcher, along with other 'main line' applications. For good performance Context Switchers take advantage of the various 'under 1 megabyte overlaid' large memory techniques described previously. When an application is to be switched, its 'context' — display buffer, I/O areas, code, etc. — is frozen and stored (normally within large memory). The application to be activated has its previously frozen 'context' restored to the under 1 megabyte memory area of the PC (or real memory area of a 286 or 386 class machine), and application execution is resumed where it was last interrupted by the user. Carousel is the probably the most widely known Context Switcher, but recently a package called Headroom has been well rated by PC Magazine.
3. **Multiple-DOS** — This might be considered the first level of true multi-tasking, where more than one normal DOS application at a time can run 'concurrently'. In the previous multi-application methods, the user decides which application is to execute, and all others in the system are 'frozen'. With multiple-DOS control programs, several DOS 'partitions' are set up. The user switches between these application 'partitions' just as before, but while working with one DOS partition, the applications in other DOS partitions continue to run as long as they don't need user input to continue. Thus, a spreadsheet might continue a long recalculation, while the user switches to a word processor to type a memo. When the user switches back to the spreadsheet, the recalculation will have made some progress or be finished. Most Multiple-DOS control programs depend on 'Virtual DOS Machine' hardware features supplied only by 386 class machines, or 286 machines upgraded with hardware like the ALL ChargeCard to support 386 paged memory functions. Examples of 386 dependent Multiple-DOS programs are PC-MOS/386, VM/386 or Concurrent DOS 386. Also, more full-function multi-tasking systems like DESQview or Microsoft Windows (next category below) when running on 386 hardware support multiple-DOS partitions as part of their

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services. In non-386 hardware environments, there are more limitations to multiple-DOS capabilities, determined mostly by the techniques used to write the DOS applications that are to be multi-tasked. Packages such as DoubleDOS, Microsoft Windows or DESQview in the 286 environment will run multiple-DOS environments, but will truly multi-task only 'well behaved' DOS applications, while they context switch more 'ill behaved' DOS applications.

4. Multi-Tasking – Going beyond 'normal' DOS application multi-tasking, packages in this category provide Enhanced-DOS tools to develop full-function multitasking applications. Such applications employ an 'object oriented' or 'event driven' structure with multiple concurrent cooperating processes to provide superior responsiveness and ease-of-use to end-users. There are often provisions for both inter-process and inter-application communications and coordination. An example of inter-application services would be Microsoft Windows DDE (Dynamic Data Exchange) capability, which can be used to build so-called 'hot links' between applications, as well as other types of application coordination. Within applications, inter-process 'messaging' tools allow concurrent servicing of multiple user requests to a single application program. Typically, these multi-tasking packages provide sophisticated dynamic memory management tools and the ability to segment and share code for greater efficiency of memory usage. They also employ one or more of the larger memory techniques described previously. Multi-tasking techniques used by these packages range from non-preemptive application-initiated task switching, to full preemptive time-sliced task switching. The most well known packages in this category include Microsoft Windows, DESQview and GEM. However, there are also many less well known packages that are actively sold and fit the basic profile of this category.

Windowing / Graphics

Windowing and Graphics support services are implemented or provided in two different application environments:

1. Standalone Application Environment
2. Multi-Application / Multi-Tasking Environment

Tools or do-it-yourself approaches used to implement windowing, graphics, and associated larger memory support in the first environment may not be compatible with the methods or restrictions associated with the packages providing these same services in the second environment.

Examples of packages in the first environment include some mentioned before like IBM's Interleaf and AutoDesk's AutoCad that support both graphics and windowing, and use DOS Extenders for large memory support. There are also a number of advanced non-graphics windowing packages such as HyperPad.

Packages in the second environment include the preemptive multi-tasking DESQview non-graphics windowing system, which will nevertheless allow some graphics applications to run within its windows. In the graphics category are windowing systems like Microsoft Windows, only capable of non-preemptive multi-tasking, or Tandy's simpler graphics/windowing package called DeskMate, which uses context switching to manage multiple applications.

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Shared-Resource / Multi-User

Shared-resource and multi-user systems are included in this Enhanced-DOS discussion, because such Servers enhance the capabilities of the Client DOS systems that they service. Although 'Client/Server' is normally associated with LAN systems, there are a number of other lower-cost alternatives that suit the needs of some users. Therefore, one can generally categorize shared-resource or multi-user systems that enhance DOS as falling into one of the following four groups, listed in order of ascending cost and function.

1. **Data Switches** — these are approximately \$100 per workstation and are generally used to connect 8 to 24 systems together via ordinary phone line (RS-232 for up to 19,200 bps and sometimes RS-422 for up to 38,400 bps). This relatively low-speed linking allows basic printer or modem sharing and data file or e-mail exchanges between systems. It is a contention system, so only one connection at a time is running. In a lightly loaded system this is not necessarily a problem. Some names in this category that have had good reviews include the full-function NetCommander NC16, and more basic 1082 MainStreet or Alternet.
2. **Multi-User DOS** — Based on the hardware capabilities of 386 class machines, these systems allow 4 to 6 low-cost RS-232C monochrome terminals to share the resources of a single 386 Server, again using low-cost phone line connections. Each diskless terminal runs one or more DOS monochrome text sessions concurrently. Such a configuration might cost \$1600 to \$1900 per node. A more expensive configuration using SunRiver Fiber Optic Stations allow EGA or VGA monochrome graphics to be handled using fast fiber optic links to the 386 Server. Some products in this category are 386/Multiware, VM/386 MultiUser, PC-MOS Multiuser, Quick Connect/386 and Concurrent DOS 386.
3. **Low-Cost LANs** — These systems normally utilize a 'twisted pair' LAN to provide a fairly fast 'data highway' for resource sharing and communications. In a typical small 6 workstation configuration their prices are in the \$200 to \$500 range per node added to the cost of the workstations themselves. Due to the speed of the LAN several concurrent connections to Servers for disk or printer sharing can be supported, almost as though they were local devices to each Client workstation. Servers in these environments are normally DOS based, and usually are not dedicated, playing a dual role as both Client and Server. Some products in this category are LANtastic, ELS Netware II, and ViaNet, just to name a few.
4. **High-End LANs** — Operating over very high speed LANs, these systems can support a much larger number of Clients, since the Servers are typically dedicated systems with special high-performance operating systems. Their many sophisticated features for improved security, performance, reliability, and management is reflected in their higher price per node. Some names in this category are Novell's NetWare, Banyan's VINES, and 3+ Open LAN Manager. IBM's OS/2 LAN Manager or OfficeVision/2 LAN Series provide advanced services to DOS Client workstations as well as to OS/2 Client workstations.

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Summary

As DOS has been enhanced more and more over the years along the lines indicated above, it has become clear to developers that these 'patchwork' and often conflicting extensions to the DOS API and functions are becoming more and more difficult to manage and use. Mysterious 'occurrences' are the norm, and both developers and users need a more robust, orderly, and stable platform for continued exploitation of the expanding power of the personal workstation. OS/2 is the architected solution, with an application programming interface and structure designed to absorb rapidly increasing function and power in an orderly way over time.

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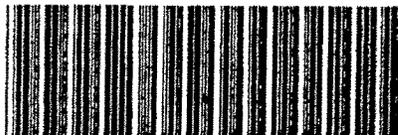
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