75 Macintosh Advantages

Why Macintosh computers are better than PCs running Windows

Apple Computer, Inc.

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INTRODUCTION

When Apple introduced the Macintosh computer in 1984, the nature of the personal computing experience changed forever. The first personal computer to offer a graphical user interface, the Macintosh was the "computer for the rest of us"—a system that transformed computing from a specialized task performed only by the technological elite into an everyday experience for everyone from preschoolers to grandparents.

Graphical user interfaces are the norm today, but Apple's personal computer offerings continue to lead the competition. More specifically, the same flair for discovering innovative ways to make complex technology simpler and more widely accessible that powered the creation of the original Macintosh model continues to drive our directions. Also, the fact that Apple remains the only major personal computer company to craft both the hardware and the operating system software affords many unique competitive advantages—advantages that are realized in the form of technology designed expressly to make computer users more productive and computer use more enjoyable.

Six key areas of advantage

Apple's head start, history of innovation, focus on the user, and integration of hardware and software give the Macintosh an advantage in six key areas: ease of use, multimedia, Internet technology, power, compatibility, and value.

Ease of use. The most notable quality of Macintosh technology has always been the capacity to provide sophisticated features in simple ways. That's because the Macintosh was designed with ease of use in mind. And Macintosh computers continue to offer unmatched ease-of-use features in every aspect of computing. In addition, the Macintosh hardware and software integration makes it easier to add peripherals, use applications, troubleshoot problems, and maintain your computer.

Multimedia. Multimedia continues to grow in importance for computer users, and the Macintosh remains far ahead of the competition in this area. While PC manufacturers are still struggling to get CD-ROMs to load properly, Apple is moving Macintosh ahead to such advanced features as three-dimensional graphics, video capture and playback, speech recognition and synthesis, and even virtual reality.

Internet technology. Our advantages in ease of use and multimedia play directly into the Internet. Apple has long supported Internet connection standards and is committed to making all of our products "Internet ready," by ensuring that our systems ship with everything—both hardware and software—needed for Internet access. And our OS-level multimedia technologies—collectively known as the QuickTime Media Layer (QTML)—are now widely accepted Internet standards.

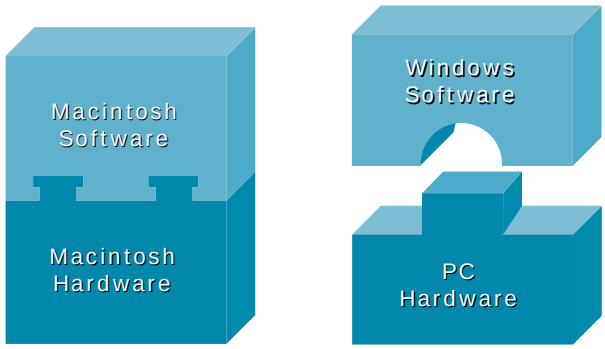
Power. Apple's Power Macintosh and PowerBook computers offer the high-performance advantage of the RISC-based PowerPC processor. Recent benchmark results indicate that PowerPC processors continue to outperform their counterparts on the Intel side for a variety of tasks and at a variety of levels. And this Macintosh performance advantage is augmented by powerful built-in hardware features, powerful system software capabilities, and powerful 32-bit applications.

Compatibility. Macintosh computers fit easily into multivendor environments, and coexist particularly well with PCs running MS-DOS and Windows. All current Macintosh computers can read from and write to MS-DOS and Windows disks, using the built-in Apple SuperDrive floppy disk drive and compatibility software that's built right into the Mac OS. For users who require PC performance, we also offer PC Compatibility Cards that can make any Macintosh with a PCI slot the functional equivalent of a PC—while still retaining all of the capabilities and characteristics of a Macintosh.

Value. When you buy a Macintosh computer, you receive the best computing value on the market. Macintosh computers include features not found on other computers, and at no extra charge. In addition, Macintosh computers are competitively priced with leading IBM-compatible computers on the market. With Macintosh, you get the best reliability, support, and service in the computer industry. The exceptional quality of Apple design and construction, as well as our use of the highest-quality components, also make Macintosh the clear choice for value.

Apple provides true hardware and software integration

Because Apple makes both the hardware and the operating system, the two work together easily—so when a change is made at the hardware level, the software automatically recognizes it and acts accordingly. The advantage in hardware and software integration is evident in a number of areas, from basic system setup and configuration to connecting and working with peripherals to networking. In contrast, Microsoft develops Windows and many different manufacturers produce the hardware systems that run Windows. So the software and hardware don't always work well together.



Macintosh hardware and software work together (left). With Windows, the user often has to make sure all of the pieces work together (right).

The bottom line

The remainder of this document examines "The Macintosh Advantage"—this platform's advantage in ease of use, multimedia, Internet technology, power, compatibility, and value—in more detail. In our research, we have tried to use the best hardware and software that the PC world has to offer, and we relied heavily on the documentation and support materials provided to users for the various Windows products.

We think that even a quick review of this paper will show why you should buy a Macintosh rather than a PC running Windows—any version of Windows. The bottom line is that a Macintosh can help you do exactly what you want to do with a computer faster, easier, and more enjoyably.

EASE-OF-USE ADVANTAGES

1 The Macintosh computer's true "Plug and Play" makes it easy to add hardware cards.

"Intel Corp. CEO Andy Grove admitted today that Plug and Play technology hasn't lived up to all of its promise...Even Windows NT, which Intel is loading on all of its in-house servers and desktops, does not fully support Plug and Play and will not until at least next year."

—PC Week, August 27, 1996

Since 1987, Macintosh users have had the ability to install a hardware card and use it in minutes, not hours. Often referred to as "True Plug and Play," this feature enables Macintosh users to avoid the tedious delays and configuration issues that often arise with the addition of new cards in PCs.

PC users, however, have long struggled with hardware/software integration. Windows 95 promised Plug and Play capability to those who spend extra money to upgrade their system BIOS chips and hardware cards to those that support Plug and Play. Unfortunately, after spending large amounts of time and money upgrading their computers to use Plug and Play or, in many cases, buying new computers, many Windows 95 users have found that Plug and Play often does not work properly. In fact, Microsoft admitted its inability to provide true Plug and Play by abandoning it altogether in Windows NT 4.0, leaving NT users to continue to wrestle with DIP switches, IRQ and DMA channel conflicts, and complex driver issues.

2 The Macintosh computer's built-in SCSI port makes it easy to add peripherals.

Today, many users want to be able to connect peripheral devices, such as scanners, external hard disk drives, and recordable CD-ROM drives. Macintosh computers allow access to such devices through the use of the built-in SCSI port, a standard feature on Macintosh computers for more than 10 years. The SCSI interface allows a user to simply connect a device such as a scanner to the Macintosh and use it within minutes.

The average PC does not come with a SCSI port, so the PC user is left to struggle to add devices by installing complex SCSI cards. And in some cases, such as with Windows NT, the SCSI scanner that you have will probably not work, since Windows NT supports only one brand of scanner as of this writing.

Compare what it takes to add an additional hard disk to a Macintosh computer with the steps required to add an additional hard disk to a PC running Windows 95. (The hard disk selected for the Windows 95 installation was a standard "Designed for Windows 95" Western Digital 850MB hard disk.)

Adding a hard disk drive

The Easy Way: Macintosh

1. Turn off the Macintosh.
2. Plug the hard disk into the SCSI port and into a power source.
3. Turn on the hard disk and the Macintosh.

The Hard Way: Windows 95

1. Turn off the computer. Disconnect the power cord.
2. Open the computer. Keep yourself grounded to avoid damaging components.
3. Set the new hard disk's jumpers to "slave" setting. (Note: This setting will vary depending on the manufacturer of the disk.)
4. Locate an open IDE adapter port on the controller card or motherboard. If necessary, add a dual-headed IDE connector ribbon so that the original hard disk and the new hard disk can share the same port.
5. Plug the new hard disk into the IDE connector ribbon. (Make sure the red strip on the ribbon is closest to the power supply port on the hard disk.)
6. Locate an unused power connector. If necessary, buy a Y adapter for your computer's power connector.
7. Plug the power connector into the power supply port on the new hard disk.
8. Attach the faceplate, LED light, and, if necessary, mounting hardware, to the new hard disk. Then mount it in an open bay.
9. Replace the cover of the computer and plug in the power cord. Turn on the computer.
10. Before the "Starting Windows 95" message appears, enter the System Setup screen.
11. Press tab until the IDE Hard Disk (slave) entry is highlighted. Configure the new hard disk as a slave. Enter the number of cylinders, heads, and sectors the new hard disk will require. (Note: The number of steps involved in this procedure will depend on your computer's BIOS chip.)
12. Exit System Setup.
13. Restart the computer.
14. Select MS-DOS from the Start Programs menu.
15. At the C: prompt, type "FDISK" and press Enter.
16. Indicate the number of partitions you would like to create on the new hard disk. (Note: This procedure requires you to change the current fixed disk, to select the number of partitions for the new disk, and to select the size of each partition.)
17. Exit MS-DOS and restart Windows.
18. Select MS-DOS from the Start Programs menu.
19. At the C: prompt, execute the FORMAT command for all partitions you created.
20. When the hard disk has been formatted, exit MS-DOS.
21. Double-click "My Computer." An icon for your new hard disk should appear in the window.

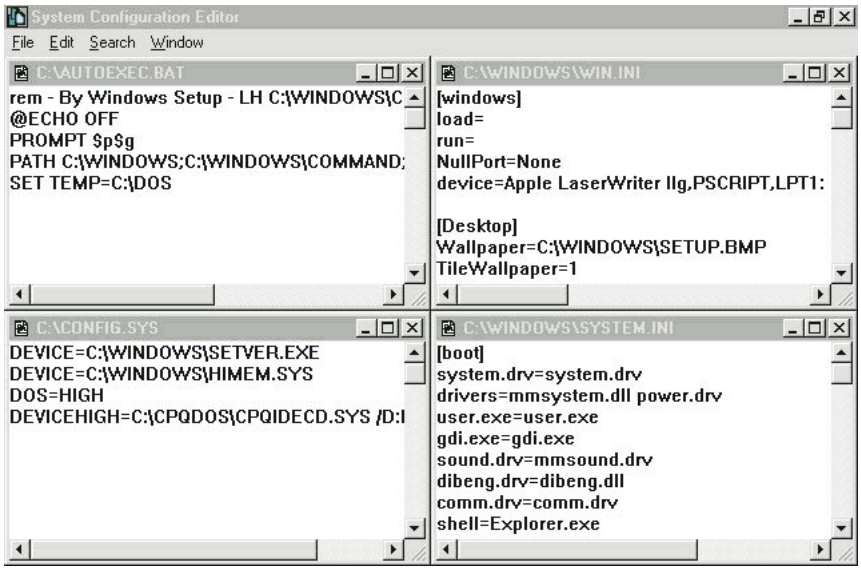
3 Windows has a plethora of drivers—16-bit, 32-bit, and Windows 95- and NT-specific drivers—making driver management difficult.

Macintosh users have never had to understand the complexities of hardware "drivers." Macintosh users don't need to spend their time and money worrying about what drivers they have on their computers.

On the other hand, Windows users cannot avoid having to know a lot about drivers—for example, what a "real mode" or a "protected mode" driver is. Finding the correct drivers, eliminating old drivers, avoiding driver conflicts, and finding hardware that will work with the right version of Windows is the bane of every Windows user. For example, most games for the PC are DOS-based and therefore use 16-bit real mode drivers to drive sound cards, CD-ROM drives, and so on. If that user upgrades to Windows NT, that game and its drivers for the sound card and the CD-ROM drive will not work, since Windows NT supports no "real mode" drivers at all. Even the Windows 95 version of Plug and Play isn't always foolproof when it comes to drivers, sometimes leaving the choice of what to do with a cryptic driver up to the user. There are Windows 95 drivers that will not work with Windows NT, and vice versa.

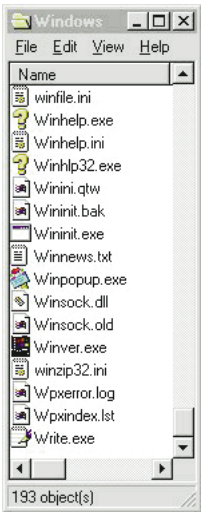
4 DOS and its command-line interface still lurk in Windows, but the Mac OS has always had a graphical user interface.

Wasn't DOS supposed to go away when Windows 95 was released? But text files such as SYSTEM.INI and WIN.INI still exist in Windows 95 and Windows NT in many cases. In addition to these complex files, Windows 95 and Windows NT now add two Registry files, SYSTEM.DAT and USER.DAT. If your PC is not running correctly, you might need to edit some or all of these files in a text editor or the special Registry editor. A mistake here could mean that these text-based files might be irreparably damaged, making the PC unusable.



Because of its true graphical user interface, you will never have to type obscure system commands on a Macintosh. Macintosh computers have never had a command-line interface; instead, the designers saw a graphical user interface as a way to control all aspects of the computer.

5 Windows is loaded with "mystery" files such as DLLs, INFs, and SYSs.



If you have ever used a PC, you are familiar with strange filenames such as NDDEAPI.DLL, MSCDEX.EXE, BOOTSECT.DAT, CONFIG.SYS, AWUPD.INF, VFINTD.386, and ODBCINST.INI. Do these sound like files left over from DOS? Well, they are. Many users hoped (in vain) that Windows 95 and Windows NT would eliminate these kinds of files in the "8.3" name format in favor of names that are more recognizable, especially since the icons for these files do not always provide a clue as to where they might need to go or what they might do.

Since the Mac OS has always supported long filenames, there are no "ghosts" from the past—unlike Windows, which cannot escape its DOS legacy. A Mac OS system-level file has a more user-friendly name, such as "Startup Disk," "Sound Manager," or "Extensions Manager Preferences." Macintosh icons also follow a pattern. Extensions look like puzzle pieces and belong in the Extensions folder, Control Panels have a "control knob" and belong in the Control Panels folder, and so on.

6 Macintosh computers offer easier, more versatile networking.

Every Macintosh since 1984 has included easy-to-use, built-in networking. You can connect a network of multiple Macintosh computers and printers together in just a few minutes. Every Macintosh includes simple and inexpensive LocalTalk networking, and all high-end Macintosh computers include industry-standard Ethernet, a claim most PCs cannot make.

Macintosh computers can be connected to virtually any computer network. Novell NetWare and Windows NT Server software support the Macintosh platform and are often popular methods for sharing information between Macintosh computers and PCs. Apple also provides a variety of options for connecting with networks supporting IBM's SNA, Digital Equipment Corporation's DECnet, Novell's IPX, and the TCP/IP and OSI protocols.

All currently shipping Macintosh PowerBook computers come with a built-in infrared (IR) transceiver. With this transceiver, two PowerBook computers can share files with each other without any cables. Like all of the other advanced features on the Macintosh, IR technology is integrated seamlessly into the operating system. You can even attach a third-party infrared pod to a desktop Macintosh computer to tie your PowerBook directly into that machine's local area network.

Networking in the Windows world can be both difficult and confusing. For example, in Windows 95, you might see the "Network Neighborhood" icon even if you aren't connected to a network. Also, though Windows 95 and Windows NT include networking capability, there is no guarantee that the computer has the hardware to support this, nor is it capable of being set up for networking as quickly as the Macintosh. The superior design of the Mac OS allows dynamic allocation of addresses on both a LocalTalk network and an Ethernet network, a time-saving feature unavailable to Windows users, who must usually rely on network administrators to configure and run their networks. And Macintosh users don't have to labor through using standard Windows PC networking protocols such as IPX/SPX or NetBUEI.

Connecting a computer to an Ethernet network

The Easy Way: Macintosh	The Hard Way: Windows 95
1. Plug the network cable into the Ethernet connector on the back of the Macintosh. 2. Open the Network Control Panel, and select EtherTalk. When prompted, click OK. 3. Select the Chooser from the Apple menu. Highlight the network resource to which you wish to connect.	1. Shut off and unplug the computer. 2. Open the cover of the computer. Keep yourself grounded to avoid damaging components. 3. Install a Plug and Play network adapter card in an appropriate expansion slot. 4. Plug the Ethernet cable into the port on the adapter card. 5. Replace the cover of the computer. Plug in the computer and turn it on. 6. Windows 95 should identify your new hardware and load the appropriate driver. Be sure that your Windows 95 CD-ROM is in the CD-ROM drive. (If you installed the floppy disk version of Windows 95, the system will prompt you to insert the appropriate floppy disks.) 7. Restart the computer. Depending on your adapter and network, you may need to check for resource settings conflicts such as IRQ and I/O address. 8. You will be prompted to enter or verify the network identity of your computer, and the workgroup to which you are attached. (Note: Computer and workgroup names are limited to 15 characters, and cannot include spaces.) 9. Verify your Primary Network Logon. 10. Double-click Network Neighborhood. Select the network resource to which you wish to connect.

Note: For the purposes of this comparison, we installed a 3Com EtherLink III Plug and Play adapter into a Compaq Presario 7170 (90-MHz Pentium processor), and connected the system to an existing two-system Ethernet network, using Windows 95 built-in networking software. When we attempted the installation with other Plug and Play computers, we met with widely varying results. These included IRQ, I/O, and COM port conflicts, as well as the need to install adapter drivers from manufacturer-supplied disks, rather than built-in Windows 95 drivers.

7 Macintosh computers offer more flexible monitor support.

Adding another monitor to your Macintosh is easy. Many users want to increase their on-screen workspace by adding extra monitors, to handle larger documents such as spreadsheets or desktop publishing pages. Because of the superior design of the Macintosh, the operating system will automatically treat the multiple displays as a single, contiguous workspace, so you can drag objects from one screen to another, or even work across screens on the same document. All you have to do on the Macintosh is add a video card for each extra monitor. The Mac OS will automatically recognize the extra video cards.

Standard PCs aren't designed to support more than one monitor at a time, so adding a second monitor is much more expensive and complex. Windows users need to buy a special video card that costs hundreds of dollars more than standard cards. And since these PC cards may not support the monitor you already have, you might also have to buy two new monitors.

Macintosh computers can change resolutions and color depth on the fly. With a PC running Windows 3.1 or Windows 95, you must restart Windows in order to change the number of colors displayed.

8 The GeoPort serial port included on every Macintosh today offers better integrated modem and telephony features than a PC modem.

The Macintosh GeoPort is a sophisticated serial port that can be programmed in software for a variety of uses. When used in conjunction with the GeoPort Telecom Adapter, a GeoPort can become a software-upgradable modem. Instead of throwing away a modem every time a faster speed becomes available, GeoPort users can simply download the latest free upgrade software from Apple and be running at a faster speed in minutes.

But a GeoPort doesn't have to be just a modem. It can be a digital answering machine, a fax machine, a full-duplex speakerphone with audio recording capability, or a high-tech switchboard for incoming and outgoing calls, all on a single line. And since the GeoPort can be used with AppleScript, many telephony applications can be automated for use with the GeoPort.

Unfortunately for PC users, no card that supports all the features of the GeoPort is available—at any cost.

9 The Mac OS is easier to install than Windows.

Fewer steps are needed to install the Mac OS. One of the leading guides to Windows NT 4.0 lists more than 30 steps for installing the OS, in sharp contrast to the "single-button" installation of the Mac OS.

The Mac OS will make all the installation decisions for you. The Mac OS has a smart installer that will install only the files needed for your particular computer. In the case of Windows, particularly Windows NT, the installation process includes several steps involving dialog boxes that require you to make installation decisions. In each case, the wrong decision could be disastrous—requiring you to start the installation all over again or, in some cases, to reinstall all applications.

Installing the OS onto a formatted hard disk drive

The Easy Way: Mac OS 7.6

1. Start up the Macintosh from the Mac OS 7.6 CD.
2. Double-click the Installer icon.
3. Select Item 1—this will launch SimpleText in order to read the "Read Me" file for information on installation. Quit SimpleText when done.
4. Select Item 2—this will launch the Drive Setup application, the hard disk driver updater.
5. Select Hard Disk to update, then click Update Driver. Quit Drive Setup when done.
6. Select Item 3—choose the hard disk drive on which to install the OS. Click OK.
7. Select Item 4—installation. The computer will automatically fix any existing hard disk directory problems and will launch a licensing agreement. Click I Agree.
8. The Mac OS will install, automatically choosing the exact configuration for the appropriate Macintosh model.
9. Click Restart to start up the Macintosh.

The Hard Way: Windows NT Workstation 4.0

1. Check Microsoft Windows NT Hardware Compatibility List on Microsoft's web site to make sure all hardware is supported by Windows NT 4.0. If not supported, installation cannot proceed.
2. Have all drivers and config settings available for all installed third-party hardware in system in case NT cannot autodetect all devices and manual installation of the drivers becomes necessary.
3. Insert NT Startup floppy disk 1 and start up the computer. Press the Enter key to install NT. Wait until the installer asks for NT Startup floppy disk 2.
4. Insert NT Startup floppy disk 2. Press the Enter key.
5. The installer will prompt you to choose between autodetection of mass storage devices (press the Enter key) or not (press the S key). Choose autodetection in this case. Wait until the installer asks for NT Startup floppy disk 3 .
6. Insert Windows NT Startup floppy disk 3. Press the Enter key.
7. The installer will attempt to detect mass storage devices. The installer will repeat step #5 and give you the option to run again if not all devices were detected.
8. Read Windows NT license and press F8 to agree.
9. The installer will check other hardware components and list what it detected. You are left to modify it manually if the installer failed to detect a device. Press the Enter key.
10. The installer lists hard disks detected and their status. If a drive partition needs to be reformatted, you must decide between file system formats, either FAT or NTFS. (Chose "C" to create a partition and format it for NTFS.)
11. Choose the directory in which to install NT (default is C:\WINNT). Press the Enter key.
12. Choose whether or not to run an exhaustive hard disk test. Press the escape key to skip this exhaustive test. After the basic test, NT will copy setup files to the hard disk.
13. When NT finishes copying files, eject all floppy disks and CDs. Press the Enter key to restart the computer.
14. The computer will restart. NT will do a file system conversion from FAT to NTFS if this option was chosen in step #10. The computer will reboot itself again when done.
15. Insert the Windows NT CD-ROM. Click OK.
16. Select the CD-ROM drive letter with the correct directory of installation files. (Default in this case is D:\I386.) Click OK.
17. Windows NT Wizard loads. The first step in Wizard will ask for user information. Click Next.

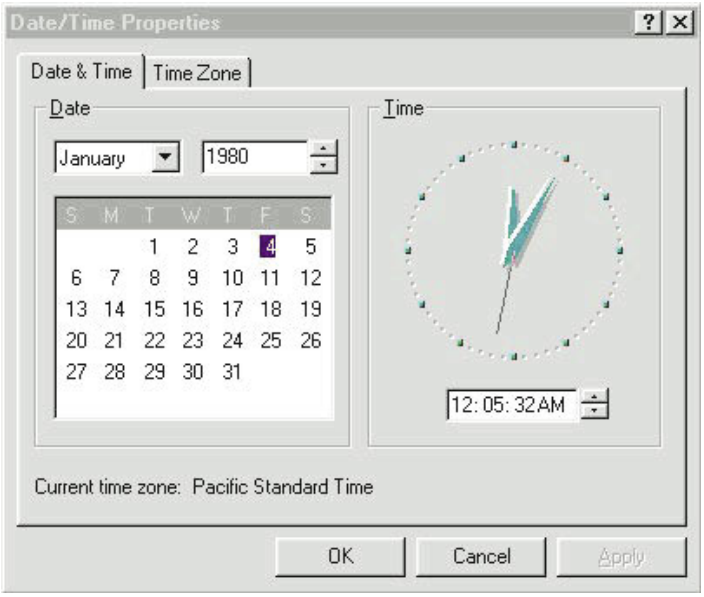
The Easy Way: Mac OS 7.6	The Hard Way: Windows NT Workstation 4.0
	18. Select type of installation—Typical, Portable, Compact, or Custom. (Choose Typical.) Click Next. 19. Fill in user name and organization. Click Next.† 20. Fill in Windows NT registration number. Click Next.† 21. Name the computer. Click Next.† 22. Fill in the Administrator password. Click Next.† 23. Choose option of creating an Emergency Repair Disk to boot system in case of problems. (Choose to create the disk.) Click Next. 24. NT component installation options: Choose to install common components or choose from list of possible components. Choose common components. Click Next. 25. Network options selection. Click Next. Choose to be included on network or not. If on network, then choose a wired connection option or a remote access option. Choose no network connection. Click Next.† 26. Finishing setup. Click Next. 27. Adjust Date and Time. Click Next.† 28. Choose display setup options, including color depth, screen resolution, screen font size, and monitor refresh frequency rate. These must be tested for each configuration or video might not work. Click OK. Windows NT will copy more config files to the hard disk and configure them.† 29. If the option to create an Emergency Repair Disk was selected in step #23, it will be created now. Insert a blank, formatted floppy disk into the floppy disk drive. Click OK. 30. Installation complete. Remove all floppy disks and CDs, then click Restart Computer.

† Marked items are not configured during Mac OS installation and may need to be configured later in separate steps.

10 Macintosh computers are ready for the year 2000.

The year 2000 is rapidly approaching, and its impending arrival has computer industry observers bracing for what is being heralded as a potential disaster of phenomenal proportions.

The problem is that many of today's computer systems operate under a date format that uses two digits to represent and store the year. Simple, right? But a hypothetical comparison based on that format would falsely claim that the year 2000 (or "00") falls before the year 1999 (or "99"). If the computer's system clock reads the date incorrectly, then all mission-critical applications, all file time stamping, and even scheduled backups are predicted to fail.



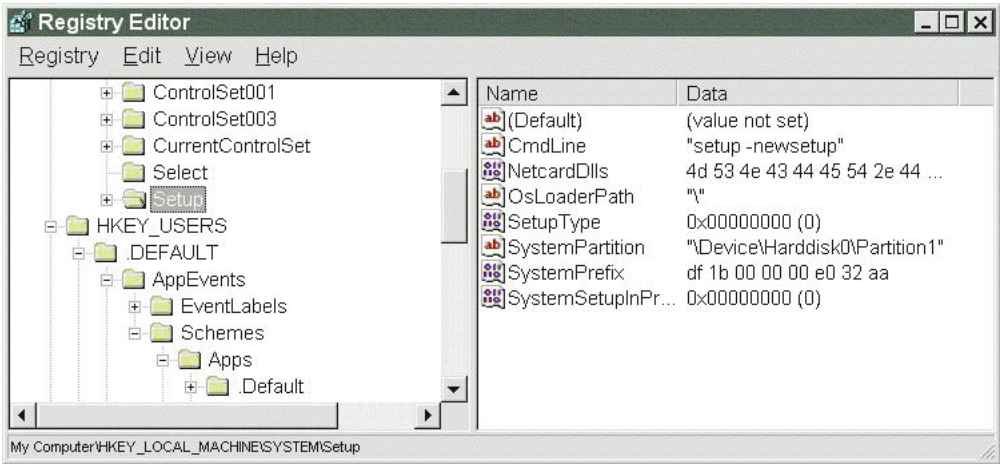
What a few minutes past midnight on January 1, 2000, looks like on a Compaq Presario 7170 running Windows 95.

But this problem will not afflict the Macintosh. Since its introduction, the Macintosh has had the ability to correctly handle the year 2000 and beyond. The Macintosh operating system uses a 32-bit value to store seconds, meaning that the Macintosh clock will work correctly until the year 2040.

Many PCs, on the other hand, cannot correctly handle dates in the year 2000 because of the BIOS version in the PC hardware. To check your PC, set the date to December 31, 1999, at 11:58:00 P.M. Quit Windows, then turn off the computer. Wait at least three minutes and start up the computer. Check the time. If it displays anything except January 1, 2000, at a few minutes past midnight, then your computer will not handle the year 2000. If this is the case, then perhaps you should replace your PC with a Macintosh now!

11 The complexity of the Windows 95 and Windows NT Registries is a disadvantage compared with the Mac OS.

Windows 95 and Windows NT both contain a "Registry," a complex text file that keeps track of OS settings. A single character in the wrong place in the Registry file can render Windows unusable.



Because of Registry incompatibilities, upgrading Windows is not as easy as upgrading the Mac OS. It is not possible to upgrade an existing hard disk from Windows 95 to Windows NT because of differences in the Registry file. You must reformat your hard disk, install at least DOS and the needed peripheral drivers (such as CD-ROM drivers), install Windows NT, and then reinstall all your files—a time-consuming process.

Resolving system-level problems on a Macintosh is easy when compared with editing the Windows Registry. End users calling for PC support are frequently directed to edit their system files to resolve problems. Macintosh users asking for support will typically be told to throw away a file (such as a preferences file) or change settings from within a graphical user interface, while Windows users could be directed to modify the Registry by typing or modifying text or, even worse, numerical data. The chances for erroneous entries are much greater in the Windows case. The complexity of the Registry also means that a damaged Registry or one that needs to be edited can become a user's worst nightmare, often resulting in the need to reinstall Windows, or worse, reformat the hard disk and reinstall all the files—if you have copies of them!

12 Every Macintosh can start up from a bootable CD-ROM.

Starting up from a CD-ROM makes the installation process easier. Although you can't normally boot from a Windows NT 4.0 CD-ROM,* installing—and reinstalling—Windows NT is a complex process that requires a CD-ROM drive. While a CD-ROM is not required to install Windows 95, the sheer number of floppy disks involved in a floppy disk install makes a CD-ROM installation the best choice. But if you have a blank hard disk or have to reformat it, how do you start up your computer? On a Macintosh, you simply boot off the CD-ROM and install the OS. On the PC, you have to at least install DOS and all the necessary drivers before you can install Windows.

For a Mac OS user, being able to start up from a CD-ROM makes troubleshooting hard disk problems easier. For a PC user, especially one who is facing a virus that has attacked the hard disk, there are fewer options and many more steps involved in fixing the problem because of the inability to simply boot from a CD-ROM.

**When equipped with a special BIOS chip that supports the El Torito CD-ROM boot specification, it may be possible to boot from a CD-ROM on a PC. However, this chip is rarely included on desktop PCs. In addition, the bootable CD-ROM must also contain the necessary disk images if the CD-ROM is acting as a floppy disk replacement.*

13 Macintosh files stay linked to the applications that created them; with Windows, this isn't always the case.

Windows 95

Double-clicking a Macintosh document icon automatically opens the application that created it—no matter where the application resides on your hard disk (or connected server) and no matter what the file is called. With Windows 95, it's not that simple. The association between applications and files is still governed by pathnames and the three-character filename extension. That means that double-clicking a document sometimes opens the application that created it and sometimes doesn't. For example, when you move an application on a PC running Windows 95 to a different directory—or even rename the directory it's in—and then try to open a document created by that application, you will usually receive an error message stating that Windows cannot find the application.

Here's an example of what's required for the simple task of moving an application and a file that the application created, then opening that file.

Moving an application and a file

The Easy Way: Macintosh	The Hard Way: Windows 95
1. Move a folder (containing an application and its documents) to another location. 2. Double-click a file in that folder.	1. Launch Windows Explorer. 2. Move a folder (containing an application and its documents) to another location. 3. Double-click a document in that folder. You will usually receive an error message, the application will not launch, and the file will not open. 4. Click the Start button. 5. Select Programs and click the application you moved. 6. Windows 95 may launch a different application. 7. Click Start, select Settings, then click Taskbar. 8. Click the Start Programs menu tab. 9. Click the Add button. 10. Type the new pathname for the application that was moved. 11. Click Next. 12. Overwrite your old shortcut and click Finish. 13. Click OK. 14. Click the Start Programs menu, and launch the application. Then open the file.

Fragile links between applications and data files can become particularly annoying when you purchase a new hard disk drive and want to move applications to the new hard disk to take advantage of its storage space and speed. Imagine going through the process just described for all of your applications.

Problems encountered when moving applications to a new hard disk on a PC running Windows 95

Windows application	Here's what happens when you double-click a file created by that application...	Here's what happens when you try to launch that application through the Start Programs menu...
Microsoft Word 6.0	Searches. Message: "Program Not Found." Click OK. Message: "Cannot find file C:\pathname\WINWORD.EXE." Click OK. Click Locate, then browse through My Computer to find the folder that contains the application. Select it and click OK to launch the application.	Searches. Message: "Problems with Shortcut. The item 'WINWORD.EXE' that this shortcut refers to has been changed or moved. The nearest match, based on size, date, and type, is 'C:\pathname\PowerPoint.EXE.' Do you want this shortcut to point to this item?"
Microsoft Word 7.0	Searches. Message: "Program Not Found." Click OK. Message: "Cannot find file C:\pathname\WINWORD.EXE." Click OK. Click Locate, then browse through My Computer to find the folder that contains the application. Select it and click OK to launch the application.	Searches. Opens the MSTXTCNV.INI configuration file in Notepad, and changes the Word icon in the Start Programs menu to a Notepad icon.
Microsoft Access 2.0	Searches. Message: "C:\ACCESS\system.mda isn't a valid path."	Searches. Message: "C:\ACCESS\system.mda isn't a valid path."
Microsoft Works 3.0	Searches. Message: "OLE registration database incorrect. Run Setup. Continue anyway?"	Searches. Message: "Problems with Shortcut. The item 'MSWORKS.EXE' that this shortcut refers to has been changed or moved. The nearest match, based on size, date, and type, is 'C:\pathname\MSDRAW.EXE.' Do you want this shortcut to point to this item?"
Microsoft Excel 5.0	Searches. Message: "Program Not Found." Click OK. Message: "Cannot find file C:\pathname\EXCEL.EXE." Click OK. Click Locate, then browse through My Computer to find the folder that contains the application. Select it and click OK to launch the application.	Searches. Message: "Problems with Shortcut. The item 'EXCEL.EXE' that this shortcut refers to has been changed or moved. The nearest match, based on size, date, and type, is 'C:\pathname\PowerPoint.EXE.' Do you want this shortcut to point to this item?"

Windows application	Here's what happens when you double-click a file created by that application...	Here's what happens when you try to launch that application through the Start Programs menu...
Microsoft Excel 7.0	Searches. Message: "Program Not Found." Click OK. Message: "Cannot find file C:\pathname\EXCEL.EXE." Click OK. Click Locate, then browse through My Computer to find the folder that contains the application. Select it and click OK to launch the application.	Searches. Message: "Can't open Cue Cards. You must provide a Cue Cards file name in the command line." The Excel icon in the Start Programs menu is changed to a Cue Cards icon.
WinFAX Pro 4.0	Searches. Message: "Cannot create phone book files. Check that the drive still has free space. If on a LAN ensure that you have write rights." (Note: This message delivered in response to double-clicking the WinFAX application. WinFAX does not generate document files per se.)	Searches. Message: "Problems with Shortcut. The item 'FAXMNG.EXE' that this shortcut refers to has been changed or moved. The nearest match, based on size, date, and type, is 'C:\pathname\GOSERVE.EXE.' Do you want this shortcut to point to this item?"
CorelDRAW! 6.0	Message: "Cannot find the file 'filename' or one of its components."	Opens a font called "Architecture True Type."

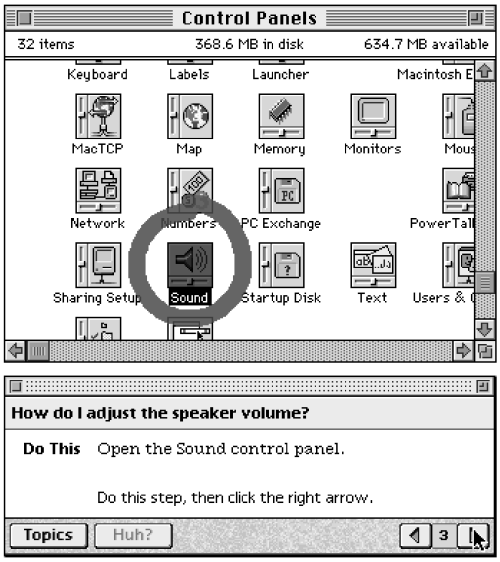
Note: Results and error messages may vary from system to system.

14 Utilities to uninstall applications are very popular for Windows. Macintosh users don't really need them.

There is a reason why one of the most popular utilities on the Windows platform is uninstaller software. As it is installed, Windows software tends to scatter parts of itself all over a user's hard disk. Not only that, but those parts can have cryptic names, such as "DWSPTDLL.DLL" or "W3CTRS.INI," making it impossible to determine whether a file is necessary. And while Windows 95 and Windows NT include an "Add/Remove Programs" feature, it doesn't always work for every program or get rid of all the correct files, or it tries to eliminate files that shouldn't be eliminated. Macintosh users know that deleting most Macintosh applications is as easy as dragging the application or its folder to the trash. If the application installed extensions or control panel files, the updated Extensions Manager in Mac OS 7.6 can locate them quickly, enabling you to easily disable and delete them.

15 Windows “DLL” files cause many problems.

The numerous “DLL” files that Windows applications install all over the hard disk drive can conflict with each other and cause serious system problems. In some cases, installing a new application installs new DLL files that overwrite DLL files installed by older applications, rendering the old applications unusable. Resolving such complex DLL conflicts are nightmares that Macintosh users never have to endure.



16 The Mac OS provides active assistance; Windows doesn’t.

The Mac OS includes Apple Guide, an innovative help system that not only tells you what to do, but also coaches you through the process by showing you exactly where to click the mouse and where to type. In fact, in many cases, you can simply ask Apple Guide to perform tasks for you. The help systems offered by both Windows 95 and Windows NT simply don’t offer the same level of active assistance.

17 It’s easier to troubleshoot problems on a Macintosh than on a PC.

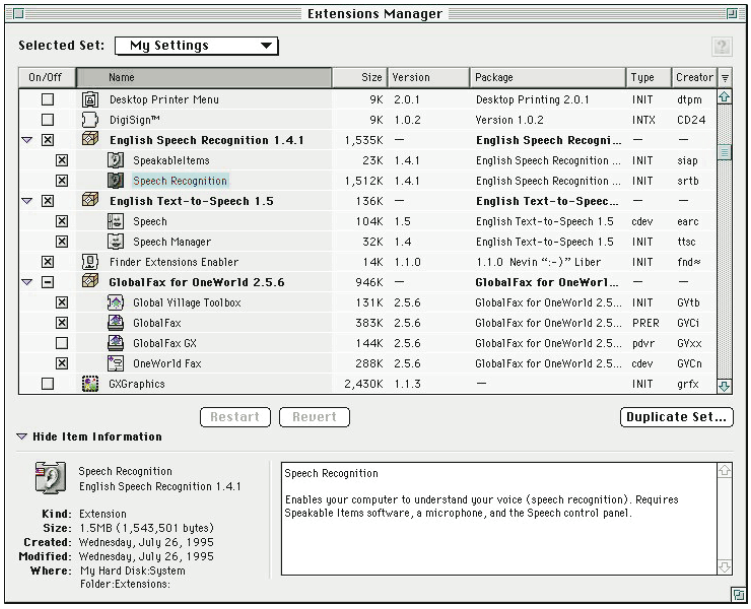
We’ve already seen that a Macintosh has no “mystery” files and no Registry to contend with, so, by nature, the Macintosh is easier to troubleshoot. A study by Norris and Wong Associates substantiates this, showing that Macintosh maintenance requires less time, less knowledge of computers, and less need for access to technical support, and results in less user frustration than similar maintenance required by Windows 95.*

Macintosh users are also fortunate because one call to Apple provides both hardware and software support. Many Windows users have to call a different vendor for every card or piece of hardware installed in their PC. Often those vendors will say that it is not the fault of their device, but the fault of another manufacturer’s hardware device in the PC.

**Norris and Wong Associates, “Maintenance Comparison: Macintosh vs. Windows 95,” November 1995*

18 The Mac OS Extensions Manager offers capabilities unmatched by any Windows feature.

On a Macintosh, you have superior control of system-level files. How do you turn on and off individual drivers on a PC? One at a time, and if you make a mistake, it may mean calling tech support or restoring your application, or even performing a complete reinstallation of Windows. But on a Macintosh, the Extensions Manager allows you to do this with ease.

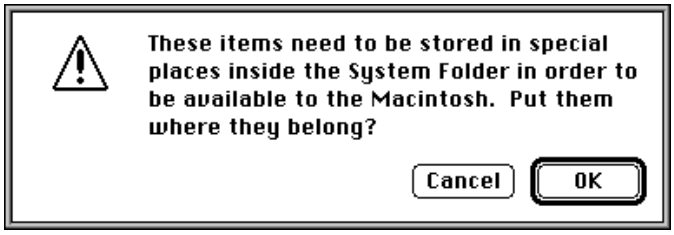


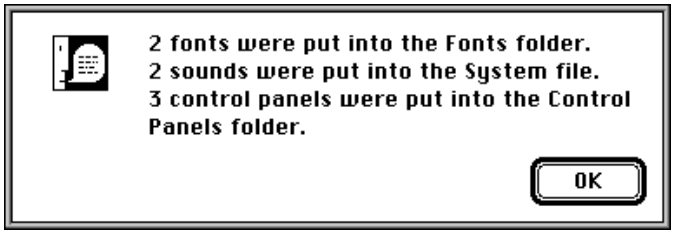
The Mac OS tells you which software extensions belong to which applications. The new Extensions Manager (shown at left) in Mac OS 7.6 allows you to view extensions and control panel files by the applications to which they belong. Now with one click, every extension or control panel file associated with that application can be turned on or off, freeing RAM to use for other things. Under Windows, you are left to guess which driver belongs to which program.

The Mac OS gives you information about what each driver does. The Mac OS 7.6 Extensions Manager also includes an information box that will tell you about the function of an extension or control panel file. No guesswork is involved. But with Windows you are left to wonder what "3C5X9A.DLL" truly is, what it is supposed to do, and whether you really need it.

The Mac OS will sort out new drivers versus old ones. The new Extensions Manager in Mac OS 7.6 also lists the version number of a control panel file or extension, so you know right away if you have an older version. If you have multiple versions of the same extension or control panel file, the Extensions Manager will sort them and give you the option of deleting older versions. Again, there is no such feature in Windows. Worse yet, Windows users are often left to guess the version of drivers, since the drivers are merely dated. For example, is a driver dated 1/21/97 newer or older than one dated 3/17/96, or is it simply the date when the driver was copied to the hard disk?

19 It's easier to add resources to a Macintosh.





When you add capabilities to your Macintosh, it anticipates what you're doing. For example, to add fonts or desk accessories, all you have to do is drag them to the System Folder. The Mac OS places all of the items into the folders in which they belong—automatically. Windows users are often left to manually place each file where it is supposed to go—if they know where that is.

20 The Macintosh makes it easy to add input devices.

The Apple Desktop Bus (ADB) peripheral interface lets you easily connect multiple input devices such as a trackball, keyboard, mouse, graphics tablet, joystick, or pen input device to a Macintosh. Because of the superior integration of the hardware and software on a Macintosh, the system will "know" which one is being used without requiring reconfiguration. Standard PCs have no such equivalent keyboard bus. To connect multiple input devices to a PC, a PC user would often face multiple card installations, as well as the conflicts that would result from having so many similar devices connected to the PC at once.

21 The Apple System Profiler in Mac OS 7.6 provides more complete and easier-to-understand information about your Macintosh.

Computers shouldn't be so complex that you need to have a degree in computer science to know how much RAM is in your computer. Only Mac OS 7.6 has the Apple System Profiler. Simply run it from your Apple menu and you can determine most Macintosh settings, such as microprocessor type and speed in megahertz, status of virtual memory, devices that are connected to the computer and their settings, and much more.

The Apple System Profiler also includes a number called the Customer Care Code. If a user needs tech support, the technician can use this number to re-create the exact conditions of the problem on the Macintosh, reducing the time needed to resolve the problem.

Windows makes it hard to find out exactly what is going on with a PC. To determine the status of various functions, you'd have to search through many panels of information to find what is needed. No one source of information is available for what you need to know. And some information can't be determined on many systems, such as the processor's exact speed.

22 The Macintosh works better with files over a network.

Because Windows 95 is built on DOS, working with files over a network is a much more difficult process with a PC running Windows than with a Macintosh computer.

With a Macintosh, you can move documents and applications, and the Mac OS will keep track of where they are. So, for example, if someone on the network moves or renames the Microsoft Excel folder on your server, you can still double-click your Excel alias or an Excel spreadsheet file—the Mac OS will find and launch Excel.

By comparison, Windows 95 will lose track of the application, so the links between your files and the application will be broken. Here's a comparison of what happens when you try to open a document if the application that created that document has been moved on the server.

Opening a document after its application has been moved

The Easy Way: Macintosh	The Hard Way: Windows 95
1. Double-click the file or select it from the Recent Documents menu.	1. Double-click the file; or click the Start button, select Documents, and click the filename. 2. You'll receive the message: "The item 'filename' that this shortcut refers to has been changed or moved. The nearest match, based on size, date, and type, is 'G:\Windows\Application\diagram.xxx.' Do you want the shortcut to point to this item?" 3. Click Yes. 4. You'll receive the message: "Windows cannot find Application.exe. The program is needed for opening the files of type 'application file.' Check the given pathname for the application." 5. Click OK. 6. You'll receive the message: "Cannot find the file 'G:\\Folder\Application.exe.'" 7. Click OK. 8. Click Locate, then search through folders on the network to find the application. Or contact your network administrator for assistance.

23 The Mac OS has few limits for filenames, as opposed to Windows.

The Mac OS has always allowed long filenames, so there are no complex filename issues. But the Windows world is just getting long filenames, and transitioning from the 8.3-character limit from DOS is a complex issue. First, PC users must buy new applications to be able to use long filenames. Running older DOS and Windows 3.1 applications in Windows 95 or Windows NT still requires 8.3-character filenames.

To work with old DOS and Windows 3.1 systems, Windows 95 keeps each long filename linked to a DOS 8.3 short filename. The Microsoft documentation says that neither the user nor the application has control of these DOS 8.3 encoded names. This can cause filename confusion. For example, when you create a file named "Presentation for status meeting" with Microsoft Word on a PC running Windows 95, then save the file to a floppy disk and insert the floppy disk in a PC running Windows 3.1, the file will appear as PRESEN~1.DOC. When you edit the file on the PC running Windows 3.1, save it, and return to the PC running Windows 95, the long filename will no longer exist. Instead, the file will now be called PRESEN~1.DOC.

To make matters even more confusing, Windows 95 gives you the option of viewing files with their extensions visible or invisible—and the effect of name changes will vary depending on how the files are viewed. When extensions are visible, you can edit them directly—with serious effects on connections between files and applications. However, when extensions are hidden, adding an extension to a filename will change the name of the file itself—and leave the original extension untouched.

The Mac OS has only one illegal character for filenames, while Windows has several. The only character that cannot be used with the Mac OS in a filename is ":", which is reserved by the OS for pathname designations. If you attempt to use ":", the Macintosh will substitute another character (such as "-"), or simply leave the ":" out of the name. With Windows, though, there are several illegal characters (such as ?, \ , /, and " ") and equally cryptic error messages that provide no explanations of what has gone wrong if such a character was used.

24 The Macintosh has easier access to alternate character sets.

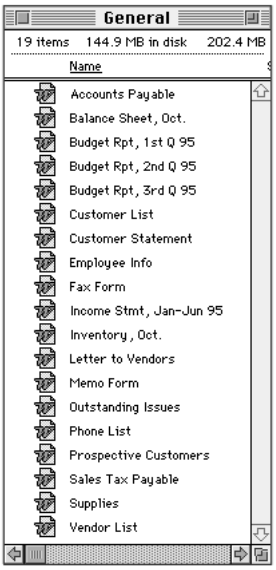
Many users want easy access to characters that aren't available on a standard keyboard, such as bullets (•) and trademark symbols (™ and ®). It's much easier to produce these characters on a Macintosh. You can type characters with accents, special symbols, and intelligent script in two key presses or less in most Mac OS–based applications. Special characters are much less generally available across multiple fonts in Windows 95 than is the case with Macintosh. For example, nearly all Macintosh fonts include "√" and many other useful special characters that are likely to be found only in the Wingdings font on PCs running Windows 95.

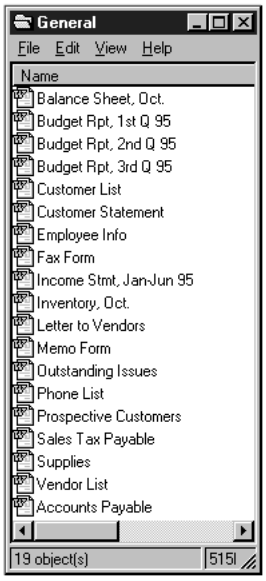
25 The Macintosh has superior folder management compared with Windows.

A Macintosh can tell you folder sizes within a window, while Windows cannot. Have you ever wondered just how many megabytes of storage space is taken up by a particular folder? A Macintosh will automatically calculate the sum of all the folder and file sizes contained within a folder and display that information in the window containing the folders and files. With Windows, a user cannot at first glance determine the folder size, nor can the user sort both folders and files by size, since folders will simply be listed alphabetically. The user is left to check the properties of every folder individually to discover its size—a daunting task if there are many nested folders. Some Windows special folders such as "Control Panels" or "Printers" do not even allow the user to run a check via "Properties," leaving the user to guess at their size.

On a Macintosh, you can create as many folders within folders as you like, without ever having to worry about long pathnames. In Windows 95 and Windows NT, pathnames are limited to 260 characters, and since pathnames grow longer each time you add a folder to another folder, you might reach this limit sooner than expected. For example, you might try to move a folder with the short name "Letters" into a deeply nested folder, and receive the error message "Cannot move Letters. The filename you specified is invalid or too long. Specify a different filename." Notice that the message suggests a problem with the filename—but doesn't tell you the pathname is too long.

26 The Mac OS provides superior on-screen window management.





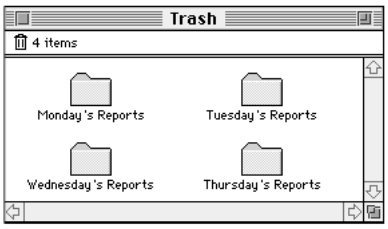
When you add a new file to a Macintosh folder, the Mac OS automatically knows where to put the new file in the list. For example, if you are viewing a list in "Last Modified" mode, the newest file instantly appears at the top of the list. In Windows 95, however, the file is always dropped to the bottom of the list (regardless of how the folder is supposed to be sorted), where you may not be able to see it until you refresh the window.

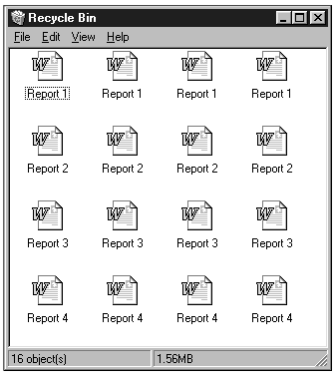
Another window management feature on the Macintosh is that you can close all open windows easily by pressing Command-Option-W. But in Windows, you must close every window manually, which can be quite time-consuming if several windows are open.

Only the Mac OS allows you to print a window's contents from the graphical user interface. The "Print Window" command prints a disk directory, while Windows users must return to the DOS level for this feature.

The Macintosh allows you to see everything in a window with just one click. With the Macintosh, the zoom box on every window will automatically resize the window so that all icons or file names will be displayed in the smallest window possible. On Windows, the window must be resized manually.

27 The Macintosh trash can is easier to use than the Windows recycle bin.





Here's what you'll see in the Windows 95 recycle bin.

The Mac OS maintains the directory structure of files in the trash. All Macintosh files stay in their correct folders when they're placed in the trash can. When you put files or folders into the Windows 95 recycle bin, however, that's not the case. All the folders vanish, leaving only their files in the recycle bin.

When you work with floppy disk files, the Macintosh trash works better than the Windows recycle bin. If you drag items from a floppy disk to the Windows recycle bin, you'll see them "flying" to the recycle bin. But they are actually being deleted, not moved to the bin. You will not be able to recover these items. The Macintosh, however, stores those files and does not delete them from the floppy disk until you select "Empty Trash."

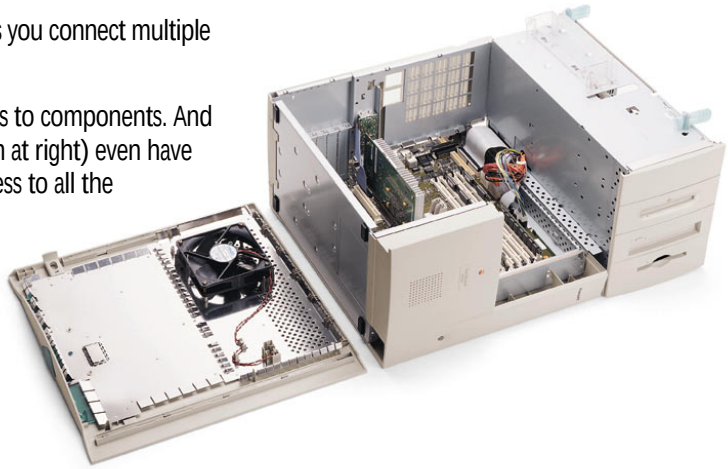
28 An advanced industrial design makes Macintosh computers superior to PCs.

The award-winning design of Macintosh desktop and portable computers provides a number of features that combine to enhance ease of use:

Multiple, multi-use ports and connections. Every Macintosh comes with enough connectors to hook up at least seven storage devices or scanners, ten input devices, two serial devices, a microphone, speakers, a monitor, and a network connection. This means that unlike many PC owners, most Macintosh owners will never need to add an expansion board to their system.

The Apple Desktop Bus (ADB) peripheral interface. This interface lets you connect multiple input devices easily.

Easy-to-open cases. All Macintosh computers today provide easy access to components. And the new Power Macintosh 8600 and 9600 models (an example is shown at right) even have specially designed cases that can be opened in seconds to provide access to all the major components.



Automatic startup, operation, and shutdown. Many Macintosh computers can be easily set up to work remotely—turning on at a designated time, performing scripted functions, and then shutting down automatically; whereas "Shut Down" on Windows doesn't turn the computer off. Many Macintosh computers also have "software" startup and shutdown, so that you can just press key or select a menu item rather than reach around back for the power switch.

29 Floppy disk management is easier with Macintosh computers.

The Mac OS mounts a floppy disk automatically on the desktop. The Mac OS recognizes when a floppy disk has been inserted and automatically shows the disk's icon on screen. When you eject the disk, the Mac OS indicates that it has been removed. But when you insert a floppy disk into a PC running Windows 95, nothing happens. To see the contents of the disk, you have to double-click "My Computer," then double-click the correct disk drive icon. And if you eject the disk, Windows 95 leaves its window unchanged on the screen—even after you've placed a different disk in the floppy disk drive.

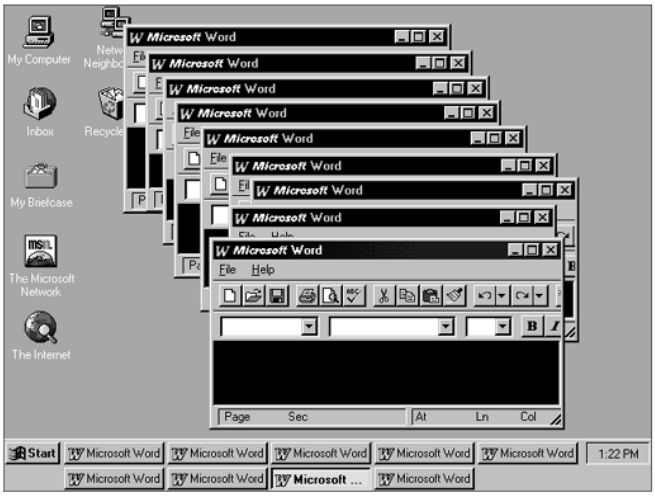
The Mac OS automatically updates a floppy disk's contents. In Windows, however, you have to select the Refresh command when you change floppy disks, or close and reopen the floppy disk drive window. Failing to refresh the window can cause confusion as to what files are actually being viewed.

A floppy disk left in a Macintosh is ejected automatically on startup, and the Macintosh will continue to boot. But on a PC, the computer will respond to this same situation with the message "Non-system disk or disk error." At this point, a PC user must manually eject the floppy disk and press a key to continue loading Windows.

30 The two-button mouse used with Windows can cause confusion.

The whole idea behind the use of a mouse in conjunction with a graphical user interface, as opposed to the keyboard and a command-line interface, centered around ease of use. This is fully realized on a Macintosh computer and its one-button mouse. But the PC's two-button mouse often makes things nearly as complicated as DOS did: Right-click on mouse versus left-click—when to do which? Between this problem and its inconsistent menus and functions, Windows offers simply too many options for performing the same function.

31 Applications launch once on the Macintosh; with Windows 95, some applications may launch multiple times.



If you double-click an application on your Macintosh and that application is already open, the Finder will simply take you to the running application. Windows will often launch additional instances of the application each time you open it, which adds confusion and consumes memory. In addition, Windows allows you to load multiple versions of the same drivers, creating a potentially unstable situation.

32 The Macintosh provides easier security customization features.

Apple's At Ease software is a security program that protects important applications and documents in a shared environment against unauthorized users and unauthorized configuration changes. With At Ease, it's a simple matter to limit access to specific programs and files, protect system settings, and assign passwords.

Unlike Windows 95, At Ease lets you easily match the user interface to each person's age and level of computer experience. For example, talking buttons are available for children just learning to read. Menus let you quickly designate which desktop each person will use. You can easily control each user's ability to open, delete, copy, or rename specific files. You can also assign passwords to each user. At Ease can control where documents are saved and can even limit saving to only floppy disks. And each person's files are located in a single folder for easy organization.

MULTIMEDIA ADVANTAGES

33 The Mac OS comes with QuickTime technology built in.

QuickTime, which is built into the Mac OS, provides a medium through which digital video comes alive. Desktop video can be saved in standard high-quality QuickTime format and in MPEG-1 format that works entirely in software—no separate hardware card is needed. You can even watch movies on video CDs. QuickTime authoring tools also include the ability to create closed captions and karaoke sing-alongs, insert text, and create chapters on video. And for the music professional, QuickTime offers full MIDI compatibility with 41 voices standard in QuickTime Musical Instruments. In addition, QuickTime video can be incorporated into QuickTime VR 2.0, Apple's virtual-reality software. QuickTime also supports Macintosh computers with multiple PowerPC processors, as well as videoconferencing, game sprites, QuickDraw 3D, all the popular video codecs, and SMPTE time coding to ensure perfect synchronization of video and sound. No other multimedia format is as flexible. That's why QuickTime is rapidly becoming the standard for multimedia production on desktop computers and for the Internet.

34 The Macintosh has superior three-dimensional graphics capabilities.

To work effectively with three-dimensional graphics, you need a powerful processor that can handle images of tens or hundreds of megabytes in size. You also need advanced software to make three-dimensional graphics intuitive and available systemwide. The only personal computer that offers both those capabilities today is the Power Macintosh—with the PowerPC processor and QuickDraw 3D software.

QuickDraw 3D is a powerful, built-in Macintosh 3D tool. QuickDraw 3D is an application programming interface (API) for creating and rendering workstation-class three-dimensional graphics in real time. Developers can use QuickDraw 3D to integrate three-dimensional rendering capabilities into existing or new software programs. QuickDraw 3D includes a human interface that makes it easy and intuitive to draw and edit three-dimensional graphics, and software tools for drawing three-dimensional objects (including high-end features such as shading, texture mapping, and lighting effects). QuickDraw 3D also includes a cross-platform file format, so users can share three-dimensional drawings, and has an open architecture that lets Apple and others accelerate its performance. Windows does not include integrated system-level three-dimensional graphics capabilities.

QuickDraw 3D images are portable. You can drag and drop QuickDraw 3D images into many different kinds of Macintosh applications. QuickDraw 3D images can also be stored in the Macintosh Scrapbook. There is no standard for 3D images on the Windows side, making it difficult to move 3D data between Windows applications.

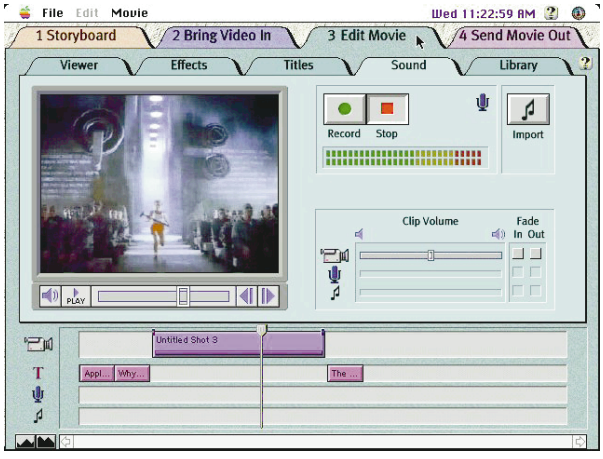
35 The Macintosh has built-in virtual-reality software.

QuickTime VR, Apple's virtual-reality software that's included with every Macintosh, offers users superior speed and smoothness on the Macintosh, thanks to the PowerPC RISC architecture. QuickTime VR lets personal computers display 360-degree panoramic movies from photos taken by a standard 35mm camera or from computer-generated images. Users can move forward and backward through the images, pan left to right and up and down, and select objects for close-up 360-degree views. Users can also embed QuickTime movies and QuickDraw 3D objects into a VR scene, as well as join several scenes together. Using this approach, a real estate agent could show a complete walkthrough of a home right from a Macintosh.

Panoramic movies made with QuickTime VR use as little as 150K of storage space. That means thousands of panoramas can fit on a single CD-ROM, providing developers with the opportunity to create a rich and realistic three-dimensional user experience. And all of these capabilities are available on the Macintosh without the need to purchase add-on hardware or graphics accelerator cards.

Although QuickTime VR runs on both Macintosh computers and PCs running Windows 95, it is enhanced to take advantage of the higher performance of the PowerPC processor in Macintosh systems. Apple's in-house testing shows that users can get smoother, more realistic motion from Power Macintosh computers than from Pentium processor–based computers. Because of the superior graphics capability of the Macintosh, all QuickTime VR authoring tools are available only for the Macintosh.

36 Desktop video works better on Macintosh computers.



Several Macintosh models come ready to go right out of the box with RCA and S-video connections that connect to VCRs and camcorders. You can easily capture and then edit QuickTime movies on the computer from a video source and even save the edited movie back to videotape. With the Avid Cinema card available on some Macintosh models, just connect a cable and you can "print" to videotape as easily as you can print to a laser printer. In fact, the Avid Cinema solution, designed especially for the Macintosh by Avid Technology (a leader in digital video for the movie industry), is also available for other Macintosh models as a separate PCI card with specially designed, easy-to-use software that makes video editing a simple desktop activity.

On a PC running Windows, setting up and using desktop video capture is difficult. PCs don't ordinarily ship with video connectors for hooking up a camcorder or a VCR, so the user must open the computer case, install an expensive card, configure the software, and test the system. Since few PC peripherals adhere to the Plug-and-Play standard, the well-known difficulties of installing and configuring PC hardware remain. And video card add-ons do not necessarily include the appropriate Windows drivers.

37 Macintosh computers provide sophisticated color-matching capability.

Apple's ColorSync software provides sophisticated color-matching technology that ensures consistent color from input to monitor to output device. ColorSync 7.0 is supported by a wide variety of third-party scanners, monitors, printers, and applications, making it the default industry standard for color-matching technology. Windows comes with no standard color-matching technology. And Apple is also leading the way in output technologies, with FinePrint, PhotoGrade, and Color PhotoGrade software technologies that help to ensure that your printed output of text and images looks as close to the original as possible.

38 The Mac OS is ahead of Windows in speech capabilities.

The Mac OS has true speech recognition today. With PlainTalk, you can open any Macintosh document or application by speaking its name. Just move an alias of the item into the Speakable Items folder, and the built-in PlainTalk and Speakable Items technologies take care of the rest. For example, a user who wants to check her stock portfolio without opening several folders and launching an application can just say "Check stocks," and the Macintosh will execute the necessary commands. Speakable items can also be AppleScript files, so users can execute an almost unlimited series of actions.

By comparison, Windows 95 does not have built-in speech recognition. And much of the third-party speech-recognition software that is available for the Windows 95 platform requires dedicated hardware support, is poorly integrated with the overall computer system, and must be trained repeatedly to eliminate "misfires" (when the computer mistakes a background noise for a command). Macintosh speech-recognition technology can recognize virtually any English-speaking voice, even one with an accent, and includes features that nearly eliminate misfires.

The Mac OS has superior speech synthesis. Apple's speech-synthesis software allows the Macintosh to read text aloud as it appears on screen in any of 22 reading voices. A good example of the power of speech synthesis is Scholastic's WiggleWorks for the Macintosh, a series of "electronic books" for beginning readers, which not only read stories aloud to children, but can even read aloud sentences and stories that children write themselves. Apple is now providing text-to-speech capabilities for Latin American Spanish, and is working to add other languages, including Chinese, French, Italian, and Japanese.

39 Installing and using CD-ROM titles is easier with Macintosh.

Macintosh computers have a single, built-in standard for sound and graphics, so no special drivers are required. In contrast, today's PCs have multiple standards for sound and graphics, and each standard and piece of hardware requires a different software driver. As a result, PC owners often have problems matching the hardware and software in their systems to the hardware and software requirements of different CD-ROM titles, and different titles can run much differently. This is especially true with games on CD.

CD-ROMs are mounted automatically on the Macintosh desktop. Windows machines require the user to go to Explorer, File Manager, or "My Computer"; find the CD-ROM drive letter; and select "Refresh" or press the F5 key to make sure that the CD-ROM shown is the current one in the drive. Also, in Windows, the drive letters are assigned dynamically, which can break shortcut links for CD-ROM titles that use shortcuts to launch content or applications from the CD-ROM.

40 It's easier to work with graphics and multimedia content on the Macintosh.

Macintosh graphics and multimedia formats are more standardized, and therefore more flexible. On a Macintosh computer, the PICT file format is supported by most applications that can deal with graphics, which allows for easy cut and paste between applications. In fact, the OS-level integration between three-dimensional and video data formats provided by Apple's QuickTime Media Layer even allows you to cut and paste three-dimensional data and motion video.

Windows users are often subjected to dozens of different formats for graphics and multimedia. Windows users have no assurance that what they create in one graphics application can be cut and then pasted into a different graphics application for further processing or modification.

The Macintosh Scrapbook is more powerful for storing and manipulating mixed media than any Windows application. Also, every Macintosh sold today includes the multimedia Scrapbook, a program you can use to store text, graphics, sounds, three-dimensional objects, and video. And retrieving items stored in the Scrapbook is as easy as dragging them to a document, the desktop, a folder, or a disk. Because Windows 95 doesn't have an equivalent to the Macintosh Scrapbook, you first have to find an application that can accept the kind of data—sound, video, graphics, text—you're working with. This makes cutting and pasting multimedia data more difficult.

41 Macintosh computers have superior sound capabilities compared with PCs running Windows.

The Macintosh has long been the computer of choice for handling complex sound. Every Macintosh sold today has 16-bit CD-quality stereo sound capable of handling a sampling rate of 44.1 kilohertz. The Macintosh also has MIDI capability built in, so driving complex sound modules and synthesizers is simple. The QuickTime Musical Instruments extension that comes with QuickTime 2.5 includes 41 instruments (and more can be added), allowing a Macintosh to output sampled MIDI files in multi-voiced sound through any speakers. QuickTime can even be used to sample tracks right off an audio CD. Add to all this the built-in speech capability of PlainTalk, and Macintosh becomes the platform of choice for sound professionals. This may be why some of the best professional sound-manipulation software, such as Opcode's StudioVision Pro and Arboretum Systems' Hyperprism series, are available only for the Macintosh. *Rolling Stone* magazine recently conducted a survey of 15 influential musicians. Of those, 13 used Macintosh computers, and 11 used Macintosh computers exclusively.*

Windows users must first make sure that their systems include a sound card, and that it is capable of handling CD-quality sound. But the very real problem lies in conflicts with sound cards—the source of many of the incompatibilities that PC users experience when trying to use games or sound software. Certain CD-ROM drives for PCs are finicky about which sound cards they will work with correctly, if at all.

*Rolling Stone, *"alt.rock," 10/28/96, pages 97–101*

42 Games for the Macintosh work better than their Windows counterparts.

Macintosh games do not suffer from the driver problems that Windows games do. Because so many games on the Windows platform have unique drivers for running sound cards and other devices, the driver difficulties encountered by the average Windows user are well known. Because most Windows games are actually written for DOS and use older DOS drivers, many will not work at all on Windows NT.

Macintosh games utilize the same drivers built into each and every Macintosh, so this problem doesn't exist on the Macintosh platform. And Macintosh games have received many laurels for the ways in which they utilize technologies such as QuickTime movies, QuickTime VR, QuickDraw 3D, PlainTalk speech, and many other factors that make the Macintosh a cutting-edge games computer. These greater multimedia capabilities make it possible for games designers such as LucasArts Entertainment Company to enhance their Star Wars series of games so that images rendered on the screen, background music, and sound effects are done in far greater detail on the Macintosh than on a computer running Windows.

Macintosh

Windows

Screen detail from Descent, a game by Interplay and MacPlay.

43 Every Macintosh comes with the ability to capture screen shots.

For those who have ever tried to create manuals or publications, capturing images of on-screen menus, windows, and commands is a snap with Macintosh. Simply press Shift-Command-3 to capture the entire screen. In Mac OS 7.6, you can also use Shift-Command-4 to insert a cursor that allows you to select just part of the screen. Windows does not offer such a built-in feature; you must instead purchase a program to do this.

44 The Macintosh has more sophisticated font manipulation.

One of the reasons for the Macintosh computer's popularity in the publishing world comes from the fact that Macintosh fonts are more versatile than their Windows counterparts. For example, PCs simply don't include "outline" or "shadow" versions of a font. In addition, the fact that Windows NT doesn't handle Adobe Type Manager (ATM) fonts means that text posted on the Internet can be viewed much more clearly on a Macintosh.

Only the Macintosh has QuickDraw GX. QuickDraw GX provides a richer drawing environment than Windows 95, and handles type fonts, even those for character-based languages, such as Cyrillic and Chinese, much more flexibly. For example, QuickDraw GX provides scale, skew, and perspective functions, which are not included in Windows 95, as well as the ability to mix colors on the screen in real time by overlaying objects of different colors. This technology also automatically produces ligatures, fractions, automatic subscripts and superscripts, automatic kerning, and other advanced typographical elements, and supports international script systems and reading directions (right to left, left to right, vertical, above and below a baseline, and so on). In addition, QuickDraw GX allows you to run printing extensions that modify a print job beyond what the application does. For example, a printing extension can add a custom watermark to each page or provide password protection for a document.

Microsoft's closest answer to QuickDraw GX is a font format called TrueType Open, which allows the creation of fonts with ligatures and other advanced characters. But while QuickDraw GX actually provides new functionality for end users and developers alike, TrueType Open is simply a specification for a font format. That means developers have to write their own display technology in order to use the fonts.

INTERNET ADVANTAGES

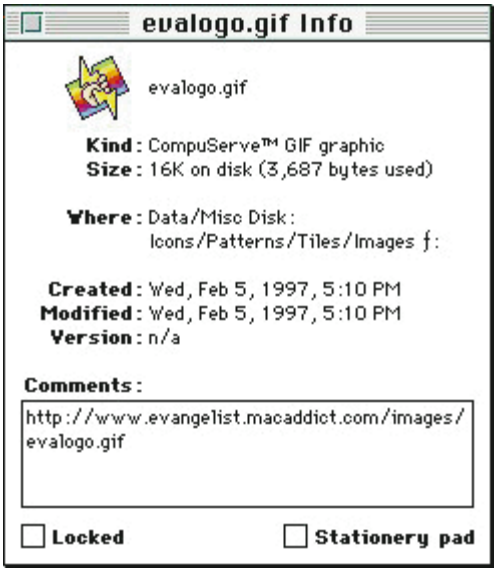
45 The Macintosh makes Internet authoring easier.

What made the Macintosh number one in the graphics and multimedia industry also carries over to Internet publishing. The OS-level support for sophisticated multimedia authoring provided by the QuickTime Media Layer (QTML) makes it easier for Internet content creators to use the Macintosh to enhance their online offerings with images, sounds, video, 3D, and virtual reality. Perhaps that's why Macintosh is the number one platform for World Wide Web authoring, and why more than half of the digital video content available on the Internet today was created using QuickTime technology. In addition, Apple peripherals such as the QuickTake digital camera and the Apple OneScanner scanning devices are extremely easy to use—and ideally suited to web content creation.

46 The Macintosh makes Internet access easier.

Apple's commitment to making Internet technology accessible has led to a variety of Internet access offerings, to meet the needs of a range of users. Because Macintosh computers make Internet access so easy, more than a quarter of Internet users use a Macintosh.

The Apple Internet Connection Kit provides one-click Internet access. All Macintosh computers come with the Apple Internet Connection Kit, a collection of "best-of-class" Internet tools that makes it easy to get started with direct Internet access. The Apple Internet Connection Kit includes such premier software as Netscape Navigator, Claris Emailer Lite, Farallon Look@Me, Adobe Acrobat Reader, and many other tools to enhance Internet use. This kit also includes an installer that—with just one click—can configure your Macintosh to be up on the Internet in minutes. It will even select an Internet service provider (ISP) for you if you do not know of an ISP in your area. And you can use AppleScript, the built-in Macintosh scripting language, with the Apple Internet Connection Kit to perform automatic functions such as checking for e-mail at a certain time.



Windows does not come standard with a suite of Internet tools as sophisticated, complete, or scriptable as the Apple Internet Connection Kit. And in many cases, Windows users are left guessing as to how to set up their computers for the Internet, especially if something happens to their original hard disk setup. Since the Apple Internet Connection Kit is included on CD-ROM with every Macintosh, reinstallation is simple.

Only the Macintosh keeps track of the source of downloaded files. Ever try to figure out where a file you downloaded from the Internet came from? Every Macintosh file downloaded retains its URL in the Get Info box, making it easy to catalog or return to the file's source for more information or files.

47 The Macintosh makes running an Internet server easier and more secure.

Another way that Apple is broadening Internet use is by providing the tools to make publishing information on the Internet much more accessible. The Apple Internet Server Solution is a collection of easy-to-use, best-of-class products that includes all the functionality needed to publish information on the World Wide Web. Since this software comes preinstalled on the Apple Workgroup Servers, your server can be up and running in as little as 15 minutes.

A Mac OS–based server is far easier to set up and maintain than a traditional Windows NT–based server, so the Apple Internet Server Solution has opened the arena of Internet publishing to individuals and organizations that would otherwise have been unable to enjoy the advantages of becoming Internet content providers. This ease of use has enabled a growing number of elementary and secondary schools to join the world of Internet publishing. The Apple Internet Server Solution provides significant Internet server functionality, and is less costly than a single traditional Windows NT server.

Server security is a prime consideration today. In a demonstration of the ruggedness of a Mac OS–based server, a $10,000 challenge was issued on the web to anyone who could hack the web site of Westwind Computing Inc. (along with cosponsors ComVista Inc. and Digital Forest). Despite thousands of attempts, no one was able to crack the Mac OS–based site.[1] Windows NT and UNIX servers do not have this same level of security because of command-line "back doors" into the server.

Because of its ease of use, solid software bundle, and resistance to server tampering, 36 percent of all servers on the Internet are Mac OS–based servers. In contrast, only 14 percent are based on Windows.[2]

[1] Computer Reseller News, *1/1/96*

[2] *Georgia Tech 6th Annual Web Study, http://www.cc.gatech.edu/gvu/user_surveys/survey101996/graphs/webmaster/Which_Server.html. Results for the percentage of Mac OS–based servers include the sum of percentages for WebStar and MacHTTP.*

48 The Macintosh gives you 100 percent pure Java.

Apple has built Java directly into the Mac OS. Java is the revolutionary computer language that will enable new technologies on the Internet and beyond. As a committed partner with Sun Microsystems, the developer of Java, Apple Computer is providing industry-standard "100% Pure" Java for the Macintosh. The Macintosh Runtime for Java and Software Developers Kit are available free today from Apple's web site at http://applejava.apple.com.

There is widespread speculation that Microsoft is attempting to "own" the Internet by creating their own proprietary version of Java. Microsoft has elected to make modifications to their implementation of Java that raise serious compatibility questions. Microsoft Java applets may not work correctly with other platforms. Also, Microsoft is bypassing the use of certain features of Java as implemented in Sun's Java Developers Kit 1.1 in favor of their own ActiveX, which has been shown to have serious security problems that are not an issue with Sun's Java.

49 Configuring TCP/IP on a Macintosh is much easier.

With Macintosh and the Apple Internet Connection Kit (AICK), connecting to the Internet is a simple process. AICK will configure everything you need automatically—no confusion with IP addresses, flow controls, and modem speeds. But for the power user who wishes to have multiple ISPs or other TCP/IP connections, configuring PPP and Open Transport is a snap. Windows users have a much harder path to achieve the same result. An example of the steps needed for a Macintosh user and a PC user to connect to an ISP is shown below.

The Easy Way: Macintosh via Open Transport

1. Open the Control Panels folder from the Apple menu and double-click TCP/IP.
2. Select MacPPP from the "Connect via" pop-up menu.
3. Select Using PPP Server from the Configure pop-up menu.
4. Under "Name server addr.", fill in all necessary IP addresses.
5. Under "Additional Search domains," type in the domain name of the ISP.
6. Close the TCP/IP window and click Save.
7. Double-click "Config PPP" from the Control Panels folder.
8. Select the proper port from the Port Name pop-up menu.
9. Click New... .
10. Type in the ISP's name. Click OK. The ISP's name should now show in the PPP Server pop-up menu.
11. Click Config... .
12. Select the correct port speed from the Port Speed pop-up menu.
13. Select the correct flow control from the Flow Control pop-up menu.
14. Enter the phone number of the ISP.
15. Click Done.
16. Click Open from the Config PPP control panel.

The Hard Way: Windows 95 via Dial-Up Networking

1. From the Start menu, select Accessories, then select Control Panels. Double-click "Add/Remove Programs".
2. Select the Windows Setup tab.
3. In the Components section, make certain the box next to "Communications" is checked. Click Details... and verify that "Dial-Up Networking" is checked. Click OK.
4. Click Apply. Windows will prompt for the Windows 95 CD or floppy disks. Insert and click OK.
5. The software will install. Click OK. Restart your computer.
6. Choose Shut Down from Start menu and select "Restart the Computer?"
7. Once Windows 95 has restarted, go to the Start menu, select Programs, select Accessories, and select Dial-Up Networking.
8. The Dial-up Networking Wizard will start. Click Next.
9. Type in the ISP's name.
10. Select the correct modem, configuring it if necessary.
11. Click Next.
12. Type in the ISP's area code, phone number, and country code. Click Next.
13. Confirm the information. Click Finish. Windows 95 will create a Dial-Up Networking folder inside "My Computer" that contains the ISP information.
14. Go to the Start menu, select Settings, select Control Panel, and double-click Network.
15. Select "TCP/IP- > Dial-up Adapter" in the network components window. Click Properties.
16. Select the IP Address tab.
17. Choose "Obtain an IP address automatically."
18. Select the Gateway tab.
19. Type in the IP address of the ISP's gateway. Click Add.
20. Select DNS Configuration tab.

The Easy Way: Macintosh via Open Transport	The Hard Way: Windows 95 via Dial-Up Networking

21. Select Enable DNS.
22. For “Host,” type the host name.
23. For “Domain,” type the doman name.
24. For “ DNS Server Search Order,” type the correct DNS address and click Add. Repeat for each address as necessary.
25. Click OK.
26. Click OK.
27. Go to “My Computer” and open the Dial-Up Networking folder.
28. Right-click the icon that corresponds to the ISP and select Properties.
29. Double-check the information in the dialog window. Click Server Type... .
30. For the “Type of Dial-Up Server,” select “PPP: Windows 95, Windows NT 3.5, Internet” from the menu.
31. In the “Allowed Network Protocols” section, make sure only “TCP/IP” is selected.
32. Click TCP/IP Settings... .
33. Select “Server assigned IP address.”
34. Select “Specify name server address.”
35. Type the “Primary DNS” IP.
36. Type the “Secondary DNS” IP.
37. Enable “Use IP header compression” and “Use default gateway on the remote network.”
38. Click OK.
39. Click OK.
40. Click OK.
41. Double-click the ISP’s icon in the Dial-Up Network folder.
42. Type the username and the password. Click Connect.

50 The Macintosh has Cyberdog.

Cyberdog, a part of Mac OS 7.6, is a breakthrough approach to the Internet that provides easy and intuitive access to all the Internet resources you use most. Cyberdog brings Internet connectivity into mainstream applications and documents. With Cyberdog, you can browse the World Wide Web, read and write e-mail, follow usenet newsgroup discussions, utilize file transfer services to share files, explore gopher-space, and remotely log in to computers via telnet.

Because Cyberdog uses OpenDoc component technology, it's completely integrated into the operating system and can be extended with other OpenDoc components. This integration allows you to drag and drop files from the Internet right to your desktop, copy URLs to your desktop to revisit them or embed them into e-mail, and much more. Using Cyberdog's DocBuilder, you can create your own custom applications to access the Internet.

This type of advanced Internet component technology is not available for Windows.

POWER ADVANTAGES

51 Macintosh computers are faster—and getting faster yet.

PowerPC processors beat Pentium and Pentium Pro processors. Independent tests prove that today's Power Macintosh computers, based on the PowerPC processor, outperform comparable machines based on the Intel Pentium processor. For example, in an independent benchmark test, PowerPC processors outperformed their Intel counterparts in integer calculations by as much as 81 percent (PowerPC 603e vs. Pentium), and in floating-point calculations by as much as 26 percent.

The PowerPC processor is not subject to the limitations of Intel-based processor designs. Because of the superior design of the PowerPC processor, Apple is able to build the PowerBook 3400, which utilizes a blisteringly fast 240-megahertz processor. No Intel chip can claim this speed in a notebook, because no such chip exists for PCs. One of the main reasons for speed limitations in PC notebooks is heat. Pentium chips run far hotter than PowerPC chips at the same speed, limiting the top speed for PC notebooks.

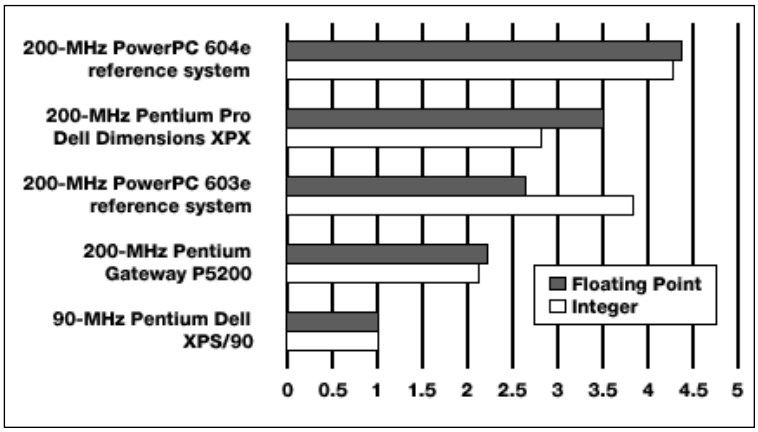
The existing Macintosh speed advantage should increase. The PowerPC processor in Power Macintosh computers is at the beginning of its life cycle, and should keep right on getting faster for a relatively low cost. Apple has recently introduced a 300-megahertz Power Macintosh model at a very affordable price. In contrast, Intel's Pentium and its follow-on, the Pentium Pro, are moving to increased speeds more slowly and at greater cost.

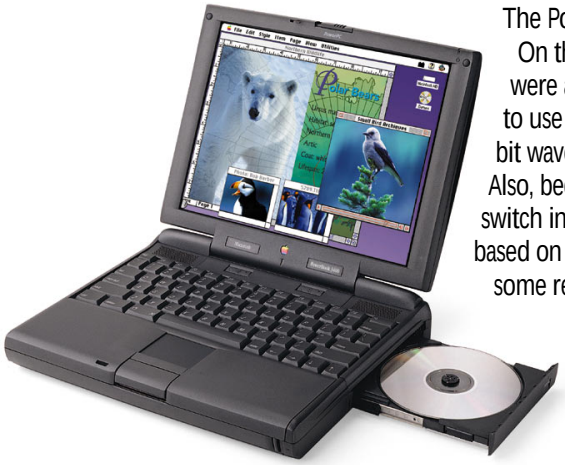
* BYTE *magazine, August 1996.*

52 The PowerPC processor offers many significant advantages over the Intel Pentium MMX processor.

The PowerPC processor doesn't need special instructions to implement new technology. Intel has a different view of their processors. They believe that to catch up with the PowerPC processor, they need to add new functions to their processors, such as the MMX instructions. An MMX chip can achieve its increased multimedia speed only by adding a new set of transistors to the Pentium chip. Unfortunately, PC users will need to buy not only new software written to utilize MMX, but also a new computer that has the MMX chip and the new BIOS chip needed to work with it.

The PowerPC processor provides a superior notebook solution. Unfortunately, because the Pentium MMX chip is nearly 50 percent larger than a regular Pentium processor, it generates an enormous amount of heat, making it a poor choice for notebook computers. The PowerPC processor, in contrast, is a very small chip with significantly less heat output, so it's possible to put much faster PowerPC processors in a notebook computer.



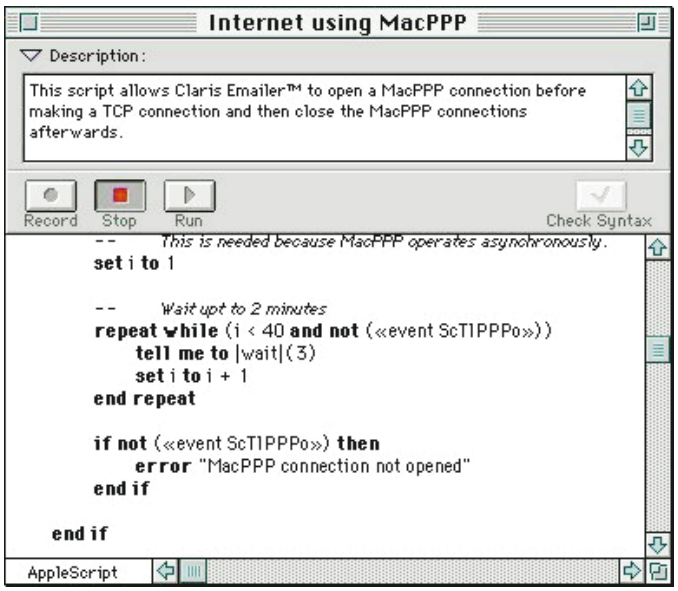


The PowerPC processor speeds up every multimedia application, not just certain ones. On the other hand, only specific operations can benefit from the MMX instructions that were added to the Pentium chip. And even then, software must first be rewritten to be able to use these instructions. For example, vector-based graphics and PC sounds that utilize 32-bit wavetable synthesis may receive no acceleration at all on MMX processor–based systems. Also, because of a design compromise, MMX processors must perform a time-consuming switch internally when attempting to go from conventional multimedia functions to those based on floating-point math, such as certain forms of 3D graphics and functions found in some rendering packages. Because the PowerPC processor needs no gimmicks to enhance multimedia, Macintosh users can be assured that their computers can perform every function, not just a chosen few, at the highest speeds.

"There are only about 20 MMX apps on the shelves today. But there will be more than 100 by the end of the year, says Claude Leglise, Intel's vice president in charge of content. Nearly all of those are home- and game-oriented products...."

—PC Week, "With MMX, Intel overcomes its paranoia," January 20, 1997

53 The Mac OS has AppleScript automation.



A big part of the next generation of personal computing is end-user automation—giving users the ability to program their computers and automate tasks using plain English and point-and-click commands. AppleScript—the built-in, systemwide scripting capability of the Mac OS—lets you automate routine and highly complex tasks, giving you extremely powerful ways to extend and customize the features of the Macintosh.

For example, you can write a script that backs up your hard disk onto a server every night, or imports information directly into a database. You can even execute Windows commands using AppleScript and a Macintosh equipped with SoftWindows software.

Windows does not include any systemwide scripting capability.

54 The Mac OS is superior to Windows NT for mobile computing.

Macintosh PowerBook computers feature better PCMCIA card management. Windows NT has no hot swapping of PCMCIA cards and limited drivers for such cards, which makes it a poor choice for portables. Macintosh PCMCIA cards, however, have always been hot-swappable. And since so much of the card support is built into the Mac OS, PCMCIA card driver problems are very rare.

The Macintosh is more efficient with battery power. Unlike computers running the Mac OS, there are no power-management/sleep features in Windows NT. Also, because of the way Windows NT stores temporary files and uses virtual memory, hard disk drive access is increased, quickly depleting battery power in notebooks.

55 WorldScript technology makes the Mac OS a better global solution.

Apple designed Macintosh to be the first truly international personal computer, so it offers a variety of support technologies for languages that use non-Roman alphabets. A unique OS-level technology called WorldScript enables the Macintosh to support the complexities of many languages, including "two-byte" character sets, graphics, line layout, even typing direction. Apple even offers a series of software "Language Kits" that provide fonts and system software for a variety of languages.

Apple also recently released the Chinese Language Dictation Kit, a groundbreaking speech dictation system that converts Mandarin (Putonghua) speech into either simplified or traditional Chinese text. It's the most affordable Chinese dictation product on the market, and requires no additional hardware to operate on a Power Macintosh computer.

There is no comparable technology or products to the Macintosh Language Kits in the Windows 95 or Windows NT 4.0 platforms.

56 The Mac OS has fewer viruses.

Macintosh-hosted viruses are much less common than viruses specific to Windows and DOS. The Antivirus Research Center, a Symantec web site dedicated to tracking existing viruses on both Macintosh computers and PCs, shows that there are more than 8,000 PC viruses in existence, with two or three new ones appearing every day. In contrast, there are only 47 known viruses specific to the Mac OS.

The same web site states that "Many of the currently known (Macintosh) viruses are not designed to do any damage." Meanwhile, the PC virus information page says, "Some of the viruses identified are benign; however, a high percentage of them are very malignant. Some of the more malignant viruses will erase your entire hard disk, or delete files."

57 Macintosh computers have many unique, powerful applications.

The power of the PowerPC processor and the Mac OS is enabling software developers to create products that offer capabilities that simply weren't possible before. As a result, the Macintosh has gained a clear lead over PCs in terms of powerful applications—from three-dimensional rendering to flight simulators to speech recognition. The speed of the PowerPC processor also gives Macintosh computers a performance advantage in digital video, component software, and software emulators. Examples of the Macintosh advantage in software appear below:

Lari Software Electrifier: Powerful yet small-file-size web page graphics powered by QuickDraw GX

AVID Cinema: Simple yet powerful video editing tools included on several Macintosh models

Digital Harbor WAV: A multi-use OpenDoc-compliant word processor

Opcode StudioVison Pro: Professional music and sound editing software, only for Macintosh computers

Macromedia Freehand 7: Powerful graphics software utilizing AppleScript and ColorSync

Nisus Software Nisus Writer: WorldScript-compatible word processor capable of handling multiple languages (even non-Roman) in a single document

Terry Morse Software Myrmidon: Converts virtually any document into a web page

A list of hundreds of other Macintosh-only applications is available at www.apple.com/whymac.

58 Printing functions are more powerful on a Macintosh.

The original LaserWriter laser printer gave Macintosh users the power to be their own publishing house. And Macintosh still leads in this area.

The new LaserWriter 8.4.2 software included with Mac OS 7.6 provides many advanced printing capabilities, including inverted or flipped images, color matching, automatic border printing, and mixing of paper types within one document. For those who rely on Adobe PostScript, print jobs can be saved as a PostScript file.

As a print job is queued, an icon of the printer appears on the Macintosh desktop with a visual image of the file that's printing, so with one glance a user can see how far along a print job is. If a different printer is needed, one can be selected from a convenient menu on the menu bar.

Windows users will find that few of these options are available to them. Worse yet, every application may have its own printer options, so no uniformity is available, making it more difficult to produce high-quality output.

59 Apple component technology provides unique benefits.

Apple is leading the way in component software technology. The idea behind component technology is to get away from large, monolithic programs that are difficult to develop and even more difficult to use by creating smaller programs with more specific functionality—which users could combine to create their own custom solutions. Apple has been a leader in the component movement with OpenDoc and the LiveObjects Essentials Kit, included in Mac OS 7.6, which provide Macintosh users with a core set of such software.

With OpenDoc technology, a user can create a document that is constructed of a word processor "container" that includes "parts," such as a spreadsheet and a chart linked to each other, a QuickTime VR scene, embedded sounds, and a button that runs an AppleScript script. The document would look like a standard word processing document, but would include all of these "live" parts.

Apple has consistently taken an open approach toward components, offering our component technology as an open, nonproprietary cross-platform standard, as well as working actively with a variety of industry partners to ensure its widespread proliferation—and its optimal utility. In contrast, although Microsoft recently announced that it was "opening" its component architecture (originally called OLE and now known as ActiveX), it is in fact retaining control of a number of key component technologies—effectively maintaining ultimate ownership of ActiveX.

60 The Mac OS supports multiprocessing.

Numerous advanced applications for the Mac OS can support multiprocessing—the ability to use the power of multiple PowerPC microprocessors in the same Macintosh computer. For example, the Power Macintosh 9600/200MP has two 200-megahertz PowerPC processors for maximum processing capability. While Windows NT supports multiprocessing, Windows 95 has no multiprocessing support.

61 The Mac OS makes much better and more effective use of hard disk drives than Windows NT.

The extensive use in Windows NT of virtual memory and "swap files" (files that are stored briefly on the computer's hard disk drive and then deleted) means that Windows NT needs a rugged, high-speed hard disk drive to acheive acceptable performance. The constant creation and subsequent deletion of these swap files can cause hard disk drive fragmentation, which in turn will degrade hard disk drive performance, since it causes the computer to skip around to various locations to access a complete file.

The Mac OS is a much more efficient operating system than Windows NT and does not need to use nearly as much virtual memory and do as much "swapping" to operate effectively.

62 PCs can lose valuable information if their batteries fail.

Basic information about the setup of a PC is stored in a chip whose contents are maintained by battery power. In the case of a battery failure, a PC might lose information about its hard disk drive, causing it to be unable to access the drive for startup. But on a Macintosh, no vital information depends on battery power, so you can still use your system even if battery power is lost.

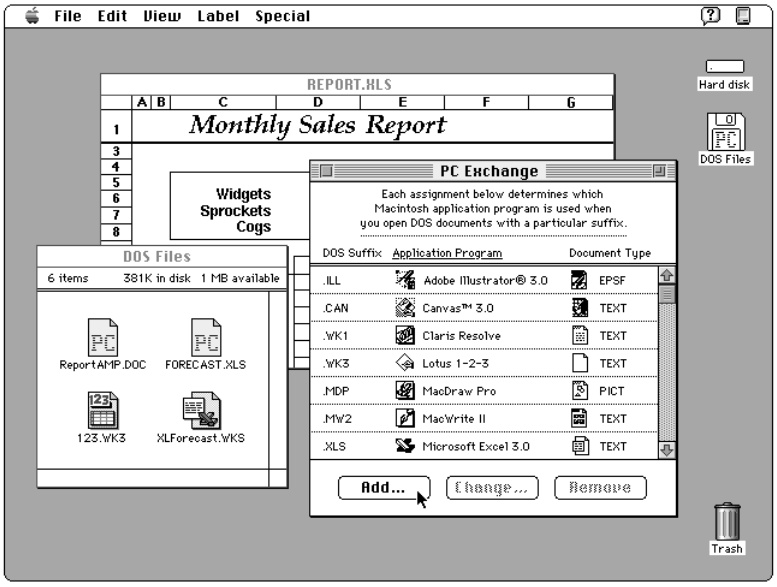
COMPATIBILITY ADVANTAGES

63 Macintosh computers let you run more applications.

With Insignia's SoftWindows application or with an Apple PC Compatibility Card installed in a Power Macintosh computer with PCI slots, you can run applications written not only for the Mac OS, but also for DOS, Windows 3.1, and Windows 95—more applications than any other mainstream personal computer. Macintosh users can preserve their investment in PC software while still taking advantage of the unique Macintosh features.

64 You can easily work with PC files on your Macintosh.

Every Macintosh sold today comes with software that lets you read PC media and work with PC files. PC Exchange software makes it possible for a Macintosh to read and format PC floppy disks. It can also assign files on those floppy disks to be opened directly from the desktop by Macintosh applications when double-clicked. Macintosh Easy Open will suggest a particular Macintosh application to open a PC data file type if one has not been assigned in PC Exchange. File translation is not a problem between Macintosh computers and PCs, either, since many of the most popular programs on both the Mac OS and Windows platforms—such as Microsoft Word and Excel, Corel WordPerfect, and Adobe Photoshop—have identical file formats between Macintosh computers and PCs. In cases where this is not accomplished inside an application, DataViz MacLinkPro translators, included with every Macintosh, will translate files from one format to another.



65 A Macintosh running Windows can share data between OS environments.

When you configure a Macintosh with a PC Compatibility Card from Apple, you essentially get two personal computers in one. The Macintosh shares a clipboard with Windows, so you can copy and paste text, graphics, and other information between the two operating systems. CD-ROM and network drives connected to the Macintosh can be mapped to drive letters on the Windows side, enabling easy common file access.

66 A Macintosh computer can be a client in virtually any network.

Macintosh computers can be connected to virtually any computer network system or host computer environment, often adding significant value and ease of use over other access methods. For example, Apple's Open Transport networking architecture, with its inherent support for TCP/IP, makes Macintosh an ideal platform for accessing the Internet—as well as the perfect choice as a client to an organizational intranet. In addition, Novell NetWare and Windows NT Server support the Macintosh platform and are often popular methods for sharing information between Macintosh computers and PCs. Apple also provides a range of options for connecting with other network types, including networks supporting IBM's SNA, Digital Equipment Corporation's DECnet, Novell's IPX, and other protocols.

VALUE ADVANTAGES

67 Macintosh computers include many features that cost extra on PCs.

It's a common belief that PCs cost less than Macintosh computers. But while some PC clones offer a lower "base price" than Macintosh computers, a feature-by-feature comparison shows that Macintosh computers provide the better overall value. That's because Macintosh computers include many key features that either cost extra or simply aren't available on most PCs.

Standard on Power Macintosh 8600...	What it allows you to do...	What it would cost to add to a PC running Windows 95...
Ethernet networking	Connect your computer to an Ethernet network.	Intel EtherExpress Card, $94.95[1]
SCSI expansion port	Add up to seven high-speed peripherals without opening the cover.	Adaptec AHA 2920 PCI SCSI Host Card, $149.95[1]
AppleScript scripting	Automate complex tasks.	Microsoft Visual Basic 4.0, Standard, $99.95[1]
Apple Desktop Bus (ADB) port	Daisy-chain a keyboard, a mouse, a drawing tablet, and other input devices, and use them all interchangeably.	No comparable, widely used function available for a PC
Speech recognition and synthesis	Operate your computer through spoken commands, and have your computer read text aloud.	Creative Labs AWE32 PnP Card, $249.99[1]
ColorSync	Work with consistent color.	Pantone ColorDrive Survival Kit for Win95, $229.95[1]
Video-input port–standard on the Power Macintosh 8600	Capture video clips on your Macintosh.	Intel Smart Video Recorder Card, $419.95[2]
TOTAL		$1,244.74

1 Prices verified via Internet on 2/97 from MicroWarehouse at www.warehouse.com

2 Prices verified via Internet on 2/97 from Cyberian Outpost at www.cybout.com

68 The Macintosh platform provides better customer support.

Apple supports not only the Macintosh computer, but also all Apple software. One call gets you the answers you need for both your Apple hardware and software questions. But many Windows users find that the manufacturer of their hardware will not support the preinstalled software, including Windows. Compaq recently started charging users for support calls that its technical support staff can trace to software rather than hardware causes.[1] As of this date, IBM and Compaq have stopped bundling Windows NT with their systems because of support costs[2]—instead Windows NT users must call Microsoft and be charged $95 per call.

You won't be on the phone forever with Apple. According to *PC World,* the average time a user waits to talk with a tech support person is 11.5 minutes. Of the 15 major computer manufacturers tested, Apple had the fastest response time, with a hold time of only 5.5 minutes.[3] *HomePC Magazine* also showed that Apple technicians diagnosed the problem over the phone faster than any of the 15 companies they checked.[4]

With Apple, you'll get the right answer. Among the 15 major computer vendors, Apple technicians were shown to be the most accurate in diagnosing a computer problem, according to *HomePC Magazine*.[5]

Maybe all these reasons are why *InfoWorld* magazine rated Apple technical support the best of all companies, not only those that manufacture computers, but also all other hardware and software companies.[6]

[1] PC World, *"Goodbye to Good Support," December 1996, page 143.*

[2] InfoWorld Electric, *"Major server vendors may no longer bundle NT OS with hardware," November 22, 1996.*

[3] PC World, *"Goodbye to Good Support," December 1996, page 145.*

[4, 5] Home PC Magazine, *"The Best in Customer Support," November 1996, page 158.*

[6] InfoWorld, *"Best of 1996: Technical Support Award," January 31, 1997.*

69 Macintosh computers retain their usability and value longer.

People keep their Macintosh computers 25 percent longer. Computer Intelligence and NFO conducted a study in which they concluded that the average Macintosh computer's life span is 25 percent longer than that of its Windows-based counterpart.[1]

You don't have to buy a new Macintosh every few years to keep up with the latest technology. This is not true with the Windows market. Most PCs sold just three years ago are unable to run Windows NT 4.0. Many PCs sold just five years ago cannot run Windows 95. But the Macintosh IIci, which was introduced in 1989, can run Mac OS 7.6.1 today. You can enjoy the Internet, QuickTime multimedia, and more without having to replace your system.

Macintosh computers have higher resale value. A Macintosh Quadra 605 computer (released in 1993) with 4 megabytes of RAM and a 160-megabyte hard disk retains 30 percent more resale value over the same time period than a comparable 486SX/25 PC from Packard Bell. Over a no-name PC clone, the figure rises to almost 50 percent more.[2]

[1] *Computer Intelligence Installation Database, October 1996, and NFO Consumer Panel Survey, October 1996.*

[2] *Figures based on calculations from United Computer Exchange's PC Appraisal software.*

70 The Macintosh is rated more reliable—for the third year in a row (PC World).

No one wants a computer that is plagued with problems. For the third year in a row, *PC World* magazine has rated Apple best in reliability among the 15 major computer vendors.* This means that you can purchase a Macintosh with confidence, knowing that you will be more productive than those who are left holding on the phone to tech support.

* PC World, *"Goodbye to Good Support," December 1996, page 144.*

71 Macintosh has better backward compatibility.

The Macintosh has long provided excellent backward software compatibility, ensuring that users can run their older software on new Macintosh models or on new versions of the Mac OS. Even as Apple was transitioning to the PowerPC processor with its RISC architecture in 1994, we made certain that the new computers would run older software. And we will continue to provide this backward compatibility in the future, even as we move forward with new advances in technology.

The Windows world does not have this same assurance. Every new version of Windows has included features that make backward compatibility of existing applications an issue. What ran on DOS or Windows 3.1 didn't necessarily run on Windows 95; and DOS, Windows 3.1, and Windows 95 software didn't necessarily run on Windows NT. And Microsoft has made it known that they will be changing the way their next operating system handles the file system and hardware drivers, so we can expect more premature application obsolescence again in the near future. All this means time lost upgrading to new software and, once again, more money.

The advent of the Intel MMX processor also makes it necessary for users to abandon current software for rewritten MMX versions. When combined with changes in Windows, PC users are caught in a never-ending struggle to keep their brand-new computers working with their software—a complex and expensive proposition.

72 Macintosh computers require less hardware than PCs running Windows to run similar applications.

To run the latest system software, Mac OS 7.6, Apple recommends a minimum of 8 megabytes of physical RAM with virtual memory set to make a total of 16 megabytes. Minimum hard disk space needed for installation is less than 10 megabytes. You can therefore run Mac OS 7.6 easily on a Macintosh IIci, which dates back to 1989. But what about Windows NT? Microsoft says that Windows NT can be run on a 486DX/25 computer with 16 megabytes of physical RAM and 117 megabytes of hard disk space. However, several Windows publications, including *PC Magazine,* disagree. Windows NT Workstation 4.0, according to them, really needs a minimum of a 75-megahertz Pentium processor and 32 megabytes of RAM to be usable. But to run really well, they recommend even more RAM—64 megabytes.* And your old video card, BIOS chip, and hard disk drive might not be sufficient enough or might not even work with Windows NT because of driver incompatibilities.

Considering all the hardware needed, it's apparent that even a PC just three years old might not run Windows NT, whereas an eight-year-old Macintosh will run Mac OS 7.6.

*PC Magazine, *"The Big Business Upgrade," by Jim Seymour, September 10, 1996.*

73 The Mac OS is more stable than Windows 95.

One of the greatest frustrations encountered by computer users is a system crash or freeze. The Mac OS is less prone to freeze unexpectedly or crash than its Windows 95 counterpart, according to a study by Evans Research Associates. This study shows that users who have used both Macintosh computers and PCs find, by a margin of two to one, the Mac OS to be more stable than Windows 95.*

**Evans Research Associates, "Personal Computer Satisfaction," May 1996, available on apple.com/whymac.*

74 Macintosh users are the most brand loyal of all computer users.

One excellent indication of user satisfaction is brand loyalty–how likely a user is to buy their next computer from the same manufacturer. According to a study conducted by Computer Intelligence in June 1996, Apple is the number one computer company worldwide in brand loyalty. In fact, an astounding 87 percent of Macintosh users repurchase Macintosh computers, far more than any other vendor.

75 "Dual users" prefer their Macintosh.

Perhaps the best comparison of Macintosh computers versus Windows PCs comes from users who know both systems very well. Evans Research Associates found in an independent study that "dual users"—those who routinely use both Macintosh computers and PCs running Windows 95—preferred the Macintosh in many important categories.* The following are the percentage of dual users that rated each system as "excellent" (9 or 10 on a 10-point scale) in various categories.

	Macintosh with System 7.5	Windows 95 PC
Overall satisfaction	60%	41%
Overall productivity	59%	42%
Overall ease of use	78%	37%
Graphics and publishing	85%	27%
Multimedia	71%	36%
Ease of learning	78%	29%
Ease of connecting peripherals	74%	39%
Ease of setup and installation	69%	33%
Ease of connecting to a LAN	62%	42%
Running educational software	46%	32%
Ease of troubleshooting	41%	21%

Dual users were also asked to pick which system they preferred for these three questions (a fraction of the users preferred neither).

	Macintosh with System 7.5	Windows 95 PC
"Which system is more enjoyable to use?"	52%	39%
"Which system allows you to be more creative?"	53%	27%
"Which system is more stable?"	58%	29%

So before you buy your next computer system, make sure to do a hands-on test of both a Macintosh and a Windows-based PC. That's the best way to truly understand the Macintosh Advantage!

**Evans Research Associates, "Personal Computer Satisfaction," May 1996.*

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