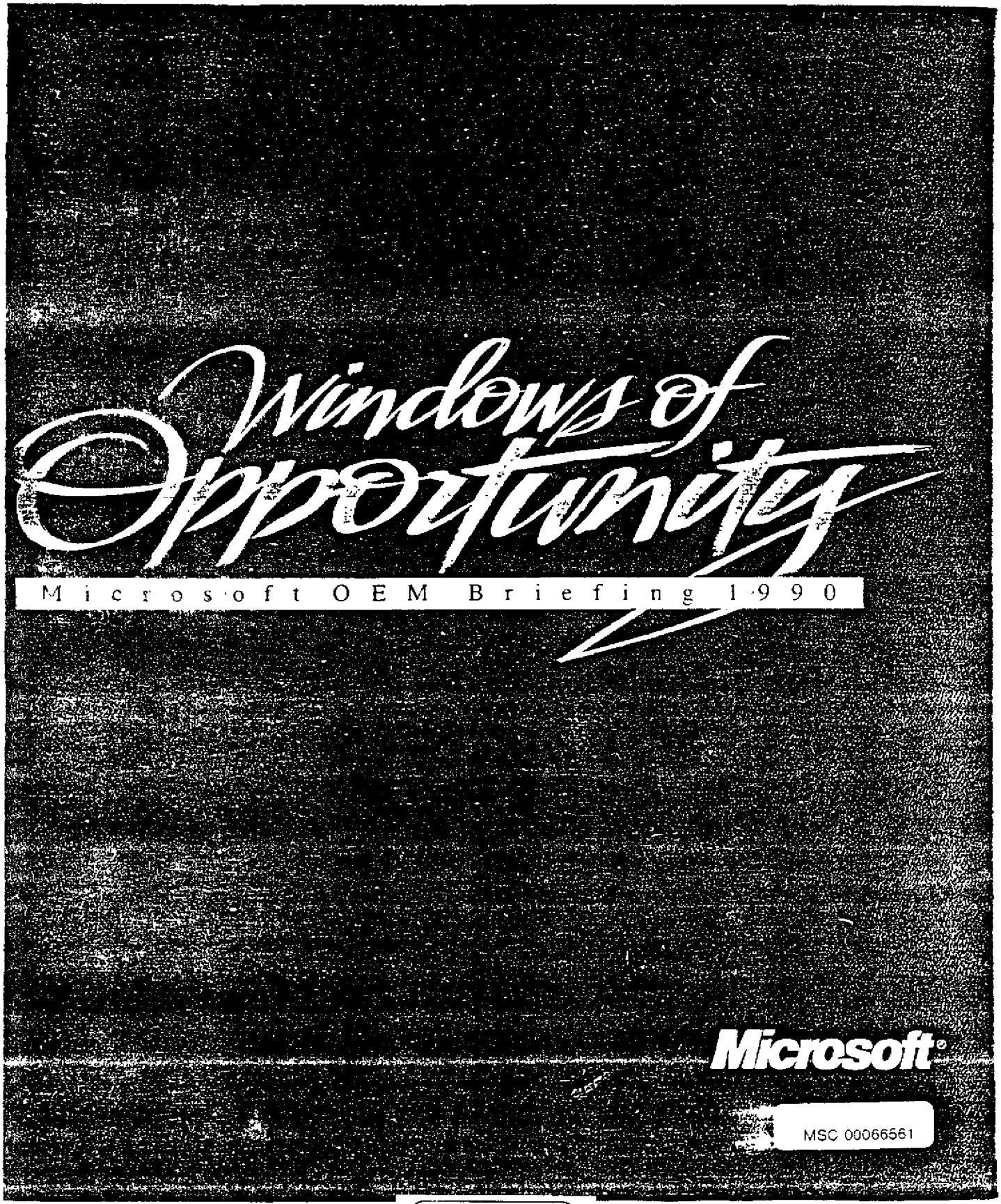

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AGENDA
1990 MICROSOFT OEM BRIEFING
October 1-3, 1990
Hyatt Regency Bellevue

Windows of Opportunity

Monday, October 1		
Noon - 10:00pm	Registration	Ballroom Level (Third Floor)
6:00pm -10:00pm	Welcome Reception and ISV Fair	Wintergarden Room(Third Floor)
Tuesday, October 2		
7:00am	Breakfast Buffet	Regency Ballroom (Third Floor)

GENERAL SESSION **Grand Ballroom (Third Floor)**

8:00am	Introduction to 1990 OEM Briefing	Joachim Kempin
8:10am	Welcome and Industry Overview	Mike Hallman
8:30am	Microsoft Systems Family	Steve Ballmer
9:30am	PalmTops, LapTops, Notebooks & Portables	Brad Silverberg
10:30am	Break	
11:00am	Standalone & Client Desktop Machines	Rich Abel
11:45am	Power Platforms	Paul Maritz
12:45am	Panel Question & Answer	Brad Silverberg Steve Ballmer Paul Maritz Rich Abel
1:00 - 5:00pm	ISV Trade Fair	Conference Level (Fourth Floor)
1:00pm	Lunch	Regency Ballroom (Third Floor) and Wintergarden

BREAK-OUT TRACKS **(50 Minutes Each / Repeating Sessions)**

2:00pm	3:00pm	4:00pm	
MS-DOS 5.0	MS-DOS 5.0	MS-DOS 5.0	Ballroom(Third Floor)
Windows	Windows	Windows	Madrona (Fourth Floor)
Microsoft Works	Microsoft Works	Microsoft Works	Laurel (Fourth Floor)
Windows Productivity	Windows Productivity	Windows Productivity	Larch (Fourth Floor)

5:00 - 6:00	Freshen Up / Prepare for Cruise	Hyatt and Red Lion
6:00 pm	Shuttles Depart for Dinner Cruise	Hyatt and Red Lion
6:30 - 10:30pm	Dinner Cruise on Puget Sound	
10:30pm	Shuttles Return to Hotels	Hyatt and Red Lion

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AGENDA
1990 MICROSOFT OEM BRIEFING
October 1-3, 1990
Hyatt Regency Bellevue

Windows of Opportunity

Wednesday, October 3, 1990

7:00am	Breakfast Buffet	Regency Ballroom (Third Floor)
GENERAL SESSION	**Grand Ballroom (Third Floor)**	
8:00am	Introduction	Joachim Kempin
8:05am	Intel Microprocessor Strategy	Albert Yu
8:50am	Networking	Mike Murray
10:00am	Break	
10:30am	Application Integration	Darryl Rubin
11:15am	Multimedia Computing in the Home and Education	Rob Glaser
11:45am	Emerging Opportunity - Stylus Computers	Pradeep Singh
12:15 pm	Panel Q&A	Mike Murray Darryl Rubin Rob Glaser Pradeep Singh
12:30pm	Lunch	Regency Ballroom (Third Floor) and Wintergarden

BREAK-OUT TRACKS (50 Minutes Each / Repeating Sessions)

2:00pm	3:00pm	4:00pm	
Stylus Windows	Stylus Windows	Stylus Windows	Ballroom (Third Floor)
OS/2	OS/2	OS/2	Madrona (Fourth Floor)
LAN Mgr 2.0&Server Apps	LAN Mgr 2.0&Server Apps	LAN Mgr 2.0&Server Apps	Laurel (Fourth Floor)
Multimedia Windows	Multimedia Windows	Multimedia Windows	Larch (Fourth Floor)

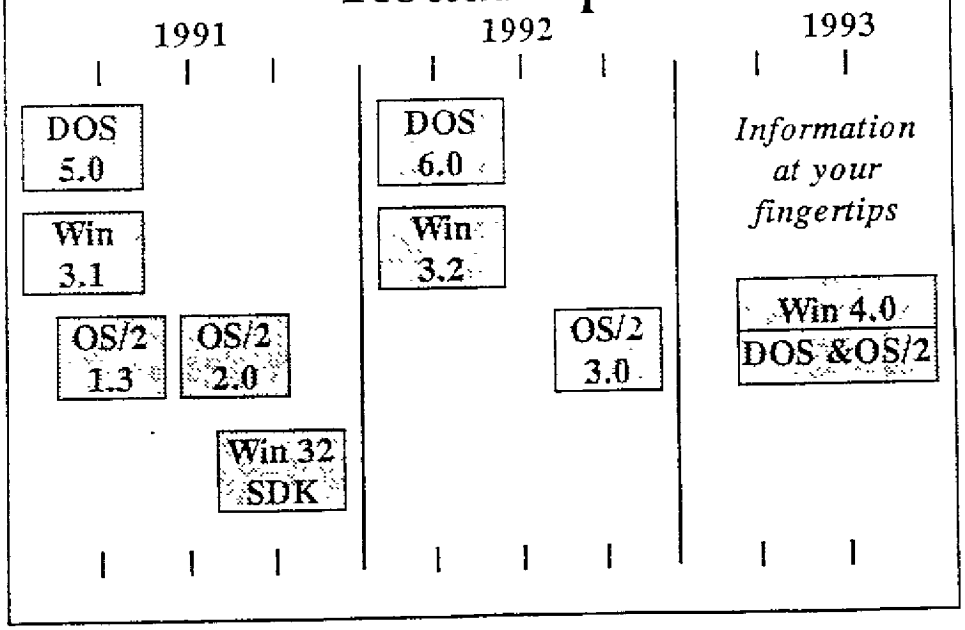
GENERAL SESSION	**Grand Ballroom (Third Floor)**	
5:00pm	Technology Trends	Bill Gates

END OF MICROSOFT OEM BRIEFING 1990 CONFIDENTIAL

Multimedia

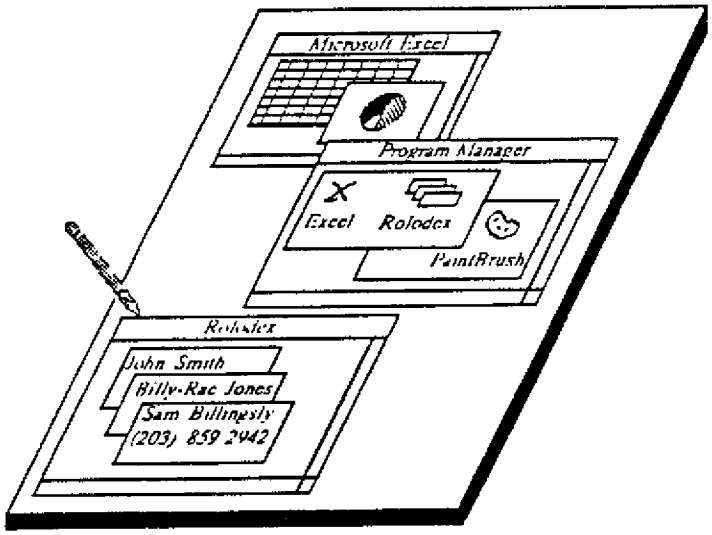
- New market opportunities for information and home applications
- Extensions to Windows hardware platforms
  - CD to deliver information applications
  - Video: 8 bits per pixel
  - Sound: digital signal processor
- Requires: tools & evangelism
- Microsoft is spending $10M next year

Roadmap



Microsoft Pen Windows

October 1, 1990
Lloyd Frink



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Overview

The purpose of this document is to give a detailed description of the Pen Windows project. Pen Windows is a superset of Windows 3 designed for portable notepad sized computers which use a pen as their primary input device. The principal goal of Pen Windows is to allow the development of software designed specifically for this platform, while allowing the execution of Windows and DOS applications designed for desktop machines.

The main addition to Windows is a handwriting recognition module for Roman characters that Microsoft is developing. Other software developers will also be able to plug in their own handwriting recognition package. The Microsoft module will initially recognize neatly handprinted characters and will adapt to each specific user. Other packages might recognize cursive, Kanji, or be user-independent. Microsoft encourages development of handwriting recognition which will meet additional user needs.

The most important measure of an operating system's utility is the availability of applications software. Pen Windows is in a very good position to succeed as an operating system on portable pen-pad computers because it leverages off of the existing base of Windows and DOS applications. And, since the application programming interface to Pen Windows will be the same as Windows 3, with some additions, developers will be able to use all of their existing know-how to create applications tailored more specifically to this new class of computers. Modifying existing Windows applications to be better suited for a pen based interface is also an option many companies will choose. Pen Windows will be built into machines made by many different computer companies, and because Windows is device independent applications will run on any of these Pen Windows machines. This will also make Pen Windows an attractive platform for developing pen specific applications.

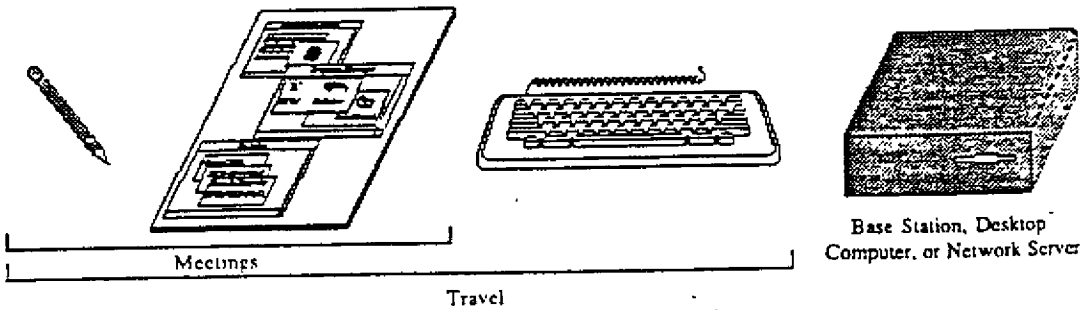
Computers that run Pen Windows will be able to run existing DOS and Win 3 applications. These new computers will have a superset of functionality of today's portable computers. The main differences are the addition of a pen and different computer shape because the keyboard is no longer essential for all applications. Here are the important issues related to pen input:

Positive pen vs. keyboard/mouse
- more natural form of input, easier to control computer; less intimidating
- allows computers to be smaller, more portable (no keyboard required)
- less obtrusive to use when other people present, in meetings (no vertical screen popped up)
- better for entering graphic data (pictures, annotations)
- requires only one hand for operation, not two (or three with mouse!)

Negative pen vs. keyboard/mouse
- slower, less reliable way to input characters
- existing applications were designed for keyboard and possibly a mouse

A combination of hardware and software is used to address the negative issues in Pen Windows machines.

Microsoft believes the standard Pen Windows computer will have the following four major components:



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The pen and screen unit are the most portable components, and they would used in situations when a keyboard is not appropriate or desired. This might be in a meeting with other people, talking on the phone, or walking around. The pen is also a much more intuitive and convenient way to issue commands to the computer. It is much easier to do a lot of pointing and clicking than with a mouse/keyboard combination. The pen can also be used for gestures like an "X" to delete something. New applications designed for Pen Windows systems will take advantage of these concepts. The screen unit may also have optional portable devices such as a modem built in.

The keyboard can be used for heavy data entry and nice compatibility with existing applications. Since some people can type faster than writing, they may prefer to write long memos at their office or in a hotel room with a keyboard instead of a pen. Also, today's applications use a keyboard not only to enter a stream of characters but to issue commands (e.g. arrow keys, control/Alt/function key combinations). For compatibility with Windows applications a keyboard will not be necessary because we can do an excellent job to simulate it with a pen, but a keyboard might be preferable for such applications as a word-processor. To run DOS applications, a keyboard will be required. The idea is to use keyboards when it makes sense, not to throw them away.

The base station or desktop computer will be used for mass storage and network communication. Processes which have been queued up on the portable unit will automatically be carried out when connected to the "base station." For example, this could be backing up files, updating files, printing files, or email uploading and downloading. Easy to use software which allows this seamless integration between Pen Windows computers and the "outside world" will be available. Other uses for the base station might include battery recharging or installation of software from floppy disks.

The following is a brief outline of the rest of this document. First compatibility with existing Windows and DOS applications is discussed. Then a description of the Pen Windows user interface and internals is given. Following this is a brief discussion of handwriting recognition. After that, ways a pen-aware application can use Pen Windows will be presented. Then is a specification of the hardware for Pen Windows machines. And finally there is a diagram of the Pen Windows internals and programming interfaces between various modules.

Compatibility

Since Pen Windows is an addition to Windows 3, it will run all protect mode compatible Windows applications without modification. (Pen Windows will *only* run in protect mode on a '286 or '386 microprocessor in order to allow applications to access greater than 640K of memory). Running existing applications is done by making the pen emulate a mouse and using the handwriting recognition to simulate a keyboard. It is relatively easy to see how the pen can act like a mouse, the primary difference being that a pen is much more accurate. To simulate a keyboard, the user will switch into a mode and Windows will begin to recognize the pen movements as characters. When a character has been recognized it will be sent to the application as if it had come from the keyboard. The applications will not have to know they are running on a pen-based system. Gestures written by the user, for example a caret - ^ can be used to send commands to both old and new applications. Gestures will be discussed further in the next section.

The pen will look like a one button mouse to existing Windows applications. The mouse will be emulated by a pen as follows:

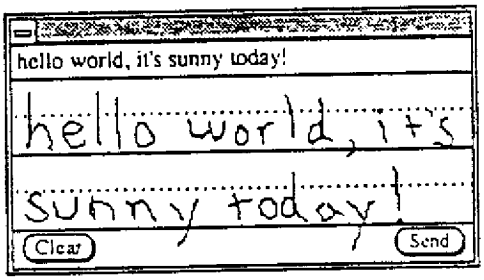
Pen Action	Mouse Action
pen down	mouse down
pen down and move	drag
pen up	mouse up
pen tap	mouse click
double pen tap	double click
pen move slightly above screen	mouse move (cursor move)

The last emulation requires the tablet to be able to sense the position of the pen when it is above the screen. This is an important capability for compatibility with existing Windows applications.

There will be a few ways to emulate the user holding down the Shift, Alt, or Ctrl keys while clicking the mouse. One way is to have a floating window with three radio buttons that the user can switch on and off. Or, OEMs could put physical buttons on their computer that the user could press in conjunction with pen actions. Neither of these are extremely convenient, but they should suffice. Emulating the right (or second) button on a mouse will have to be solved in a similar manner because the side button on the pen is going to be used for other purposes.

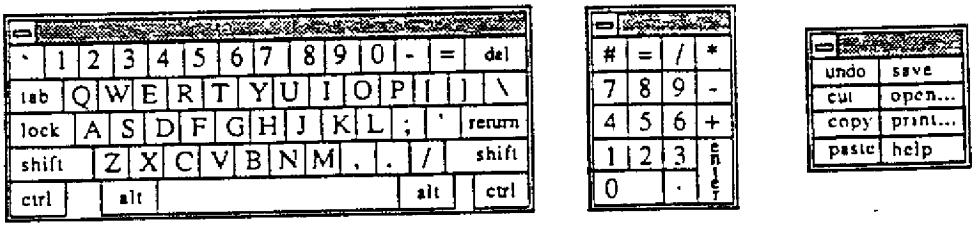
On Pen Windows computers, a side button on the pen will be required to help distinguish between handwritten characters, gestures and mouse-like pointing actions. For example, whenever the user presses the button, Pen Windows would ink the screen and recognize anything the user draws and send this as a standard keyboard message to the application. If the user writes a word or a string of characters, then they will be sent to the application as if they had come from the keyboard. The user can write *anyplace* on the screen, and the message(s) will be sent to the window which has the focus. The application would not have to know that these characters came from a pen instead of a keyboard.

Another way to input characters to existing applications is to use the virtual keyboard application. This application is always present and is used to translate handwriting into keyboard events. It will be used to send long streams of text, more than a word or two, to existing applications. The virtual keyboard is a blank window which the user can bring to the front of the screen by drawing a gesture (probably a caret). The user can then write in this Window and do limited editing of his text. After the text has been recognized, it is sent to the current application exactly as if it had come from a keyboard, and the handwriting window will go to the back of the screen.



Virtual Keyboard

Yet another way to send characters to applications will be with a synthetic keyboard. This is a floating window which is a picture of a keyboard. The user taps a key with the pen to send that character to the application. There will also be a number of other synthetic keyboards that only have special keys, e.g. function keys, arrows and numbers, or ctrl/alt/shift. Users will even be able to create their own synthetic keyboard which can be used to send any sequence of keystrokes to an application. Synthetic keyboards will make it easier to use existing desktop applications with only a pen.



Synthetic Keyboards

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If the user attaches a keyboard then DOS applications will run on Pen Windows machines. Pen Windows will not enable handwriting recognition to be done in DOS. It is relatively easy to make the pen emulate a mouse, and OEMs will likely do this, but doing a virtual keyboard with handwriting recognition in DOS is much more difficult. Microsoft's handwriting recognition software, and others developed for Pen Windows, will not easily port back to DOS because they depend on the many resources of Windows (e.g. memory management, graphics, windows...). It is possible to write a character-based synthetic keyboard for DOS, and Microsoft might do this. But in reality, the most practical and convenient way to run DOS applications is with a keyboard.

Windows User Interface Additions

In order to take advantage of the capabilities of a pen, Pen Windows will include additions to the standard Windows user interface. These additions will enable Pen Windows to make use of the unique characteristics of pen input, notably handwriting recognition. It is important to point out the differences and similarities of how a user will interact with a computer that has only a pen versus one that has a mouse and keyboard.

There are five logical ways a pen can interact with the computer:

(1) To input a stream of characters exactly like a keyboard
pen: virtual keyboard, synthetic keyboard
keyboard: Only the ASCII characters on a keyboard

(2) As a pointing device exactly as the mouse is used
mouse or pen: point/click, drag, move

(3) To issue commands similar to keyboard shortcuts
pen: gestures
keyboard: Alt-Ctrl-Shift with any key, F-keys, special keys

(4) To do freehand drawing much better than a mouse
mouse: clumsy drawing
pen: more accurate drawing of shapes/figures (which may or may not be recognized depending on application/user preference)

(5) To input characters or issue commands AND indicate position on the screen
combination of (1) + (2) or (3) + (2).

The effectiveness of a keyboard/mouse combination can be compared to that of a pen in each of the five areas above. The keyboard and mouse win for task (1), it's a toss up for areas (2) and (3), and the pen is a winner in areas (4) and (5). The most useful applications on pen based computers (when keyboard is not attached) will be those that use areas (2), (3), (4), and (5), i.e. the ones that don't concentrate on simple text data entry. The reason there will be additions to the standard Windows user interface is to allow the pen to function in the five ways described above.

Keyboard and mouse emulation, (1) and (2), were described in the compatibility section. Issuing commands with the pen, (3) - gestures, will be discussed in this user interface section. Areas (4) and (5) are application dependant, and therefore will be discussed in the section about how new, pen-aware application can use Pen Windows.

Electronic Ink

When a user is writing something to be recognized Pen Windows will dribble electronic ink onto the screen. The mouse cursor will be turned off while this is happening. At all other times while the pen is being used in a similar manner to the mouse, there will be a cursor on the screen. Usually the ink on the screen will be erased after it is recognized, but an application may choose to leave it on the Window (e.g. for sketches or annotations). Hardware manufacturers may wish to provide an extra graphics plane to speed up the inking and de-inking processes, but this is an optional feature.

Gestures

Gestures are new way to issue commands to program. Gestures are defined as a series of one or more marks which send a command to an application. A mark is anything the user draws on the screen. The following are the recommended gestures for Pen Windows applications. The user will press the side button on the pen to indicate that a gesture is being drawn. Applications will be able to assign the characters 'a-z' to any command they choose. Applications should be careful not to use letters of the alphabet which conflict with this set of gestures (e.g. 'I', 'x', 'c' or 'v').

Command	Pen Windows Gesture	Win Application Equivalent
select characters		drag
general object selection		—
anchor selection		click
extend selection		shift-click
undo		alt-bksp
cut selection		shift-del
clear char		—
cut word		dbl click + shift-del
paste clipboard		click + shift-ins
move selection		shift-del + click + shift-ins
duplicate selection		ctrl-ins+ click + shift-ins
copy selection to clip		ctrl-ins
correct character		—
place I beam		click (opens up virtual keyboard)
insert horizontal white space		(opens up or expands virtual kbd)
insert vertical white space		(opens up or expands virtual kbd)
close white space		—
insert line break		enter
select lines	 (in left margin)	—
anchor rect for text + graphic selection	 (creates small bin)	—
extend rect for text + graphic selection	drag anchor bin	—

The first column of the gesture table is the command to be issued to the application. The second is the Pen Windows gesture which will invoke the command. As soon as the gesture is recognized, its "ink" will be removed from the screen. The arrows for straight line gestures *only* indicate the direction of the line, not that the user has to draw an arrow. The third column contains the mouse and keyboard messages that Pen Windows will send application which are not pen-aware (the compatibility layer). A series of dashes in this column

indicates that the given gesture will not work on non pen-aware application (existing, unmodified Windows applications.)

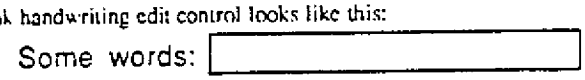
Edit Controls

Pen Windows will allow applications an easy way to get handwriting input from the user. When a user writes characters on the screen, an application should not have to worry about the many complexities involved in doing accurate handwriting recognition. There will be a new control onto which users can write and have this info converted into ASCII characters - a handwriting edit control (abbreviation: HWXEC).

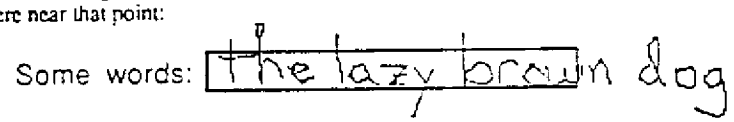
The functionality of an HWXEC will be a superset of those of a normal edit control. (An edit control is a box on the screen which allows a user to type text into it, for example, there is an edit control in a "File Open..." dialog box for typing the filename.) The primary difference between an HWXEC and a regular edit control will be the ability to deal with handwriting input. When an application wants to have handwriting input to be sent to it as ASCII characters, it puts up an HWXEC window. One example of this might be a rolodex application which has and area to type a person's name, address, and phone number. The rolodex application can simply put up the HWXEC windows and it will only see the characters when they have been recognized. Again, the application will not have to know if the input came from a keyboard or a pen, and therefore does not require and special code. The user can plug in a keyboard, type into the HWXEC's, and get the same result as writing into them.

Here is an example of how a user might interact with an HWXEC

The blank handwriting edit control looks like this:

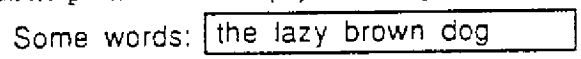


To enter handwriting into the HWXEC, the user first taps the pen inside of the rectangle, then writes text somewhere near that point:

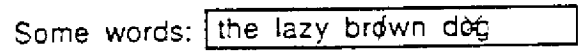


Notice that the writing can go outside of the rectangle.

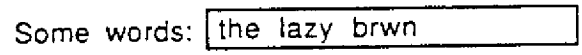
When the recognition is done (either after a timeout or user action such as pressing the button on the side of the pen) the recognized text will be displayed in the original sized rectangle:



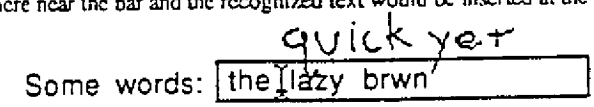
At this point the user may want to use gestures to edit recognized text. For example a vertical line, /, can be used to delete a character, or an 'X', X, to delete a word:



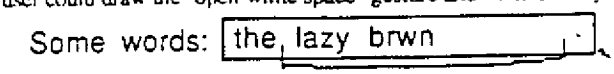
And the result would be the following.



If there user wanted to insert some more text, there are two ways to do that. The first is to simply tap the pen where he wants to insert the text and an insertion bar, I, would appear. The user could then write somewhere near the bar and the recognized text would be inserted at the insertion point:



Or, the user could draw the "open white space" gesture and write directly in the edit control:



Some words: the quick yet la

And the result of either of these two actions would be the same (the white space automatically collapses around the text):

Some words: the quick yet lazy brwn

This is how a single line handwriting edit control will work. Applications will also be able to specify the type of data to be entered into and HWXEC. Some data types might be, alphabetic characters, numbers, valid words in a language (e.g. English, French, German...), or a list of application supplied words. All of the handwriting functionality is available for single line as well as multiple line handwriting edit controls.

Other Windows Control Changes

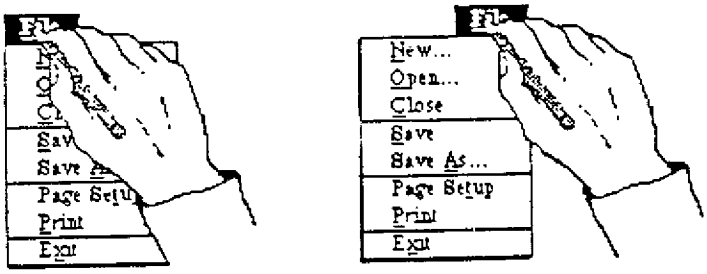
There will also be slight modifications to many other existing Windows controls so that they can take advantage of the pen.

List boxes are typically used to display a list of choices (e.g. filenames) for a user user to choose. If there are many entries in the list, say more than 20, it can be cumbersome to scroll down to the desired selection if it is near the end. With a keyboard a user can type a key on the keyboard, and the list box will automatically scroll to those entries which start with that letter. Pen Windows will allow the user to write the letter on the box, with the side pen button down, to get the same functionality.

Check boxes and radio buttons are used to indicate *on* or *off*. With a mouse a user toggles these controls by simply clicking on them. The same will also be possible to do with a pen. If a user wants, he will be able to draw a check mark or an X to toggle the state of the control.

Floating Windows

Menus will be modified so that they pull down in a more convenient way for the pen based interface. If a right handed user pulled down a menu with a pen, most of it would be obscured by his hand. To solve this problem, it will be possible for menus to open up shifted slightly to the left of where they normally are. There will be a new option in the control panel which lets the user specify if he is right or left handed.



Screen Rotation

A user might want to use a Pen Windows computers so that it is positioned vertically like a normal pad of paper, or horizontally as most computer screen are. Pen Windows will allow the user to rotate the screen so that it can be used in either position. This feature will have to be done by hardware mapping of the graphics memory.

Windows Internal Modifications

There will be some changes inside of Windows so that it will work better in a low power environment. The first is to put Windows into ROM, and the second is to add power management.

By making Windows ROMable, Windows and applications will be able to execute directly out of either ROM or a RAM/FEPROM disk. This is particularly desirable for portable computers because it will not require program code to be copied from the permanant storage device (ROM or RAM/FEPROM disk) to RAM. Programs will be able to *execute in place*. Since programs that run in protect mode can't write to their code segments, it should not be very difficult for developers to add this capability. Files which execute in place will have a special header so that Windows knows not to load the code into RAM. This bit image could also be transfered to ROM. Developers may choose to create a table of their program functions that resides in RAM so it is easier to patch programs if there is a bug in them. Microsoft might use this technique for ROM Windows itself.

Microsoft will put some hooks into Windows to allow the hardware to go into low power mode when the system is idle for a certain period of time. When there is nothing on the system queue for a while, Windows can call an OEM provided routine which slows the processor clock speed down to something like 1 mHz. Then Windows can execute a certain set of special routines to monitor things while it is sleeping. When the user starts writing again on the screen, Windows will be awoken. A lot of OEMs might want to implement this differently in hardware, so we'll provide a standard way to do it from Windows.

Some interesting issues might come up because of low power mode. One example is alarms to remind people to do something. Normally the way applications implement this is with a Windows TIMER, but it isn't desirable to call applications in *sleep* mode. This problem can be solved by creating an "Alarm" app which takes DDE messages from other applications to set/reset alarms. The alarm app could then pass this information along to the device dependant routines that execute while in sleep mode. The routines would check the clock and if an alarm was set to go off, Windows would wake up and the alarm application would notify the other application that it was time to rise and shine.

ROM Windows will work in conjunction with Microsoft existing version of MS-DOS in ROM, aptly named ROM DOS. An addition made for ROM DOS is the flash file system. The flash file system is file system which makes efficient use of memory in FEPROMs. It does this by rewriting only the changed parts of a file to blank space left in FEPROM. When all of the FEPROM memory is used up, the flash file system will erase used blocks which no longer have info on them and then reuse these blocks. Because of some of the current limitations of FEPROMs (not dense enough, not enough granularity) the primary use of FEPROMs will probably be to store code or permanent, seldom changed data. This information can be easily updated if necessary. FEPROMs wear out after a many writes, so it might not be very efficient to use them as a complete replacement for hard disks. This will become more possible as improvements are made in FEPROM technology.

IC card storage will also be supported by Pen Windows. Microsoft endorses the standard set by the PCMCIA (PC memory card international association) which is working in cooperation with the Japanese group JEIDA (MITI sponsored). This will make it possible for IC cards to be used interchangeably between different manufacturers computers.

Handwriting Recognition

In the first version of Pen Windows, Microsoft's goal is to provide software that can recognize a user's natural, neat handprinting. In general, Microsoft believes the computer should adapt to the user, not the other way around. This means the software will have to be capable of recognizing pseudo-cursive, a mix between printing and cursive which many people write. Outside companies are developing handwriting modules that recognize all types of writing, including kanji and cursive. These will plug into Pen Windows in the same manner that the module from Microsoft does. It will be difficult to for Pen Windows computers to gain widespread acceptance unless very good handwriting software is developed.

As stated above, Microsoft plans to develop its own handwriting recognition software for Roman characters. This software will fulfill the following requirements:

Upper and Lower Case	This is the way most people write. If handwriting software could not recognize upper and lower case, it would force many users to change their habits based on the limitations of the software.
Adaptable	Ideally, the computer would instantly recognize anyone's handwriting. At present, it is going to be necessary for the user to do some training of the software in order to achieve higher recognition rates. It is important that this is not burdensome on the user.
Extensible	Applications, as well as users themselves, will be able to add new gestures and symbols for the system to recognize.
Robust Segmentation	One of the most difficult problems in handwriting recognition is determining when one character ends and another begins. Microsoft's handwriting algorithm will do a good job of solving this.
Use Context	Applications can give a lot of contextual information about what they expect from the user to aid in the recognition process. For example, an application might expect a number in one place and a valid word in a language in another.
Return Probabilistic Estimates	Applications will be able to get a list of characters or words with probability factors that indicates what the system thought the user has written.
Run in Background	Recognition will take place while the user is continuing to write. Individual applications can determine when recognition results are displayed.
Fast and Small	People can write as fast as 2-3 characters per second. Since recognition will take place in the background, the speed should be significantly faster than this. Memory is precious, so the smaller the better.

How a Pen-Aware application can use Pen Windows

Pen-aware applications are those that have been designed to take advantage of the pen as an input device. So far, this document has described how Pen Windows differs from the standard desktop version of Windows. In this section a few examples will be given of how Pen Windows applications (pen-aware applications) can differ from standard desktop Windows applications. Once again, it is important to note that pen-aware applications will only differ in their user interface; all other functions such as memory management, data manipulation, file input/output, screen and printer output will be the same.

From a programming standpoint, some applications will remain largely the unchanged - for example a form filling out application. This type of application is particularly useful on a portable pen-based computer because data can be entered outside of the office, instead of written on a piece of paper and then typed into a computer at a later date. Typically a form application will present the user with a series of fields (e.g. name, address, phone...) in which data is to be entered. On a desktop this information is entered with a keyboard, but on a Pen Windows machine it can be done with handwriting. Because Pen Windows handwriting edit controls make this possible, the application developer will only have to make minor additions to allow the input of handwritten data. Information can be entered using other standard Windows controls as well - drop down list boxes, radio buttons, check boxes, etc. A person might wish to design his form to have more of these types of controls because it will be easier to point and click with a pen than with a keyboard/mouse combination. But these changes will be largely transparent to the application developer.

Applications such as a CAD package can be enhanced in other ways to take advantage of the pen. One way to modify CAD systems is to allow users to draw symbols directly on the page instead of having them choose from a palette and then positioning the symbols. For example if a user wants to put a capacitor symbol in the center of the page, he simply draws it, Pen Windows recognizes it and passes the information on to the application which then displays the recognized capacitor symbol at the same location. This enables the user to enter data *and* specify where it goes at the same time. The CAD application can also allow the user to specify which handwritten symbols are connected to its database of symbols. Developers of CAD applications will have to make enhancements to their code to allow this functionality.

Using Pen Windows it is also possible to write an application like an equation editor which has completely different interface when using a pen than it would with a mouse/keyboard. Let's say a user wanted to enter the following equation:

$$s_k^2 = r^2 \frac{\int_0^1 z^{k+1}(1+z^2)^{(n-k)/2}\,dz}{\int_0^1 z^{k-1}(1+z^2)^{(n-k)/2}\,dz}$$

This is not an trivial task for the user with a keyboard and a mouse. But with a pen, the user could simply draw the equation to enter it into the computer. Applications such as this will require a significant amount of development effort to enable this new user interface. Pen Windows will do the actual recognition of the symbols. By using additional information provided from the recognition routines, the application will have to decide where exactly to put each symbol and what size it will be. Pen Windows will make it possible to develop new and exciting applications such as this.

Hardware Specifications for Windows H Machines

Processor
- Pen Windows will run ONLY in protect mode to allow applications access to all available RAM
- Required:
  12 mHz 286 capable of running in protect mode
- Recommended:
  386sx
- Optional:
  processor to deal with i/o (stylus, screen)
  386, 486

Memory
- Dynamic RAM and Static RAM will be used as normal memory for programs as well as a RAM disk. SRAM is much preferable for RAM disk.
- ROM can be used to store DOS and Pen Windows, which will execute directly out of ROM.
- Flash EPROMs can be used as a virtual disk. If Pen Windows or applications are stored in FEPROM they will execute in place and need not be loaded into RAM.
- Required:
  1 meg DRAM or SRAM for application data storage during execution
  2 meg of FEPROM, ROM, or SRAM to store Pen Windows
  1 meg of FEPROM, or SRAM to store applications
- Recommended:
  2 meg DRAM or SRAM for application data storage during execution
  2 meg of FEPROM, ROM, or SRAM to store Pen Windows
  3 meg of FEPROM, or SRAM to store applications
- Optional:
  More RAM or FEPROM

Disk Storage
- Required:
  None
- Recommended:
  External floppy to be used for backup purposes
- Optional:
  Hard disk, either external or internal

Screen
- Required:
  80 DPI resolution
  1 bit/pixel LCD (or other)
  no parallax
- Recommended:
  greater than 80 DPI resolution
  backlit LCD
  screen size approx 8" x 10"
- Optional:
  higher resolution
  greater than 1 bits/pixel
  color

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Input Devices

- Required:
  stylus/tablet
    - senses pen up and pen down
    - Resolution: ~.005", 200 DPI, .127mm
    - Sampling Rate: ~150 samples/sec
    - Error Rates: To be determined
    - has a barrel (side) button
  portable keyboard attached to main unit by cord
- Recommended:
  stylus/tablet
    - senses position of tip when not touching screen
    - is quiet when making contact with screen
- Optional:
  stylus/tablet
    - senses pressure, rotation, angle, or height above screen
  mouse or other pointing device
  control button(s) on side of computer

Battery Life

- Required:
  greater than 4 hrs
- Recommended:
  8 hrs
- Optional:
  more than 8 hrs

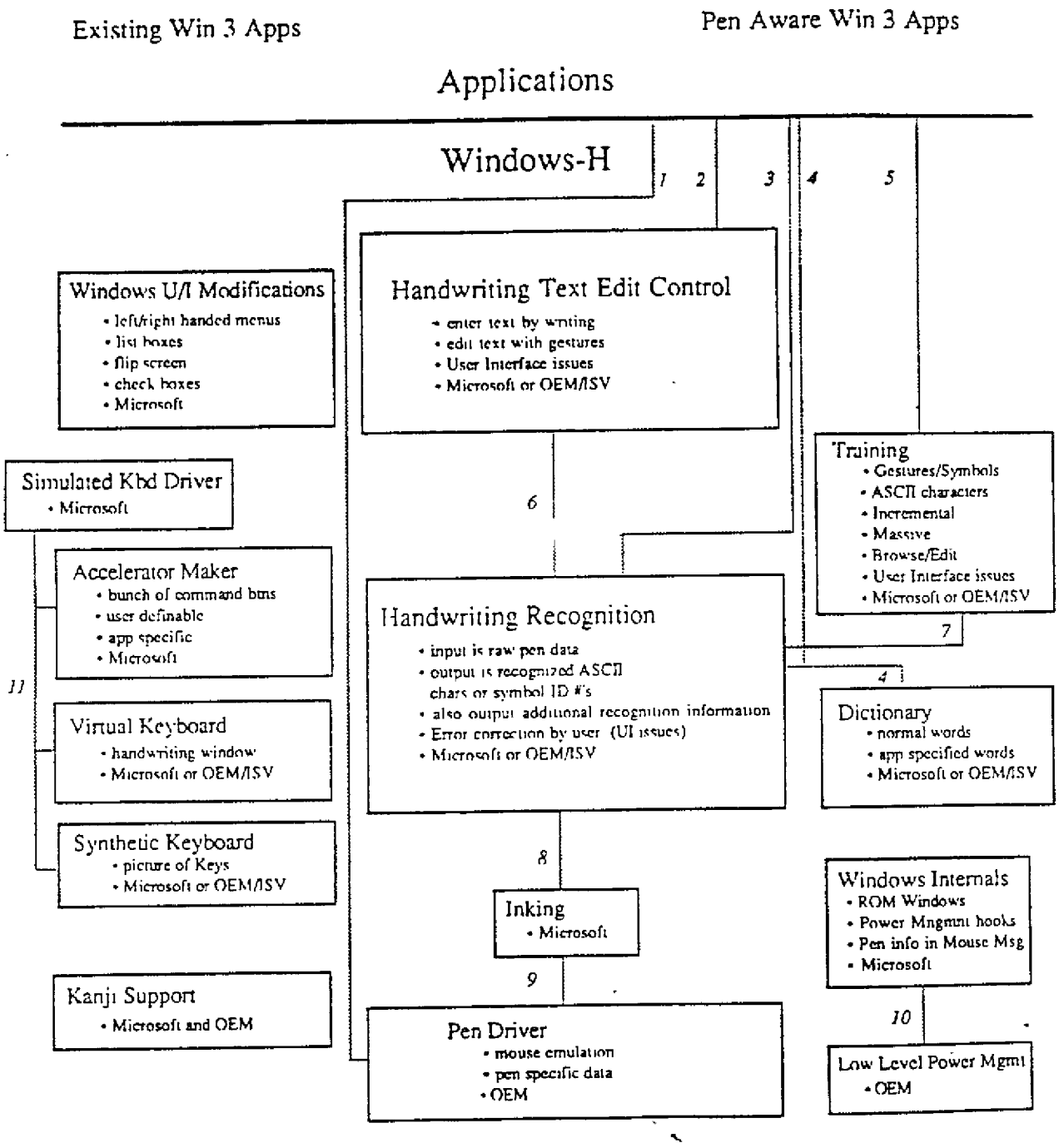
IC Cards

- Required:
  None
- Recommended:
  IC Card Standard being set by PCMCIA and JEIDA

Other hardware

- Required:
  None
- Recommended:
  Internal modem
  parallel/serial ports
  External Base Station w/expansion slots for:
    - network cards
    - printer cards
    - external hard/floppy disk
    - color display
    - scanner
    - ...
- Optional:
  paging capability (one way communication/read only)
  Cellular phone/modem (two way)
  infrared network connection (two way)

Pen Windows Internals and API's



Information At Your Fingertips

Bill Gates
Chairman

Microsoft®

15th Anniversary
1975 - 1990

A computer on every desk and in every home...

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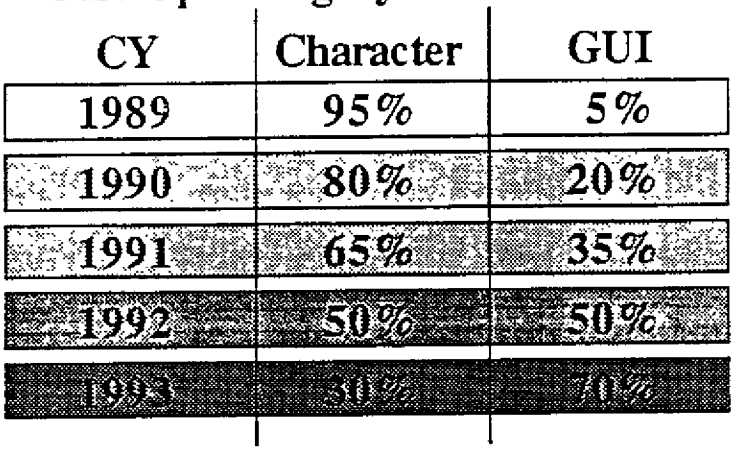
Information At Your Fingertips

- "Personal" computing
- Application integration
- Corporate information online
- Corporate-wide file sharing
- Corporate-wide electronic mail

U.S. Operating Systems Forecast



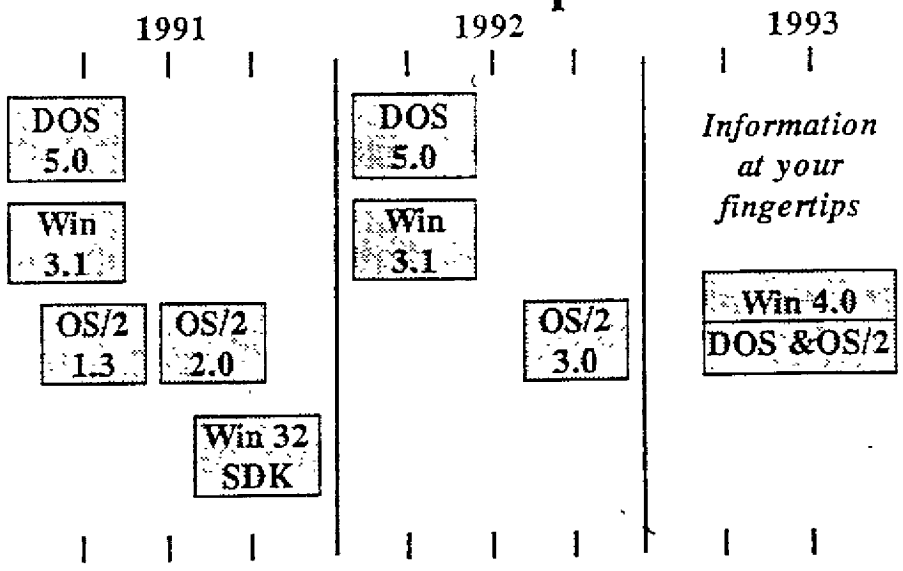
CY	Character	GUI
1989	95%	5%
1990	80%	20%
1991	65%	35%
1992	50%	50%
1993	30%	70%

Windows also will sell into the installed base

Multimedia

- New market opportunities for information and home applications
- Extensions to Windows hardware platforms
  - CD to deliver information applications
  - Video: 8 bits per pixel
  - Sound: digital signal processor
- Requires: tools & evangelism
- Microsoft is spending $10M next year

Roadmap



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RBC 001847

R&D Investments For The Future

- Graphical user interface
- Networking
- Object orientation
- Multimedia
- Handwriting
- Applications

Facilitate "Information at your fingertips"

Microsoft Crusades

1980s: Graphical user interface

1990s: Information at your fingertips

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OS/2 1.3 Fact Sheet

What is it?

On September 17, Microsoft and IBM announced an expanded cross-licensing agreement covering DOS, Windows, OS/2, and New Technology OS/2, referred to as OS/2 3.0. The new agreement specifies that all of these products are completely cross licensed by both companies, so that both companies can offer the same family of products to their customers.

Microsoft and IBM also announced a series of steps being taken to improve the efficiency and productivity of development efforts for DOS and OS/2. Although both IBM and Microsoft will define requirements for these products, primary development responsibilities for DOS and OS/2 3.0 reside with Microsoft; and primary development responsibility for OS/2 1.X and 2.0 are being assumed by IBM. In most cases, development efforts will be centralized in one location. Microsoft will continue to have significant development resources dedicated to OS/2 1.21 and 2.0.

Microsoft also indicated that we would make available to our OEM customers OS/2 v. 1.3, which IBM has demonstrated for customers and the press, but not officially announced.

OS/2 1.3 is a new release of 16-bit OS/2, and upgrade to IBM OS/2 v. 1.2 and MS OS/2 1.21, which IBM plans to announced in October or November and release late this year or early next year. Microsoft plans to make OS/2 1.3 available to our OEM accounts within three months of IBM.

OS/2 1.3 is an update to OS/2 1.21 with improvements for low memory systems. Changes to OS/2 1.3 include:

- Performance improved graphical file manager
- Performance improved access to OS/2.INI file
- Improved screen repaint times
- Minor changes to the shell and install program
- Intelligent fonts

There are no new API's or device driver interfaces in OS/2 1.3 and the release should work with all existing device drivers and require minimal new adaptation work. We will release OS/2 1.3 as a new OAK, but in most cases we anticipate adaptation will be limited to bug fixes.

IBM will ship Adobe Type Manager (ATM) with OS/2 1.3. Microsoft plans to ship our intelligent font technology, True Type, which will also be available under Windows and on the Macintosh. The font technology is hardware independent and will require no OEM adaptation.

Performance

OS/2 1.3 does show significant performance improvements (20 to 30 percent, depending on the task) on a 2 MB system, however this configuration does not include networking software, which cannot be installed with OS/2 in 2 MB. Nor does it include HPFS. And not all applications -- not 1-2-3 G, for example -- can be loaded in less than 2 MB. Since virtually all OS/2 users require a network, we don't believe 2 MB will be a widespread OS/2 configuration.

As memory is added to the system, OS/2 1.3 performance in most areas becomes comparable to OS/2 1.21. In tests Microsoft has run on a 4 MB system with the network installed, OS/2 1.3 showed about a 4 percent average performance improvement over OS/1.21 with HPFS, 5.3 percent average with FAT.

Some tasks are much faster under OS/ 1.3. Loading an application such as Excel or Corel Draw is 30 to 40 percent faster, and loading the File Manager is about 30 percent faster in 4 MB with the network. These speed-ups give the user a sense of snappier performance, even though running an Excel macro or drawing an image in Corel are essentially the same under either release.

OS/2 1.3 tested significantly slower than protected mode Windows 3.0 in both 2 MB and 4 MB configurations. For tasks such as loading Excel or Corel, loading File Manager, opening dialogs, Windows 3.0 averaged 120 percent faster than OS/2 1.3 on a 4 MB system with no network. On a 2 MB machine with no network, Windows 3.0 averaged 150 percent faster than OS/2 1.3.

Bottom Line

Microsoft recommends that OEMs complete their OS/2 1.21 adaptations and ship OS/2 1.21 as quickly as possible. OS/2 1.21 (and higher) is and will be required to run LAN Manager, IBM Extended Edition, and Extended Services (Extended Edition unbundled from IBM Standard Edition to run on non-IBM OS/2 systems). OEMs interested in shipping OS/2 1.3 can best prepare by completing the OS/2 1.21 adapation since we expect the changes to OS/2 1.3 will be minimal. As we said above, OS/2 1.3 should be thought of as a an update to OS/2 1.21.

Windows of Opportunity

Microsoft OEM Briefing 1990

1. Finance
   - Financials

2.
   - Non-financials

   ~~SYSTEMS~~
   - DOS
   - Windows
   - OS2
   - IBM
   - Networking

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1. Q/A

① 1,3 — run on 286
 7.0 — run on 386 & up

② IBM
 ↳ IDA
 ↳ LAG in Delivery
 3 mos/ vs incrementle

→ 1.3 issue - nothing systemic
 - may be some time differential

- Device Drivers
 Documentation - addenda

generally ⇒ in past time lag for good reasons - not ready
 - technical

Pauline - nothing systematic or legal

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RBC 001852

(3) Will NT ~~&~~ OS/2 include hardware

(4) Why not only Windows -?
not PM

-> Broadest ISV -- win + PM

-> Best-case broadest,

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MS-DOS
Version 5.0

Mark Chestnut
MS-DOS Product Manager

Agenda

- MS-DOS v. 5.0 status update
- MS-DOS v. 5.0 features and benefits
- MS-DOS v. 5.0 demonstration

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MS-DOS 5.0 Schedule: U.S. Releases

Beta OAK	October 1990
Final OAK	December 1990
ROM Version OAK	February 1990

MS-DOS 5.0 Schedule: International Releases

French OAK	January 1991
German OAK	January 1991
Spanish OAK	February 1991
Portuguese OAK	February 1991
Italian OAK	TBD
Dutch OAK	TBD
Swedish OAK	TBD
Kanji	TBD
Chinese OAK	TBD

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MS-DOS 5.0: The Best DOS Ever

- Advanced memory management
- Ease of entry: improved shell and installment
- Enhanced utility set
- Stability -- 3000 beta testers

MS-DOS 5.0: The Best DOS Ever

- Full ROM-executable implementation
- Strong complement to Microsoft Windows version 3.0
- Task switcher

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MS-DOS 5.0
Memory Management:
More Room For Applications

- Utilizes high memory area to run MS-DOS
  - Occupies 15K of base memory on most systems
  - Windows version 3.0 users gain
- Streamlined kernal

MS-DOS 5.0
Memory Management:
More Room For Applications

- "Load high" facility (EMM386)
  - TSRs, device drivers, net drivers can be moved out of 640K area
  - Compatible with Windows v. 3.0
  - Windows v. 3.0 users gain significant memory relief for DOS applications

Example Of Memory Savings With MS-DOS 5.0

- 80386 system with DOS, NetWare redirector, MS Mouse driver loaded

	Available memory
MS-DOS v. 3.3	523 KB
MS-DOS v. 4.01	506 KB
MS-DOS v. 5.0	625 KB

MS-DOS 5.0 Enhanced Utility Set

- Task switcher
- Undelete and unformat
- DOS-connect file transfer
- Command line edit/recall
- Disk file search
- Full-screen text editor
- Online help for all DOS commands

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MS-DOS 5.0 Replaces GW-BASIC With Q BASIC

- "Q BASIC" is QuickBASIC interpreter
- Major improvement over GW-BASIC
- Modern, structured language
- Online documentation with hypertext links

MS-DOS 5.0 Improved Shell

- Streamlined: less than 1 KB resident size while applications running
- Direct manipulation for copying/moving files
- Integrated utilities
- Visually consistent with Windows 3.0

MS-DOS 5.0 Installation Faster, Safer

- Automatically sets up config.sys and autoexec.bat
- Support for 1.2 MB and 1.44 MB media
- Update multiple users quickly over a network

MS-DOS 5.0 ROM Version Features

- Fully ROM-executable
- MS-DOS takes up only 15K of RAM
- Requires 70 KB ROM
- Integrated power management

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BIOGRAPHY

Rich Abel
Group Product Marketing Manager for Microsoft Windows, Microsoft Corporation

Rich Abel, as group product manager, is responsible for all marketing efforts involving Microsoft Windows. He joined Microsoft Corporation in 1985 as product manager of the highly successful Microsoft Mouse and was subsequently promoted to group product manager for the company's Hardware Division.

Previously, Mr. Abel held the position of product manager with Mannesmann Tally Corporation, and project engineer at Sperry Corporation. He holds a BS in mechanical engineering from the University of Washington.

Steve Ballmer
Vice President, Systems Software, Microsoft Corporation

Steve Ballmer joined Microsoft in 1980 and has held a variety of positions over the past decade, including vice president of marketing and vice president of corporate staffs. In his current role, he serves the company as vice president, systems software group. He is responsible for directing development, user education, marketing and testing of systems software, which is comprised of MS-DOS, Microsoft Windows, Microsoft OS/2, OS/2 LAN Manager, XENIX, and Microsoft languages.

Prior to joining Microsoft, Mr. Ballmer was an assistant product manager for Procter and Gamble. He is a graduate of Harvard, where he studied applied math and economics. He also attended the Stanford Graduate School of Business.

William H. Gates III
Chairman and Chief Executive Officer, Microsoft Corporation

William H. (Bill) Gates, is founder and CEO of Microsoft Corporation. He is a key visionary for the company's technological advancements in such interrelating areas as new product ideas, technologies for applications, computer languages, and operating systems. He also plays an integral role in the company's operating and strategic decisions, and overall management.

Mr. Gates, together with Paul Allen, developed the BASIC programming language for the first commercially available microcomputer, the MITS Altair, in 1974. He attended Harvard University as an undergraduate.

Rob Glaser
General Manager, Multimedia Systems Group, Microsoft Corporation

Rob Glaser is general manager for the Multimedia Systems Group and is responsible for the software development and marketing of a Microsoft Multimedia platform.

Prior to these duties, Mr. Glaser was director of marketing for network business unit at Microsoft, in charge of the company's OS/2-based networking efforts, including Microsoft OS/2 LAN Manager. He was also director of applications program management, and managed a group responsible for the specifications and program plans for Microsoft's applications products. He has a BS in computer science and an MA in economics, both from Yale University.

Mike Hallman
President, Microsoft Corporation

Mike Hallman joined Microsoft as President in April 1990. He is responsible for Microsoft operations worldwide, including product development and marketing, OEM and retail sales, and administration. Mr. Hallman was most recently President of Boeing Computer Services, where he was responsible for all Boeing computing and communications systems, overseeing a staff in excess of 11,000 and a computer equipment inventory valued at over $1 billion.

Previously, Mr. Hallman spent 20 years at IBM Corporation in a variety of executive positions, including Vice President of Field Operations for the company's southwest marketing division. He earned his bachelor's and master's degrees in business administration from the University of Michigan.

Paul Maritz
Vice President, Advanced Operating Systems, Microsoft Corporation

Paul Maritz is responsible for the development of marketing activities associated with Microsoft multiuser system software. Because of the strategic importance of this particular software, Microsoft chose to create a business unit which focuses on this specific area.

Before joining Microsoft, Mr. Maritz worked at Intel Corporation for five years in various software management positions. In the past, he has worked as a software engineer for Burroughs Corporation and the University of St. Andrews, Scotland. He is a computer science graduate of the University of Cape Town.

Mike Murray
General Manager of Network Business Unit, Microsoft Corporation

Mike Murray is the general manager of Microsoft's Network Business Unit, and is responsible for marketing and development of network operating systems for use in client-server and distributed processing environments. His efforts are focused principally on Microsoft LAN Manager and SQL Server.

Prior to joining Microsoft, Mr. Murray was president of Dataline, a Connecticut-based subsidiary of Unisys. He was also director of marketing for Apple Computer's Macintosh Division for three years. He holds both a BS in engineering and an MBA from Stanford University.

Darryl Rubin
Director of Network Development, Microsoft Corporation

Darryl Rubin's responsibilities include overseeing all development efforts in Microsoft's Network Business Unit, primarily Microsoft LAN Manager. Before joining Microsoft in 1986, Mr. Rubin was networks products section manager for ROLM Corporation and computer networks research engineer for SRI International.

Mr. Rubin has published numerous articles on computer languages and artificial intelligence. He is a columnist for *Computer Language* magazine, and a former technical editor for *AI Expert* magazine. Mr. Rubin received a BS in biology from Stanford University.

Brad Silverberg
Vice President, Systems Division, Microsoft Corporation

Brad Silverberg joined Microsoft Corporation in the summer of 1990, to lead the implementation of the company's overall systems software strategy. In his role as vice president of the company's systems division, Mr. Silverberg is responsible for heading up Microsoft's MS-DOS and Microsoft Windows business units.

Before joining Microsoft, Mr. Silverberg worked as a vice president of engineering, in charge of all product and application development for Borland, International. Inc. His background includes involvement in computer science and development.

Pradeep Singh
Group Product Manager, CD-ROM, Microsoft Corporation

Pradeep Singh, as group product manager, is responsible for all informational products in Microsoft Corporation's Multimedia Division. Most recently, Mr. Singh has performed in a marketing capacity involving Excel for the Apple Macintosh.

Mr. Singh held numerous product marketing positions before joining Microsoft in 1986 as product manager for Microsoft Access for the IBM PC. He has a BSEE from the Indian Institute of Technology and an MBA from Harvard University.

Albert Yu
Vice President, General Manager, Micro Products Group, Intel Corporation

Dr. Albert Y.C. Yu, in his capacity as vice president and general manager of the Micro Products Group for Intel Corporation, is responsible for the company's microprocessors, peripheral chip sets, software, development tools and design technology. During the fourteen years Dr. Yu has spent with Intel, he has held a number of senior management positions, from manufacturing to general management.

Dr. Yu received his Ph.D. and MS from Stanford University, and his BS from California Institute of Technology, all in Electrical Engineering. He has authored over twenty technical publications.

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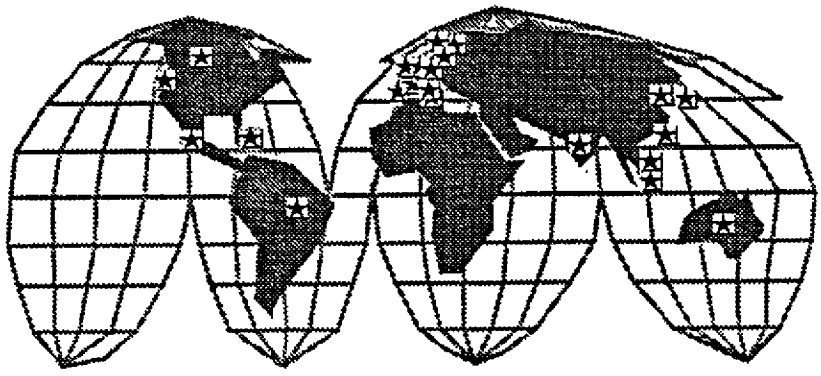
Mike Hallman
President

Microsoft Corporation

Microsoft Worldwide

Australia	Germany	Korea	Sweden
Belgium	India	Mexico	Switzerland
Brazil	Ireland	Netherlands	Taiwan
Canada	Israel	Norway	United Kingdom
Denmark	Italy	Singapore	United States
France	Japan	Spain	



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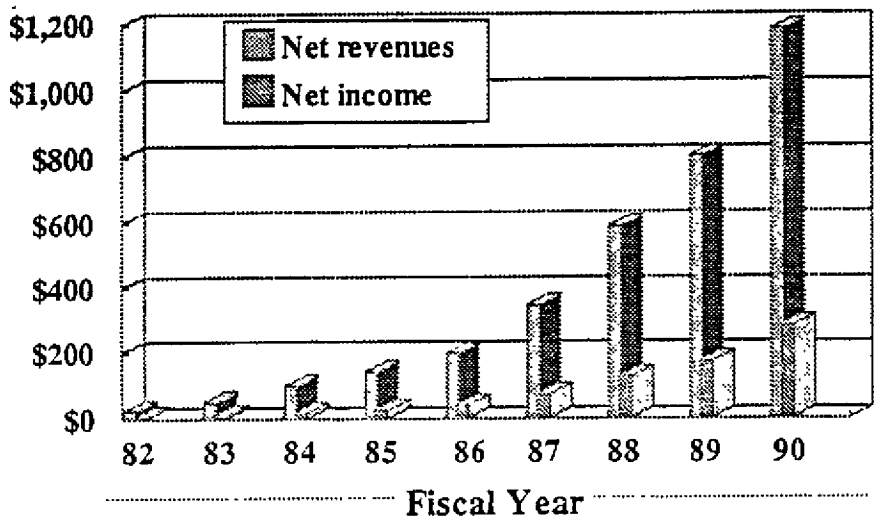
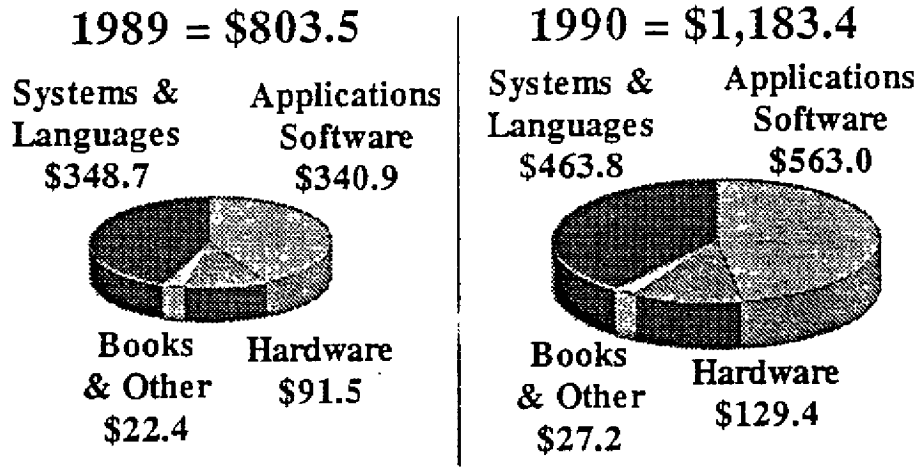
Fiscal Year Comparison

($ millions)



Worldwide Sales By Product Group Fiscal Years ($ Millions)



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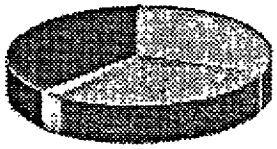
Worldwide Sales By Distribution Channel Fiscal Years ($ Millions)

1989 = $803.5

International Finished Goods $298.7

OEM $254.6



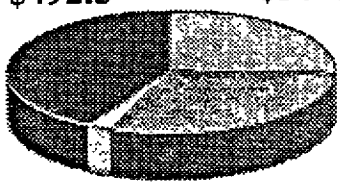
Microsoft Press & Other $18.9

USSMD $231.3

1990 = $1,183.4

International Finished Goods $492.5

OEM $307.1



Microsoft Press & Other $25.5

USSMD $358.3

Investment - People

	FYE '90	FYE '91
R & D	1950	2700
M & D	650	850
S & M - Int'l	1550	2250
S & M - U.S.	1000	1550
G & A	450	550

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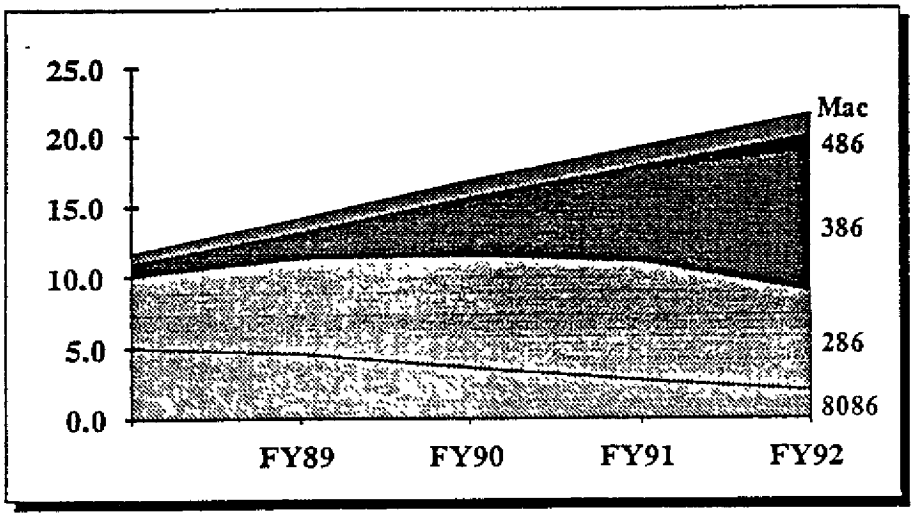
Worldwide Personal Computer Shipments



The Boeing Company

- $1.4 billion computer budget
- 14,000 MIS people
- 45,000 PCs installed
- 130,000 PC licenses/year

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Corporate Environment

- Large existing investment
- Heterogeneous environment
- Applications: make vs. buy
- Enterprise-wide data

Prerequisite To Success

- Strategic technology
- Service and support systems
- Committed, responsive team
- Focus on customer satisfaction

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Goals For FY '91

- Take advantage of Windows momentum
  - Sell the "family of applications"
- Introduce "Information at your fingertips"
  - Sell networking (LAN Manager)
- Improve customer service

Worldwide Software

- Huge commitment to localization
- Windows version 3.0 simultaneous availability in English, French, and German
- Rapid growth in Europe and the Far East

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Support Strategy

"Microsoft is committed to delivering world-class, customer-focused service"

- Microsoft/OEM/distribution partners
- Build support into the product
- Major investments in PSS and support tools

Worldwide Support Growth

	FY '90	FY '91
Number of employees	800	1200
$ Investments	$40 million	$65 million

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Windows Of Opportunity

- A computer on every desk and in every home
- Information at your fingertips

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Steve Ballmer

Senior Vice President
Systems Software

MS-DOS: The Foundation

- Installed base of more than 50 million users
  - Wide choice of hardware
  - Single binary standard for software

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MS-DOS: The Foundation

- Installed base of more than 50 million users
  - Wide choice of hardware
  - Single binary standard for software
- 1991:
  - DOS v. 5.0 replaces MS-DOS v. 3.3/4.0
  - Focus on memory utilization, user-oriented features, easy upgrade
  - Agressive retail upgrade program from Microsoft
  - Microsoft will sell upgrades only - NOT DOS
  - Customers must buy DOS from OEMs

Microsoft Crusades

1980s: Graphical user interface

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Microsoft Crusades

1980s: Graphical user interface

1990s: Information at your fingertips

Windows = Graphical User Interface

- "What You See Is What You Get
  - Fonts
  - Graphics
- Consistency
  - Ease of learning and support
- Device independence
- Application integration

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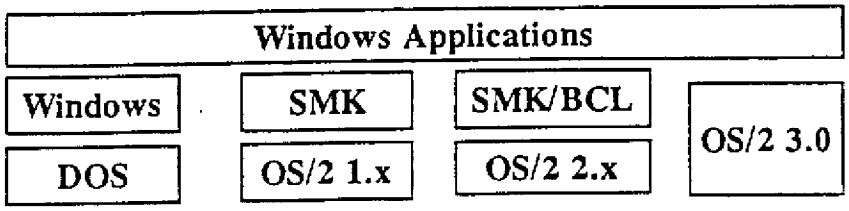
Microsoft Windows V. 3.0: Red Hot

- 1,000,000 Retail copies
- 50 OEM licenses
- 20,000 SDKs
- 1,000 Compatible applications

?
Yes
OK by Steve B

DOS And OS/2

- New Approach: Family, not replacement strategy
- Software Migration Kit (SMK) allows developers to package Windows applications for OS/2 1.x & 2.x
- Binary Compatibility Layer (BCL) allows users to run Windows applications protect mode binary on OS/2 v. 2.x



?
NO
~~Eof~~
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RBC 001879

OS/2 Will Evolve And Succeed

- Network server
- Sophisticated multitasking, protection
- Security
- Multiprocessor
- Portable
- Windows will help OS/2

Microsoft And IBM

- A healthy, long-term relationship
- To improve development efficiency:
  - DOS, Windows, OS/2 3.x at Microsoft
  - OS/2 1.x and 2.x at IBM
  - MS maintains a significant role in OS/2 1.x and 2.x
- All products are fully cross-licensed
- OEM customers can expect:
  - OEM adaptation kits from MS for all products
  - Early versions of all software
  - Support on all products

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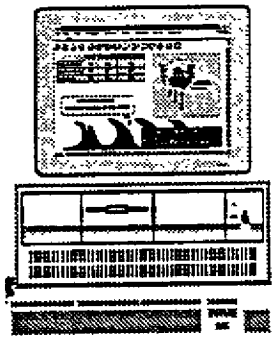
Windows Today



Productivity PC

Windows Everywhere

Portable

Multimedia

Productivity PC

Stylus PC

High-End PC

Printers

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Windows Everywhere

ROM-able

CD ROM
Multimedia

Networking Extensions
Connectivity Extensions

Handwriting
Support

In Printers

On OS/2
32-bit
Pre-emptable
Portable

Windows 32-Bit
A Long Term API

- Part of OS/2 version 3.0
- Hosted on DOS through libraries
- Toolkits available in 1991
- Extensions to Windows 16-bit for simplest migration

Microsoft Is Focused On Windows

Today:

- Excel
- Word for Windows
- Powerpoint
- Project
- Productivity Pack
- Entertainment Pack

Yes
OK
Steve b

Microsoft Is Focused On Windows

Today:

- Excel
- Word for Windows
- Powerpoint
- Project
- Productivity Pack
- Entertainment Pack

Tommorow:

- Database
- Works
- Mail
- Network Administration
- ... other applications
- Visual BASIC
- C Development Environment

Yes
OK
Steve

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Microsoft Message To Users

"Seeing is Believing"

- Extensive advertising campaign
- Free and low-cost working models
- $17 million campaign for FY '90
- Windows improves productivity
- Buy Windows-capable PCs

Microsoft Message To ISVs

- Develop using the Windows graphics APIs
- Use the SMK/BCL to exploit OS/2 features
- Build network-aware client applications
- Use OS/2 for server applications
- Plan for 32-bit Windows

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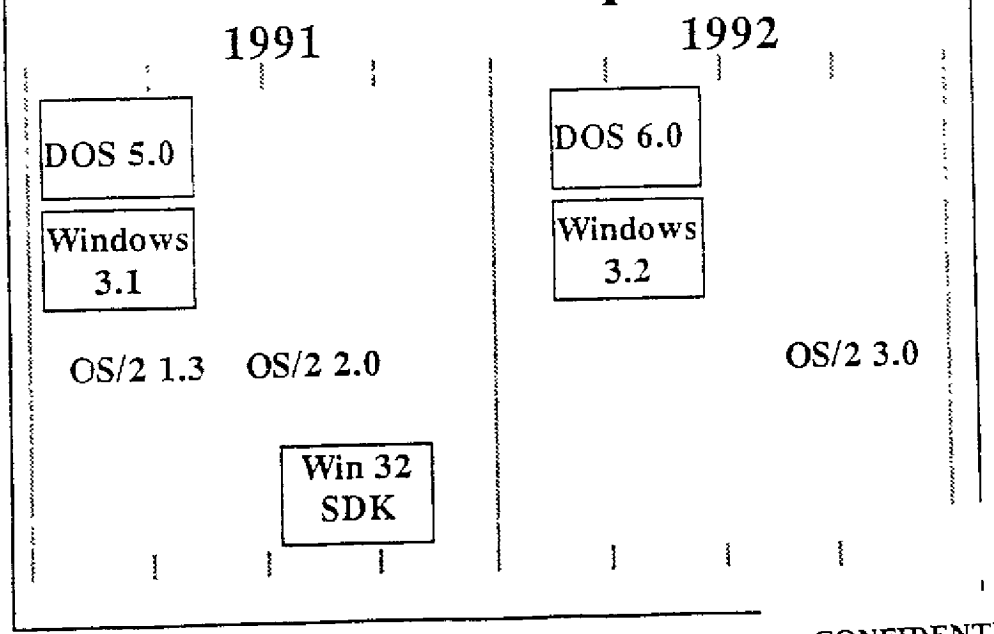
Microsoft Message To MIS

- Windows on DOS or OS/2 provides a standard for corporate computing for client applications
- Most PCs should be networked
- All servers should run OS/2
- High-level application development tools will be available for DOS/Windows or OS/2
- Deploy OS/2 clients where its advanced functionality is required

Roadmap



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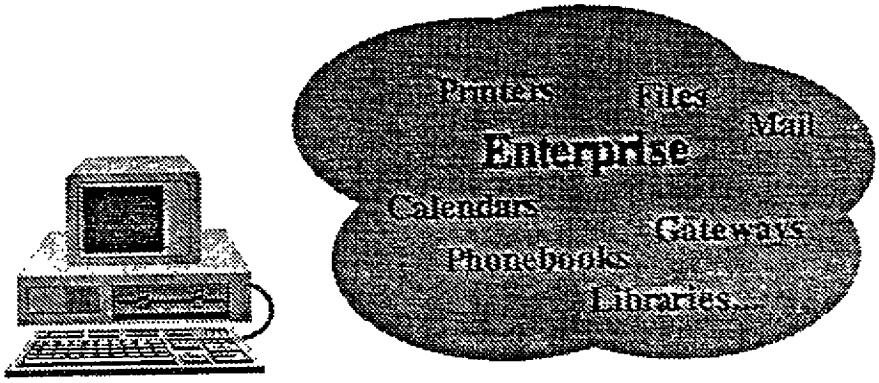
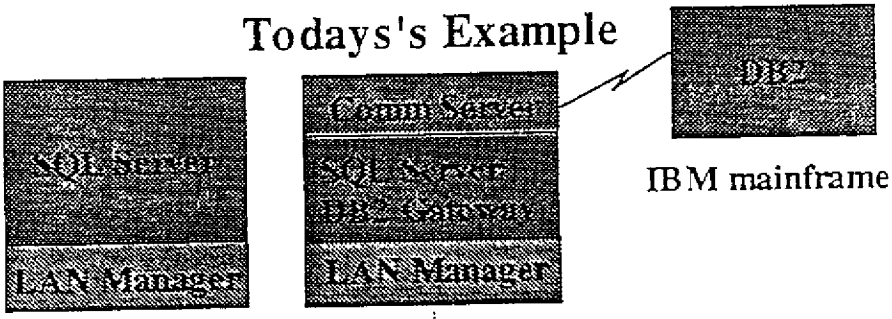
Computer Systems In The '90s



"Information at your fingertips"
More than sharing disks and printers

"Information At Your Fingertips "

Todays's Example



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What Is

"Information At Your Fingertips" ?

- "Personal" computing
- Application integration
- Corporate information online
- Corporate-wide file sharing
- Corporate-wide electronic mail

Graphical User Interface

"Information At Your Fingertips"

- Designed from the *personal* computer perspective
- Requires extensions to systems software
  - New kinds of object manipulation
  - Object oriented implementation

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RBC 001887

Graphical User Interface

"Information At Your Fingertips "

- Advanced file system to provide a rich data store and easy access to information
- Direct access to information on servers and host systems

Why Microsoft?

- Requires integrated approach
  - Operating systems, networking software and facilities, user interface
  - Blurring of network clients, peers, servers
- Needs evangelism of standard interfaces
  - New breed of information/resource sharing: "client-server applications"
  - Mail, data access, etc., "sockets" in OS

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RBC 001888

Requirements For

"Information At Your Fingertips"

- Windows workstations
- OS/2-based servers with LAN Manager
- Efficient administrative tools
- Reliability and security
- Information access transparent to users
- Multiplatform connectivity

LAN Manager v. 2.0 is a giant step forward

OEM Hardware Priorities

- Build Windows and networking-capable machines
- Build high-performance servers (multiprocessor, etc.)
- Provide hardware support for Windows extensions (Audio, Video, Handwriting, CD ROM)
- Consider networking and connectivity in hardware and support offerings

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OEM Software Priorities For The Next 12 Months

- Ship DOS version 5.0
- Bundle Windows version 3.0
- Ship OS/2 1.x, 2.x releases promptly
- LAN Manager: We'll discuss options later

Growth Opportunities

- Business/Office Market
  - Desktop PCs +4 %CAGR*
  - True Portable +44 %CAGR*
  - Servers +37 %CAGR*
  - High-end PCs +41 %CAGR*
- New Technologies
  - Home Market
  - Multimedia
  - Handwriting-based

*Source: Dataquest 1990-1994

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Agenda

◆ Portables, Notebooks...	Brad Silverberg
◆ Desktop Machines	Rich Abel
◆ Power Platforms	Paul Maritz
◆ Networking	Mike Murray
◆ Windows: The next generation	Darryl Rubin
◆ Multimedia	Rob Glaser
◆ Stylus Computers	Pradeep Singh

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RBC 001891

Brad Silverberg
Vice President
Systems

Palmtop, Laptop, Notebook, And Portable PCs

- Fastest growing segment of PC market
- 15% of total market in 1990
- Will become no-compromise mainstream machines

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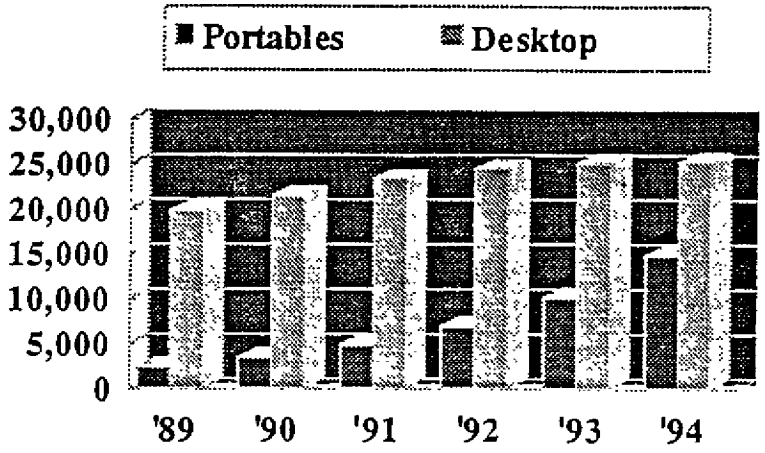
Worldwide Forecast



Source: Dataquest (July 1990)

Technical Challenges

- Size
- Mass storage
- Screen capabilities
- GUI
- Input technologies

Market needs standards

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RBC 001893

Exciting, Innovative New Technologies And Products Are Emerging

- Reduced form factors
- Function integration on the chip
- Power saving chip sets
- Flash EPROM, EEPROM
- Innovative mass storage solutions
- Stylus-based tablet PCs
- Windows to go

Microsoft Is At The Forefront

- Developing standards
- Systems software
- ROM, power management, memory cards, Handwriting
- Complementary hardware products
- Application software

Microsoft is your partner in this market

MS-DOS Version 5.0

- The new standard DOS
- Advanced memory management:
  - Minimal footprint
- Task switching
- Easy to install, update

Best version of DOS ever

MS-DOS Version 5.0

- Significant new utilities, redesigned shell
- Disk- and ROM-based OEM adaptation kits provided
- Full complement of foreign language versions

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MS-DOS Version 5.0

ROM

- Fully ROM executable: instant on
- 15 KB low-memory footprint
- ROM disk emulator
- Multiboot option
- Integrated power management

MS-DOS Version 5.0

Integrated Power Management

- Suspend/resume support in DOS
- DOS "power monitor" provides idle detection
- Extensible architecture supports OEM adaptation
- Extends system battery life

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MS-DOS Version 5.0

Integrated Power Management - Future

- Advanced power management (APM) spec in development
- Ties in with power management chip sets

MS-DOS Version 5.0

Integrated Power Management - Future

- Being developed in concert with chip, BIOS manufacturers
- Provide power-aware device driver interface

MS-DOS Version 5.0

Memory Card Support

- Driving standards on PCMCIA committee
- Member PCMCIA board of directors
- Developing Execute-In-Place (XIP) spec

MS-DOS Version 5.0

Flash File System

- Allows MS-DOS to use Flash EPROM for program/data storage
- Version 1.0 available now
  - Designed for semi-static environment
- Version 2.0 available 1Q '91
  - Provides general purpose disk emulation
  - Supports PCMCIA memory card standard
  - Includes support for EEPROM

Windows For Portables

- Windows To Go!
- Windows v. 3.1 timeframe - 1H '91
  - Power management support
  - ROM Windows

MS BallPoint Mouse

- Clip-on trackball for portables
- Provides easy point and click
- Builds on Microsoft Mouse success
- Windows moving to portables

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Stylus Windows

- Supports:
  - Stylus
  - Integrated displays
  - Handwriting
- Leverages existing industry standards (DOS, Windows)
- Exploits new hardware and software technologies
- Facilitates new uses and users of portables

MS Works

- Ideal all-in-one package for portables
- Bundled with:
  - IBM PS/1, PS/2 Model 25, 30, 50z, and 55sx
  - Toshiba T1000
  - NEC, Packard Bell, Commodore, Mitsubishi
- Possible ROM version

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Conclusions

Palmtop, Laptop, Notebook, and Portables Market

- The fastest growing market
- DOS 5.0 is KEY!
- Microsoft is your partner in creating standards for new technologies
- Windows innovations for the market
- Portables will be mainstream

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Standalone And Client Desktop Machines

Rich Abel
Group Product Manager
Microsoft Windows

The Desktop PC Market Situation

- Largest segment, maturing market
- Typical PC hardware is underutilized
- Nothing new in applications software
- Significant growth in number of LAN connections
- Innovation on other platforms

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The Windows Phenomenon

- Windows version 3.0:
  - The catalyst to re-energize this market
  - The desktop GUI standard

Windows V. 3.0 Launch Recap

- The most successful software product launch ever
- Multisite, video-linked event witnessed by 6000 customers and press
- > 1,000,000 copies in four months!
- Amazing press reception
- +133% increase in retail outlet penetration

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Windows Version 3.0 OEM Participation

Unprecedented machine and device support:

- 304 OEM machines certified compatible in testing program
- 184 printers, displays, and other peripherals certified compatible in testing program

A Very Busy Windows Summer....

- 20-city roadshow with 12,200 attendees
  - 71% end users
  - 29% Retail Sales People (RSPs)
- 9000 additional RSPs trained in the field
- Rollout events throughout the world
- >$6 million investment in launch

Broad Support Throughout the Industry: OEMs

Acer*
Akhter Group
Apricot Computers*
Aquarius Systems Int'l
AST Research*
AT&T*
Atari Corporation*
Austin Bell Computer
Austin Computer Systems*
Commodore Elec. Ltd.*
Compuadd Corporation*
COPAM Electronics, Ltd.
Daewoo Telecom*
DAK Industries
Datatech Enterprises
Epson Corporation*
Fujitsu Ltd.
Gateway 2000
Gold Star Co. Ltd.*
Grid Systems Corp.*
IBM
Intel*
Logitech, Inc.
Memorex Telex N.V.*
Mitac Int'l*
NCR Corp.*
NEC Corp.*
Nokia Data Systems*
Northgate Computer Sys.*
Olivetti SPA*
Optisys AB
Plus & Plus Co. Ltd.
Positive Corp.
Quattro Computer
Research Machines*
Samsung Elec. Corp*
Tandem Computers*
Tandon Corp.*
Tandy Corp.*
Tatung
Tiki-Data A.S.*
Toshiba*
Tulip Computer*
Twinhead Int'l
Ultra-comp
Unisys Corporation*
Viglen Ltd.
Wang Labs Inc.*
Western Digital
Wyse Technology*
Zenith Data Systems*
Zeos Computers

*Windows version 3.0 launch partners

Windows Application Status

- >1000 Windows Applications today
- >90% of Windows v. 2.x applications are now Windows v. 3.0 ready
- >1500 new applications in the next year
- Key ISVs are committed: Lotus, WordPerfect, Ashton-Tate, Borland, Software Publishing...

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Corporate Adoption of Microsoft Windows

- Corporate customers are moving to Windows workstations
  - Recent study of Fortune 500 microcomputers managers found:
    - 71% had either evaluated or were in the process of evaluating Windows v. 3.0
    - 75% report that they plan to adopt "...evaluation of Windows is expanding ...once evaluated, it is usually adopted"

Source: Robertson, Stephens & Company, 7/90

Corporate Adoption Of Microsoft Windows

- Windows is influencing the standard hardware platform purchased
  - Windows v. 3.0 compatibility is a requirement
  - 80386 becoming the minimum new purchase
  - Larger minimum memory configurations

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Corporate Adoption Of Microsoft Windows

- Windows is influencing with whom corporate America does business
  - OEM hardware: Compatible? Bundled? Pre-installed?
  - Dealers: Do they support Windows?
  - Shift to Windows application products

Typical Corporate Wins

Major construction equipment manufacturer

- 4000 workstations running Windows today
- Standard configuration for all new purchases
- No longer supports purchase of PC hardware or software that does not work with Windows

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Typical Corporate Wins

Major pharmaceutical

- 4000 workstations today, 100 new workstations per month
- Mixed Mac and PC shop
- Windows instrumental in shift from 70%-30% Mac to PC ratio last year to 30%-70% this year

Windows: The Desktop GUI Standard

Key motivating factors:

- Consistency
- Multiple application support
- Data integration
- Graphical nature, WYSIWYG
- Ease of use

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Quantifying The Benefits

Benefits of GUI study

- Compare speed, accuracy, productivity, and frustration levels of CUI vs. GUI users
- Both new and experienced users included
- Develop projectable data to justify move to GUI

Quantifying The Benefits

Study results:

- Speed: Both new and experienced GUI users work faster
- Accuracy: New and experienced GUI users make fewer errors
- Productivity:
  - +48% for new GUI users
  - +58% for experienced GUI users
- GUI users experience less frustration

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Quantifying The Benefits

Conclusions:

- GUI provides:
  - Higher output per work hour
  - Higher output per employee
  - Greater return on investment

Marketing Windows: Our Focus

- Windows computing campaign
  - $7 million campaign
  - September to December
  - Objective:
    - Communicate what "Windows computing" is
    - Windows computing = Windows v. 3.0 +Windows applications
  - Objective:
    - Encourage and facilitate trail of Windows and Windows applications

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Marketing Windows: Our Focus

- Key elements
  - Working models
  - Seminars
  - National advertising campaign
  - Training of 5000 outbound sales people
  - Demo stations in over 1000 dealers
  - End user premium for seeing demo
  - Dealer incentives to establish Windows computing section in store

The OEM Opportunity

- Market Windows machines
- Bundle Windows
- Pre-install Windows
- Leverage the Windows community

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DOS V. 5.0/Windows V. 3.0 Synergy

- "Load high" support in 80386 enhanced mode
- More memory for DOS application

Windows V. 3.1 Overview

Objectives:

- On-the-fly outline font scaling
- Performance enhancements
- Usability enhancements
- Network usability enhancements
- Complete compatibility with Windows v. 3.0
- Improved development environment

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Windows V. 3.1 Features

- TrueType
- Enhanced File Manager performance and interface
- Improved Program Manager
- Load-high support
- ROMable

Windows V. 3.1 Features

- Power management
- Fastdisk
- System support for Windows-H
- System enhancements for Multimedia Windows

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Windows V. 3.1 Schedule

- First beta release: 12/90
- Target final release: 4/90
- Early shipper support as done with Windows v. 3.0 release

Summary

- Windows version 3.0 has re-energized the largest segment of the PC market
- Windows has become the new desktop standard
- Leverage this situation to your advantage

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Operating System Software For Power Platforms

Paul Maritz
Vice President
Advanced Operating Systems

What Is A Power Platform?

With "off the shelf" PC components, it is now possible to build systems with:

- Workstation/minicomputer/mainframe performance
- PC pricing
- PC software compatibility

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Power Platform Design Points

Clients	Server
486/33 → 486/50MHZ	486/33 → 486 multi proc.
4 MB → 8 MB+ RAM	8 MB → 32 MB+ RAM
1024 x 760 x 256 color → 1280 x 1024 x 16M color display	
100 MB → 200 MB	200 MB → 1 GB+

The Power Platform Opportunity

- Increased market penetration
  - More hardware power → more application functionality
- New markets - the complete performance range is now in reach of PC compatible architectures
  - "Workstation market" (vs. "SUN")
  - "Server market" (vs. minis, mainframes)

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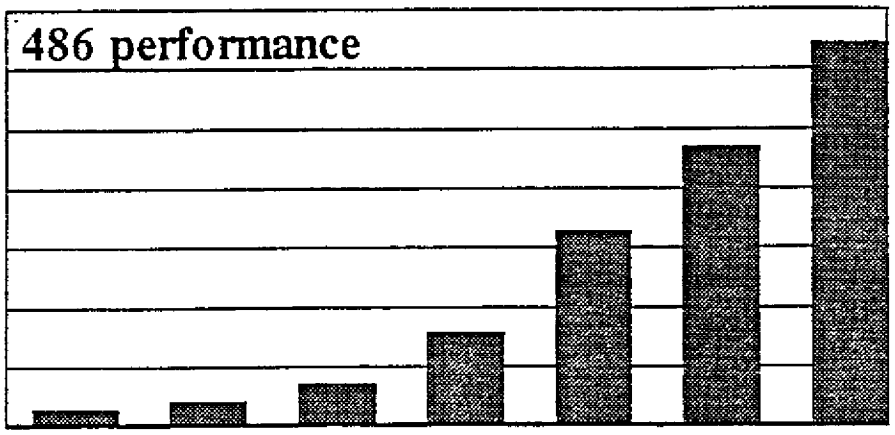
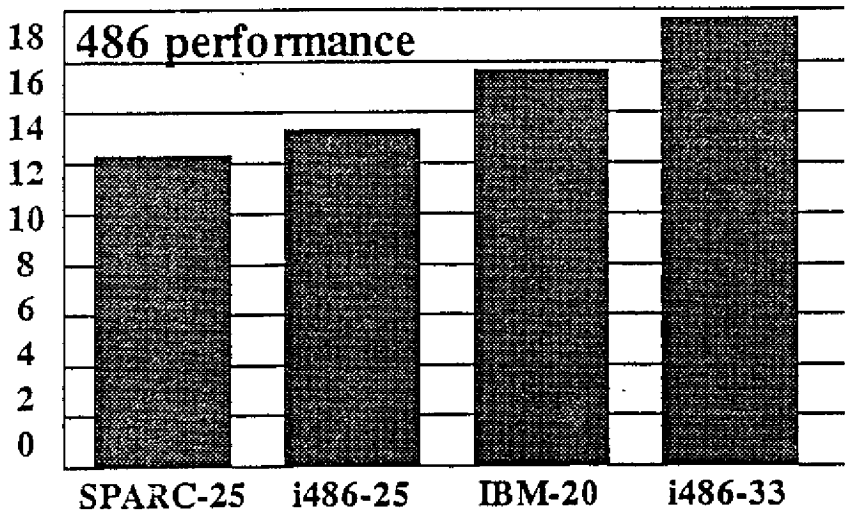
Relative Integer Performance



Integer SPECmarks



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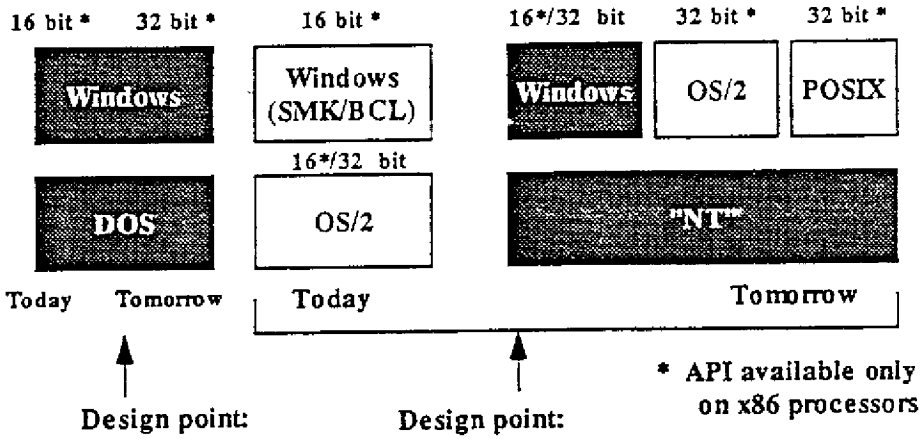
RBC 001917

Microsoft Operating Systems

- Common user interface ("Windows")
- Common application base ("Windows")

Windows with DOS	Windows with "OS/2"
- Optimized for lower-end x86 systems	- Client & server - Secure - Portable (x86 & Others) - Multiprocessor - Multiple APIs - Optimized for higher-end systems ("power platforms")

MS Operating Systems



* API available only on x86 processors

Design point:
- 286, 386SX, 386
  1-2+ MB
- Notebook, laptop, desktop

Design point:
- 386, 486, multiprocessor
  4-8+ MB
- "Power platforms"
  - Desktops
  - Servers

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Key High-End OS Versions

OS/2 v. 1.3	-	80286/80386
OS/2 v. 2.0	-	80386/80486
"NT"	-	80386/80486/other

OS/2 Version 1.3

- Update to OS/2 version 1.21 with improvements for performance on low-memory systems includes:
  - New physical memory manager
  - Perf. improved graphical file manager
  - Perf. improved access to OS/2.INI file
  - Improved screen repaint times

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OS/2 Version 1.3

- No new APIs or DDIs!
- Should work with all existing version 1.21 device drivers and require minimal new adaptation work

Performance Gains To Be Expected (OS/2 v. 1.3 vs. OS/2 v. 1.21)

2 MB system	- Approx 20-30% depending on application (caveat - some applications, e.g., 1-2-3/G, will not run on 2 MB systems)
4-8 MB "power platforms"	- Little change

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SMK - Software Migration Kit

Set of libraries that makes it easy to make an OS/2 Presentation Manager application from a Windows version 3.0 application.

- Advantages:
  - Works with OS/2 version 1.2 and later
  - OS/2 base-specific calls (e.g. threads, file I/O) can be made

SMK - Software Migration Kit

- Schedule for SMK:
  - Beta now
  - Final Q1 '91
- Is being released directly to ISVs
  - No OEM impact

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OS/2 Version 2.0

- 386-specific release of OS/2
  - Full 32-bit API
  - Full compatibility with 16-bit OS/2
  - Demand paging kernel
  - Full MVDM (DOS compatibility) support
  - Scatter/gather device support

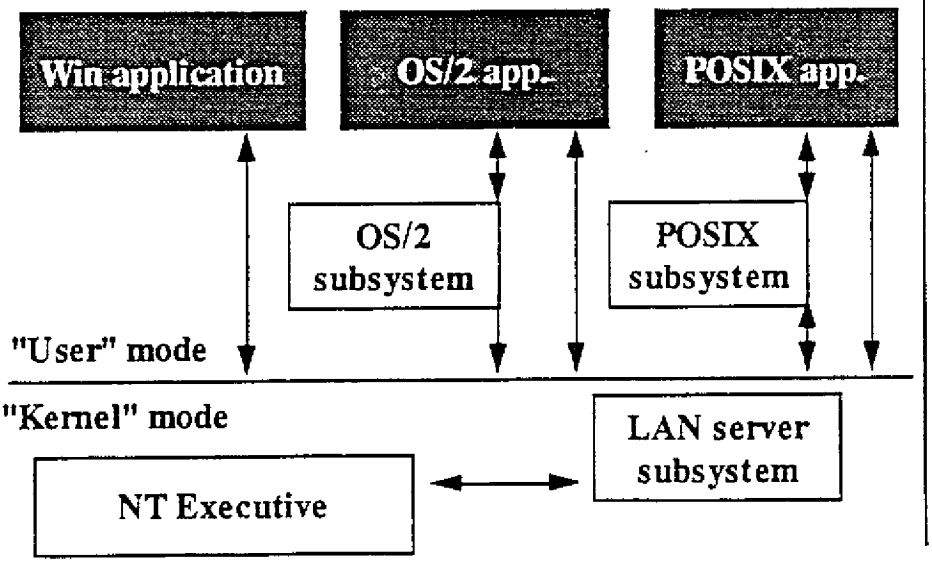
Windows BCL - Windows Binary Compatibility Layer

- OS/2 v. 2.0 is planned to be able to:
  - Detect that application being loaded is a Windows version 3.0 application
  - Link it automatically on load to BCL libraries
  - Application then executes normally
  - From user perspective, application looks like a normal OS/2 application

Windows BCL - Windows Binary Compatibility Layer

- Will be able to handle most Windows v. 3.0 applications; exception will be applications that ship with an application-specific Windows device driver
- In these cases, MS is already working on affected ISVs to help them develop OS/2-equivalent device drivers

NT - New Technology OS



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NT OS/2 Technical Summary

- Extensible design:

  Micro-kernel approach

  - Windows subsystem
  - OS/2 subsystem
  - POSIX subsystem (FIPS 151 compatibility)

NT OS/2 Technical Summary

- Extensible via
  - Subsystems (privileged or not)
  - Loadable device drivers
  - Installable file systems
- Public interfaces between components

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NT OS/2 Technical Summary

- Designed for the distributed environment
  - Security
  - Subsystems can be local or remote
  - Remote procedure call capability
- Support for symmetric multiprocessing
- Security
  - C2 initial certification with migration to B2
  - Distributed security

NT Status

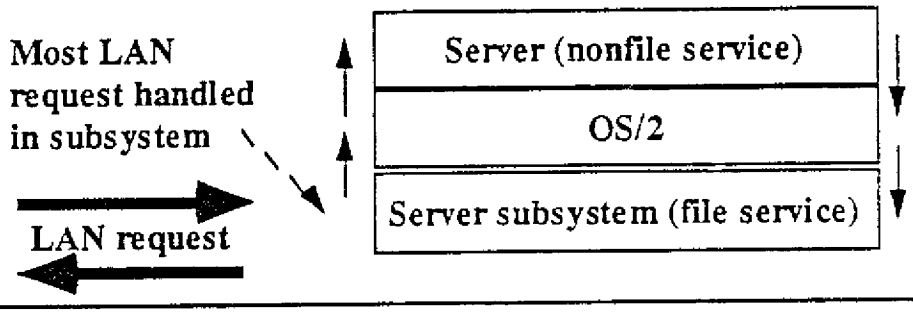
- Basic kernel functions implemented and running on 80386/80486 (primary platform)
- Ported to MIPS (DEC station 5000) and Intel i860 to ensure portability of code

System Software For The Server

Current OS/2:

LM 2.0/80386 - 80386-enhanced release

- High-performance, integrated server, file system, LAN and disk driver subsystem
- Uses 32-bit capability of 80386



Current OS/2

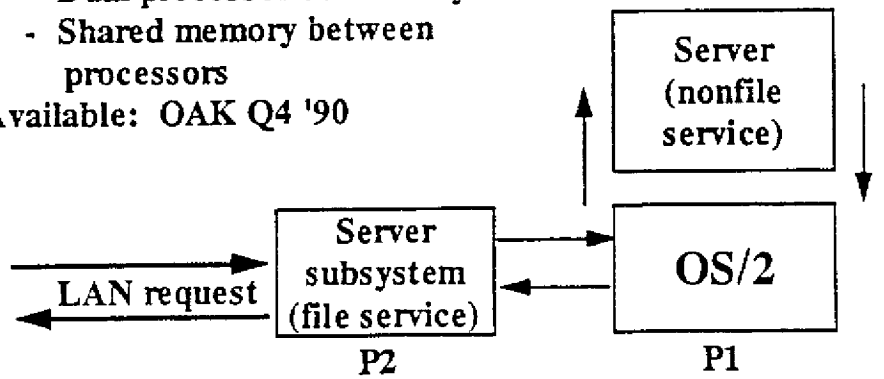
LM 2.0/386 dual processor:

- Offloads integrated server subsystem to second processor

Needs:

- Dual processor 386/486 system
- Shared memory between processors

Available: OAK Q4 '90



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LM & NT

- Integrated, high performance LAN Mgr. server subsystem a basic feature of NT operating system
- Multiprocessor operation basic feature of NT operating system

Will require:

- Fully symmetric design to achieve best performance!
- Capable of handling 1-16 or more processors

UNIX™ Software

- MS and SCO continue relationship on development and marketing of UNIX-based products
- SCO provides:
  - SCO UNIX System V - multiuser support
  - SCO Open Desktop - UNIX based graphical desktop software
- MS and SCO will continue to cooperate on supporting PC hardware standards with system software

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RBC 001927

Key Hardware Opportunities/Issues For Power Platforms

- Clients:
  - Form factor: slots or not?
  - Recommend building both configs

Clients:

- Graphics - with Windows/PM, applications are no longer tied to particular resolution!
  - Resolution: Movement to GUI will accelerate user demand, VRAMs are getting cheap
  - → Recommend 1024 x 768 x 8 minimum
    - 1280 x 1024 x 8 preferred
  - The day of the h/w accelerator is getting close (at last!)
    - MS is working with vendors on drivers

Clients:

- Memory: DRAMs are getting cheap, with Windows and OS/2 breaking the 640K barrier, applications will soak memory up; users will demand more and more

  → Recommend 8 MB standard (on motherboard), expandable to 16 MB

Servers

- Multiprocessor support:

  → make it symmetric!

- Memory:
  - Big disks need big caches!

    → For high-performance server, recommend 16 MB standard

Servers:

- Fault tolerance:
  - Partly a hardware opportunity (e.g., recoverable disk arrays)
  - Partly a software solution (e.g., NT will feature a highly resilient file system)
- Specialized bus architectures
  → required for very high performance

Time Line Summary

Availability	OS/2 v. 1.21	OS/2 v. 1.3	OS/2 v. 2.0	OS/2 v. 3.0
Now	Final OAK		SDK	
Q4 '91			Beta code	
Q1 '91		Final OAK		
Mid '91			Final OAK	SDK/ Beta code
1992				Final OAK

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Windows of Opportunity

MICROSOFT DECEMBER 1990

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Microsoft

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RBC 001933

Windows of Opportunity

MICROSOFT OEM BRIEFING 1990

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Microsoft Windows Marketing

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RBC 001935

Mike Murray
General Manager
Network Business Unit

Microsoft Networking Products

- Product vision
- OEM partnership strategies
- Marketing investment

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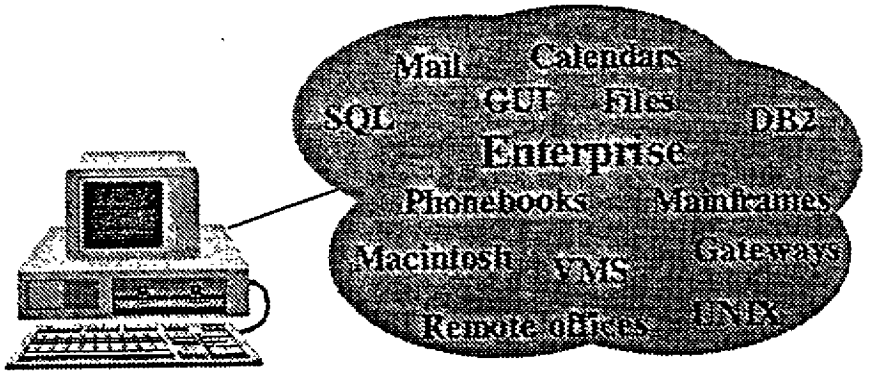
Vision

Information At Your Fingertips

Computer Systems In The '90s



"Information at your fingertips"

Connecting every desktop to the enterprise

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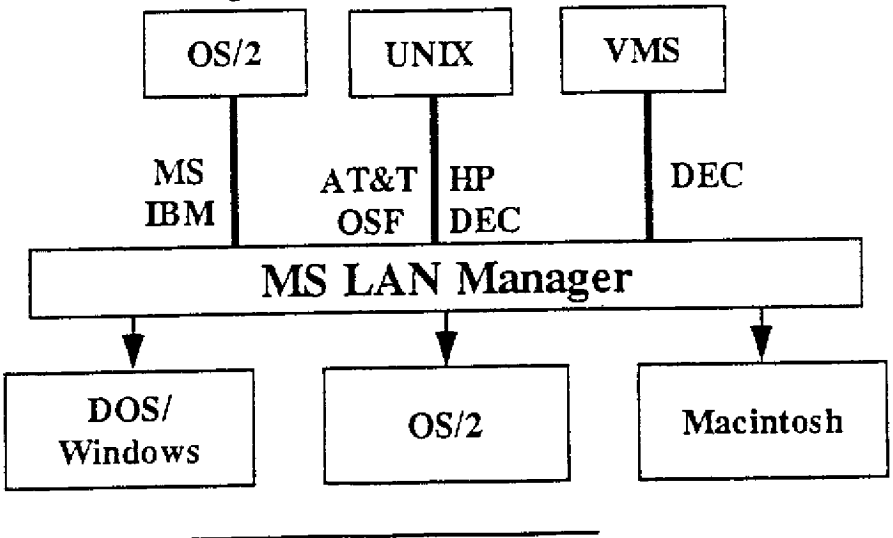
Networking Requirements For "Information At Your Fingertips"

- Enterprise-wide connectivity platform
- Client-server architecture
- System management tools
- Standard development environment

#1 Enterprise-Wide Connectivity Platform

The Strategic Choice of Systems Vendors



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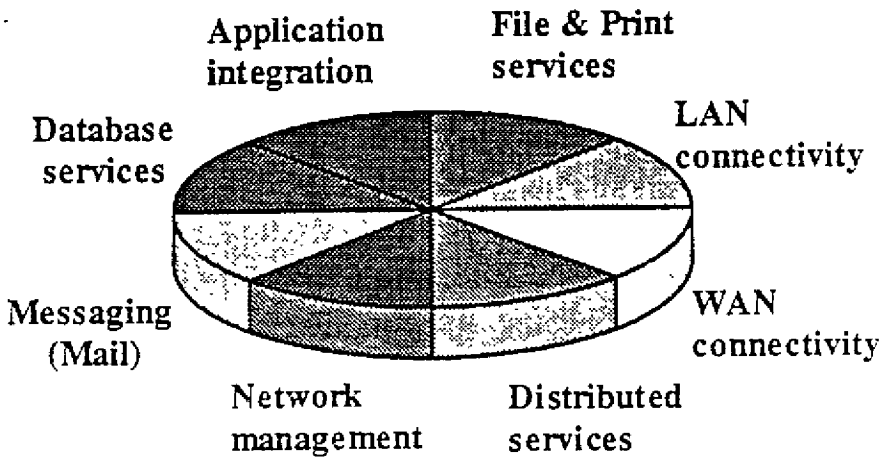
"Complete" Product



LAN Manager + OEMs = Enterprise-Wide Connectivity

- "Open" solution for MIS
- Multivendor, multiplatform industry standard
- Combined efforts yield powerful "complete" product

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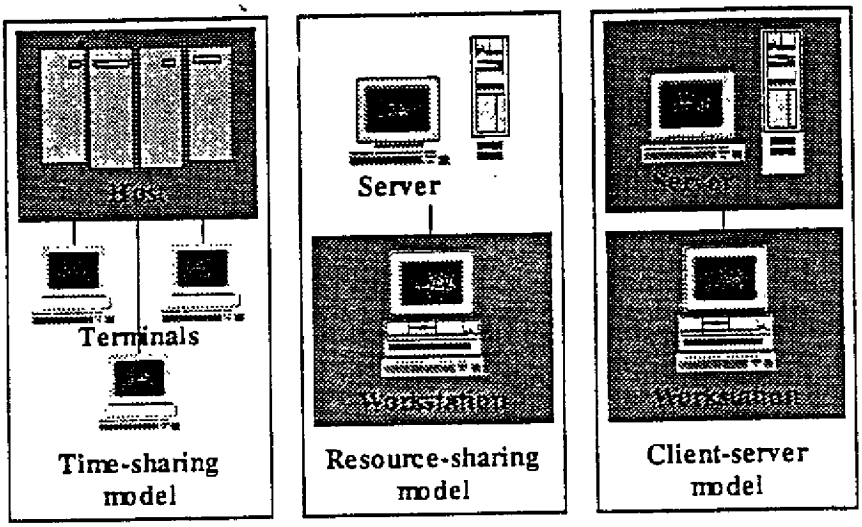
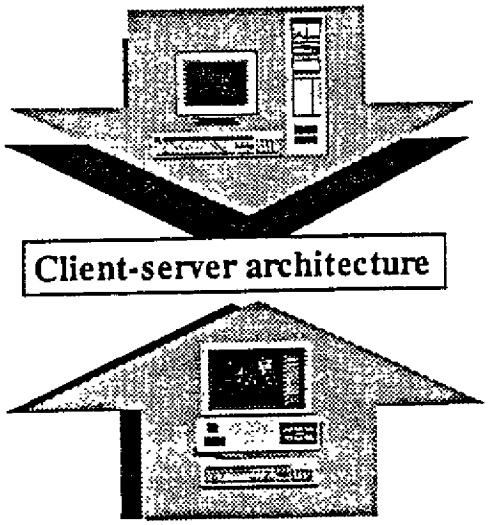
#2 Client-Server Opportunity



Colored area shows where processing occurs

The Client-Server Architecture

Combines the best of both worlds



- Multiuser environment
- Centralized data management
- Sophisticated administration and security

- Standard PC applications
- Graphical, interactive response
- Superior price/performance ratio

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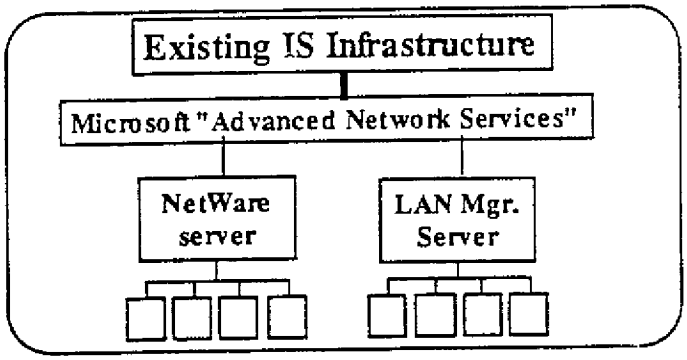
#3 Systems Management

- Huge volume of new users

- Improved usability and systems management = competitive advantage

Competitive Advantage



- Systems management
- Directory service
- Host connectivity
- Multiplatform support
- Mail servers
- SQL Server
- LAN interoperability
- "Complete product"

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#4 Standard Development Environment

Why OS/2 on the server?

What Makes The OS/2 Platform Great For Server Applications

- Efficient multitasking
  - Pre-emptive scheduler
  - Multiple threads/processes
- Memory protection
- Virtual memory

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ISV Developments

- January 1990 - formalized Network ISV program
- Here's a list of what's already shipping...

ISV Products Shipping Now:

Advanced Revelation	Forest and Trees	NEXPERT OBJECT
AM (Applications Manager)	Forms Data Dictionary	Object/1
CAPTURE	Guru	PC/FOCUS for OS/2
Choreographer	Forest and Trees	Prof. Pack SQL Server
Connectivity Pak	Forms Data Dictionary	SQL BASIC Library
Database Gateway	Imara System	SQL Commander for Windows
dBSQL	IMACS:MIDAK	SQL Link for Framework III
dBSQL-C	JAM	SQL Server Toolkit for
dBSQL-IV	JAM/DBi	Presentation Manager
Designers Visual SQL	KnowledgeMan/2	SQL Server Toolkit
EASEL/2	Kofax Image Processing	for Windows
Easy SQR	Lotus DataLens Driver	SQL SoftLink
FileShare 2.0	Mezzanine 2.0	SQLFILE System
SQR	Superbase 4	System Architect

Only Microsoft Has The Four Keys

- ✓ Enterprise-wide connectivity platforms
- ✓ Client-server architecture
- ✓ Systems management tools
- ✓ Standard development environment

Network Business Unit Product Update

- ◆ LAN Manager v. 2.0 (shipping!)
- ◆ Comm Server v. 1.0 (shipping!)
- ◆ SQL Server v. 1.1 (shipping!)
- ◆ LAN Manager for UNIX

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LAN Manager Version 2.0: A Giant Step Forward

- Multiplatform connectivity
- Windows v. 3.0 and LAN Manager v. 2.0 present a simpler user view
- Pioneering PC concepts of domains, replication, and assistant administrators
- Provides fault tolerance, secure systems
- With OS/2, strong platform for information sharing
- Optimized for 80386/80486, multiple processors

Microsoft Server-Based Applications

- SQL Server
  - High-performance database engine
  - 27 shipping front ends including specific support from Lotus
  - Highest rated database product: *Infoworld, Software Digest*
- Comm Server
  - Full IBM host connectivity

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LAN Manager For UNIX

- Extends LAN Manager onto UNIX, VMS, and other server platforms
- ISV support: Sybase, Informix, RTI, Oracle
- Standards: OSF, X/Open

Upcoming Technologies

- Mac and NetWare support
- System management tools
- GUI interface, install
- Directory services
- X.400 mail/messaging

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Our Business Strategy

- Partner with "Heterogeneous Systems Vendors" to create broad enterprise solutions
- Encourage all "Homogeneous (x86) Systems Vendors" to adapt OS/2 for their servers and to support Microsoft's networking products
- Create market awareness, trial, and purchase of Microsoft's networking products through aggressive marketing and selective complementary distribution

Complementary Distribution

Microsoft will selectively authorize and train 1,000 Network Specialists worldwide in FY '91 to sell, service, and support our networking products.

Strategies For Partnership

Two Types of Microsoft Network OEMs

- Heterogeneous Systems Vendors - PCs, servers workstations, RISC-based minis, etc.
- Homogeneous Systems Vendors - x86 (PCs and "servers")

Two OEM Strategies

- Adapt MS networking products with OEM license
- Adapt OS/2 for servers, but support MS retail distributed network products

Strategy Matrix For OEMs

	Heterogeneous Systems Vendor	Homogeneous Systems Vendor
License Technology From MS	Multiplatform Account Control HW Value Add Solution Sell	Bundled solution Unique positioning HW Value Add
Support Retail	Broad availability Leveraged mktg. Lower R&D cost	Broad availability Leveraged mktg. Lower R&D cost

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Case Study #1

- Systems vendor with OEM license for Microsoft LAN Manager
- Customer: Major accounting and consulting firm
- Network: 2500 PCs, 27 mid-size computers, 2 hosts
- Vendor used LAN Manager as key ingredient for heterogeneous connectivity
- Leveraged their value-added services

Case Study #2

- PC vendor choosing to support retail LAN Manager
- Quickly adapted OS/2 v. 1.2 to their PC server hardware
- Worked with Microsoft to leverage new Network Specialist channel
- Result: Initial leadership position as preferred PC server vendor

Marketing Investment

- $16 million worldwide budget
- Product launch seminars - Fall 1990
  - 13 U.S. cities, 300-500 per city
- Ongoing seminars - January 1991
  - 100s of Network Specialist seminars
- Corporate Account Reps/Systems Engineers

Joint PR, Ads -- Goals

- Goal: Leverage the momentum

  Industry-wide acceptance;
  Customer success stories

- Goal: Banish confusion

  All LAN Manager core code is the same
  Position OEM solutions as value added

MS plans OEM ads in Jan '91 (U.S. books)

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Innovative LAN Manager Packaging

- Novell - Traditional server-based pricing
  - Disadvantage: Multiple SKUs, advanced features only available on most expensive versions
- Microsoft - New user-based model
  - Advantage: Simplicity and affordability

  $995 - LAN Manager (includes 5 "free" users)

  $995 - 10-User Add Pak

  $5495 - Unlimited User Add Pak

People Investment

Microsoft is hiring 650 new employees in the areas of development, sales, inside support, and field support.

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Being Fair To OEM & Network Specialists

- Rules of engagement:
  - *MS sales force presents technology*
  - *Steps aside for customer to select preferred vendor*

Want To Get In On The Action?

Work with your account manager for:

- Evaluation kits
- PSS help
- Notice of promos, ads, collateral, seminars
- Attend Network breakout session

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Conclusion

- All desktops will be connected
- Networking will reach beyond file and print sharing
- Our vision compels us to succeed
- We invite you to be a partner through direct OEM license or support of the retail network products

Microsoft Windows: The Next Generation

Darryl Rubin
Vice President
Applications Strategy

Microsoft Windows Version 3.0 Solves A Lot Of Problems

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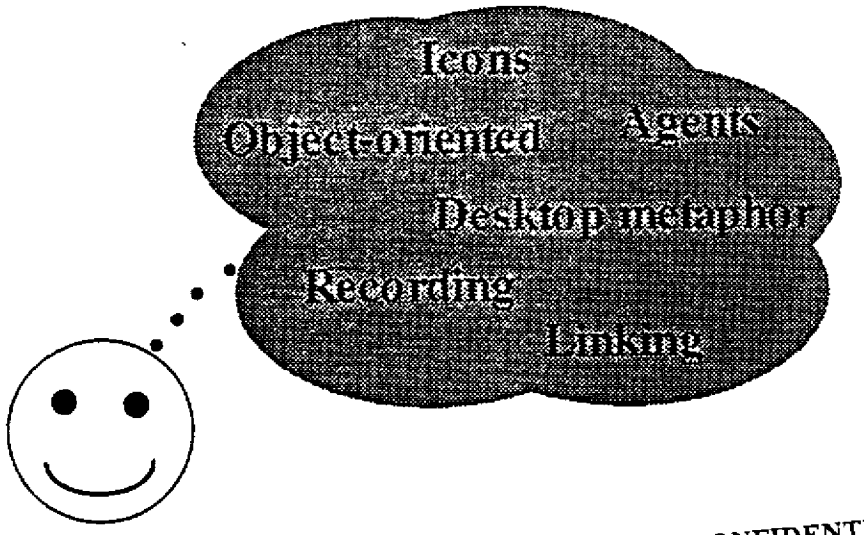
New Challenges Are Emerging

What I Want



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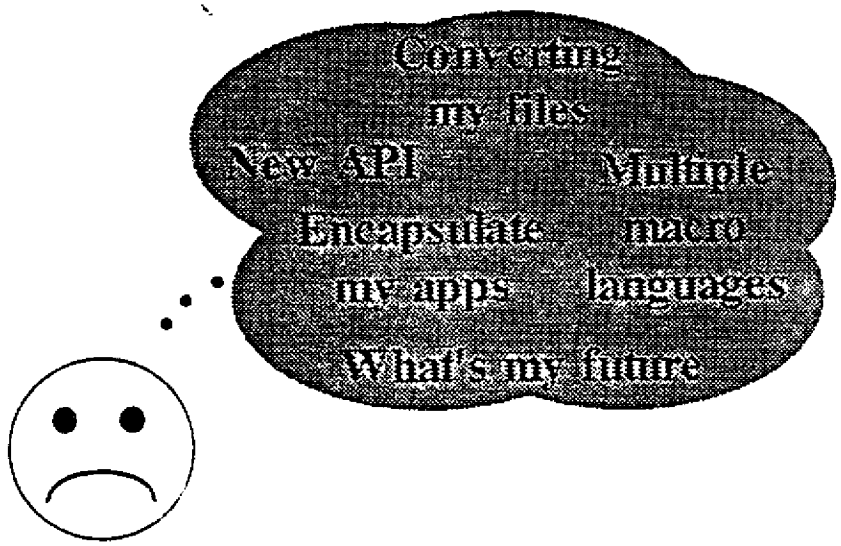
What I Don't Want



Microsoft Windows: The Next Generation

Will Attack These

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RBC 001956

GUI Software: The Bad News

- Richer document types mean redundancy among applications
- Big disks/big networks make things hard to find and file
- Multiple shells is a shell game
- Multiple macro languages is a Tower of Babel

User Scenarios For The 1990s

- Create a complex document, where:
  - The document is compound
  - Draws content from other documents
  - Company standards dictate its structure
- Then file, update, print, distribute, and automate with macros

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User Scenarios For The 1990s

Product Plan Document Example

Content	Drawn from
Feature list, illustration	Product Spec
Competitive matrix	Marketing Plan
ROI spreadsheet	Original to Product Plan
Development timeline	Product Schedule

Tasks: find, move, copy, edit, print, distribute

User Scenarios For The 1990s

Automating product plan tasks:

- Show standard outline with task-specific help
- Locate and browse example product plans based on criteria

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User Scenarios For The 1990s

Automating product plan tasks:

- Copy product overview and feature list; keep it current
- Extract schedule data, format via chart app, and insert
- Prompt for routing list and mail out review copies

Microsoft Windows: The Next Generation

- Compound documents
- Data storage
- Object-oriented shell
- External macro programming

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Compound Documents

"Create or insert any kind of information in situ, transparently calling on the needed application component"

Compound Documents

- DDE, hotlinking
- Linking and embedding (L&E)
- In situ L&E via object-oriented application framework

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Compound Documents

Linking and embedding:

- Built on top of existing DDE and Clipboard mechanism
- Defines UI conventions based on cut/paste/paste-link

Compound Documents

Linking and embedding:

- L&E subroutine library simplifies implementation
- Embedding, hot/cold linking, hyperlinking, annotation
- Presentation data is cached transparently

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Data Storage

"File and retrieve information descriptively, without regard to file boundaries, dependencies, or location"

Data Storage

Object-oriented extensions to file system (OOFS):

- Understands types and attributes of stored objects
- Supports rich indexing and content/attribute querying

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Data Storage

Object-oriented extensions to file system (OOFS):

- Provides access to object via object-supplied behavior
- Link maintenance and change notification (locally and across net)

Data Storage

How it helps application integration:

- Make any object persistent and shareable
- Uniform way to find and enumerate all kinds of objects
- Standard protocols for load, save, display, edit, print
- Dynamic class loading/binding

Object-Oriented Shell

"View and manipulate any information in a consistent way"

Object-Oriented Shell

- Operations: Move, copy, link, delete, properties
- Views: List, icon, outline (tree), categorization

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Object-Oriented Shell

- Standard tools: file, print, mail folders
- Evolving to SDI model with automatic persistence

External Macro Programming

"Shared language, tools, and standard command and data interfaces for cross-application macro programming"

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External Macro Programming

- External macro language (object-oriented) and development tools
- Command objects and information data types (IDTs)
- Visual macro recorder
- Visual programming tools

User Scenarios Revisited

- Macro for distributing a product plan:
  - Present recipients' dialogs
  - Present cover memo template
  - Mail memo to recipients with link to plan document
- Recipients can browse plan by clicking on link or drag to folder for file/print

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Design Rules We Live By

- Compatibility with existing apps and data:
  - Doesn't require data import/bridging
  - Doesn't replace existing windowing API
  - Interoperates with existing DDE usage

Design Rules We Live By

- Leverage system services as they appear:
  - Security
  - Multiprocessing
  - Transactions/recovery
  - Distributed filing/directory service
  - Archive/restore

Integration Perspective

Key Technology	UNIX	MS Windows: The Next Generation
Data exchange	I/O streams, filters	DDE, linking and embedding
Storage	Hierarchical file system	OOFS, indexing and querying
User interface	Shell conventions	OO shell, copy/move/link
Programmability	Shell language	External macro language

Multimedia Spans Market Segments

Home — Early adopters
- ◆ Makes PC more approachable
- ◆ New role for PCs in homes

Education — All levels, especially K-12
- ◆ Makes learning fun
- ◆ Increases comprehension

Business — Large and small businesses
- ◆ Training & presentations
- ◆ Business information
- ◆ Interpersonal communications

How Will The Multimedia Market Develop?

MS:
- Creating standard systems software (multimedia Windows)

MS & ISVs:
- Make great tools that enable multimedia development
- Create and ship compelling MM applications

OEMs:
- Develop integrated multimedia & systems
- Educate consumers and customers about potentials of MM

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Multimedia Computing: Making The PC More Personal

Rob Glaser
General Manager
Multimedia Systems Group

Why Multimedia Will Broaden The PC Market

Multimedia Technologies		Make a PC:
Digital audio		- More engaging
Near photo-quality images	→	- Aesthetically appealing
Animation/motion video		- Interesting
Optical media		- Informative

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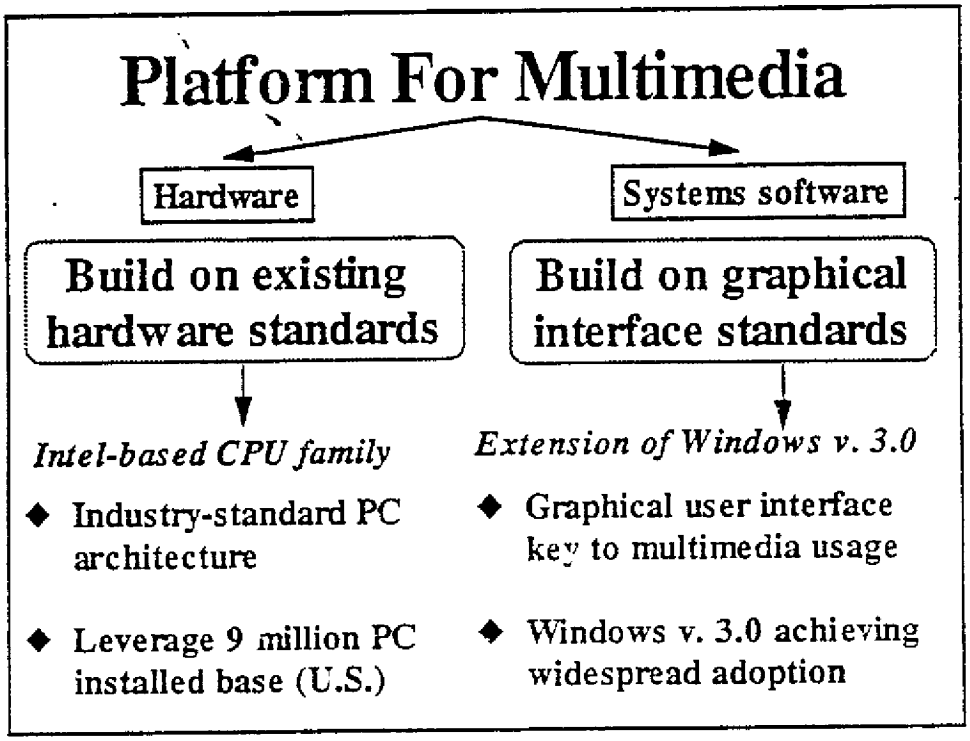
Platform For Multimedia



Base Multimedia PC

Foundation

- Fast 80286 or 80386 CPU
- At least 2 MB of RAM, 30 MB hard drive
- VGA (VGA+ supported)

Plus

- Audio (ADC/DAC, synthesizer, analog mixing)
- CD ROM drive
- Additional I/O (MIDI, joystick)

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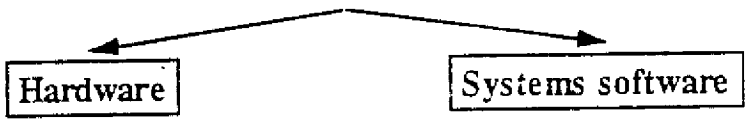
Multimedia For Windows

Windows version 3.0 plus...

Audio	◆ Waveform playback ◆ Redbook playback ◆ MIDI playback sequencer
Image and Animation	◆ Enhanced image display ◆ Animation playback
Device Control	◆ Videodisc, VCR
Data Control	◆ Resource management ◆ High-resolution timer services

Building Support For Platform



OEM Commitment...

- Design hardware for manufacturing next year
- Long-term commitment to market development & education

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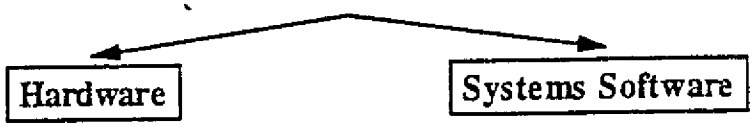
Building Support For Platform



Microsoft Commitment...

- $12 million+ investment in FY '91
- Systems software and tool development well underway
- Supporting multimedia title development
- Working closely with OEMs to ensure worldwide standards

Companies Providing Microsoft Windows-Based Multimedia Tools

- Asymetrix
- Autodesk
- Authorware
- Corel Systems
- Electronic Arts
- Farallon Computing
- Fulcrum Technologies
- Knowledgeset
- MacroMind
- MediaGenic/ZSoft
- Meridian Data
- Micrografx
- Microsoft
- O.W.L.

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Industry Commitment

- Information
  - Attica Cybernetics, McGraw Hill, Britannica, Xiphias
- Productivity
  - Microsoft, Software Publishing T/Maker, Micrometer
- Education
  - Maxis, Sphere, Inc.
- Entertainment
  - Sierra Online, ICOM, Maxis

The Multimedia PC -- The Time Is Now

- Developers conference Nov. 28/29, Fairmont Hotel, San Jose, CA
- ISV titles delivered 1st half of 1990
- System launch beginning 1st half of 1990

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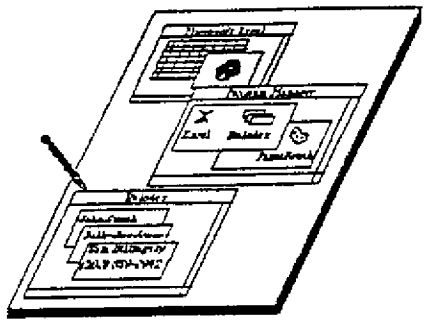
Emerging Opportunities
Stylus Computers

The new platform



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Marketing Overview

- Stylus - Why important?
- Market opportunity
- Leveraging existing operating systems
- Platform vision
- Schedule
- OEM opportunities
- Next steps

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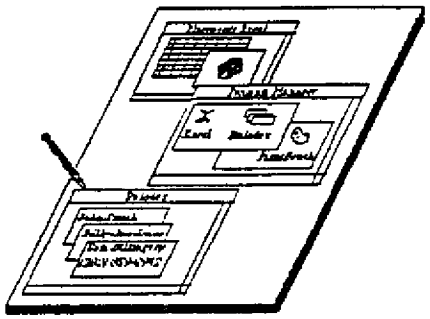
Emerging Opportunities
Stylus Computers

The new platform



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Marketing Overview

- Stylus - Why important?
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Stylus - Wonderful Strengths

- Graphic data:
  - Special symbols, drawing
- Portability
- Stand-up use
- Nonobtrusive nature
- Direct manipulation
- Familiar interface

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But, Significant Problems Too..

- Handwriting recognition is hard
- Tactile response is poor
- Screen readability is poor
- Durability ...
- Consumer expectations are high

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Market Opportunity

Take the high road

- **Low road**
  - Consumer market daytimer, e.g., Sony Palmtop
  - Special purpose device
  - Low price point
- **High road**
  - Personal computing functionality
  - General purpose device
  - Premium price point (relative to portables)

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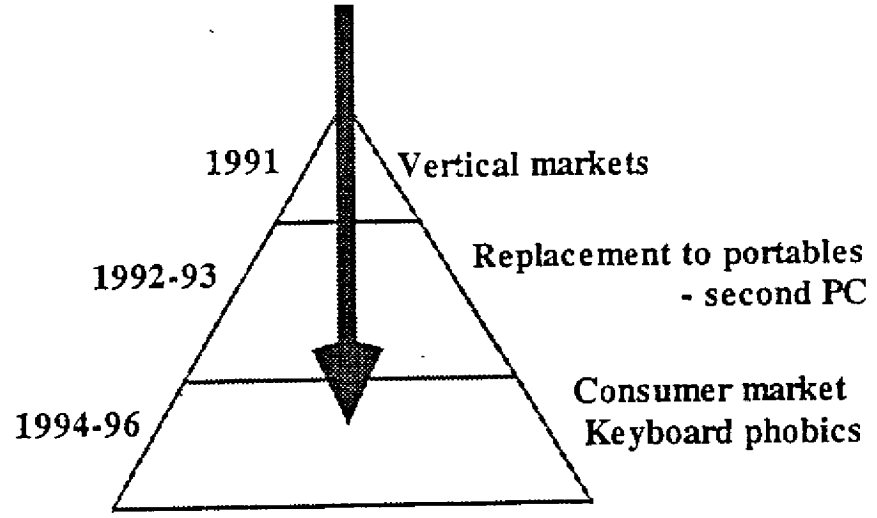
Market Emergence



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What Are Key Challenges?

- Handwriting is slow, unreliable for data entry
  - Keyboard still required
- Need high-performance hardware - $$$
  - Portable PLUS functionality
- Need UI that capitalizes on pen
  - Build gestures into Windows

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Key User Needs

- Diversity of application software
  - Leverage Windows apps momentum
- Information exchange with desktop
  - No unreliable format converters - use the same application
- Pens as part of mainstream computing
  - Pens will be:
    - Input devices for desktops
  - Consistent long-term strategy for notepad, desktop, and servers

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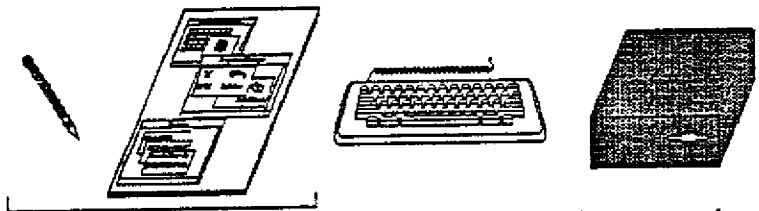
Platform Vision

The next generation portable...



...using Stylus Windows

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So, What Is Stylus Windows?

- An optimal platform for stylus-specific applications
- Runs all Windows applications
- Handwriting recognition is modular and replaceable
- An OEM product
- A small step for Windows; a giant step for computing

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Schedule

Key Events:

OEM briefing	October 1, 1990
Ship SDK	Q1 1991
Ship Stylus Windows v. 1.0	Q3 1991

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OEM Opportunities

Substantial room to differentiate:

- Technology
- Markets
- Time to market
- Price

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How Can You Find Out More?

- Detailed presentation handouts
- Overview document
- API document
- Videotape of the demo

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Next Steps

- Attend Stylus Windows breakout session
- Get videotape and documentation from your account manager
- Come partner with us. . . .

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