

AppleDirections

CONTENTS

NEWS	
QuickTime 3.0 for Windows and Mac OS Unveiled	1
Strategy Mosaic: Understanding Apple's Dual OS Strategy	1
QuickTime 3.0 Receives NAB Award	6
Apple Plans Continued Improvements to Open Transport	6
Hot New Products Take the Field	7
Mac OS 7.6.1 Update Delivers Better Reliability	10
Mac OS and Rhapsody Release Update	10
Adobe Will Support the Rhapsody OS	10
OpenStep Documentation on the Apple Developer CD	10
Personal Web Sharing 1.0 Ships	10
Apple Announces QuickTime's OMF Importer	11
Apple Brings the FireWire Digital Video Standard to Market	11
New Software Releases	12
BUSINESS AND TECHNOLOGY	
CD Highlights: System Software Edition	13
Business Feature: A Copyright Primer for Multimedia Developers	13

APPLE NEWS

QuickTime 3.0 for Windows and Mac OS Unveiled

QuickTime is Apple's award-winning, industry-standard multimedia architecture for Windows and Mac OS that makes it possible to create, integrate, and publish all types of digital media. QuickTime is the leading choice of multimedia content creators and software developers—an estimated 20,000 sites on the web now offer QuickTime content, and 1,500 leading CD-ROM developers are releasing more than 200 new QuickTime-enhanced titles every month.

With the anticipated release of QuickTime 3.0, Apple brings major advances to the world's leading multimedia delivery software. This is the first time the full power of QuickTime—including the ability to capture, edit, compress, and play back digital media—is available for all major personal computer platforms, including Windows 95, Windows NT 4.0, and the Mac OS.

QuickTime 3.0 Supports Wide Variety of Digital Media File Formats

Digital content creators regularly work with many media types simultaneously, including video, audio, still images, 3D, and text. The process of integrating each of these various media elements into a production is time consuming and error prone, and managing the wide range of relevant file formats is a daunting task. Now, with QuickTime 3.0, the job of combining disparate media types stored in various file formats is greatly simplified.

QuickTime 3.0 supports playback, editing, and integration of QuickTime, MPEG, AVI, OMF, DVCAM, and OpenDML files, providing

please turn to page 5

STRATEGY MOSAIC

Understanding Apple's Dual OS Strategy

By Gregg Williams,
Apple Directions staff

Strategy Gives Choices, New Opportunities

In the wake of the announcement of Rhapsody as Apple's next (no pun intended) operating system, there's been some confusion about the future of the Mac OS. The thinking goes something like this: By Apple's own admission, Copland was positioned as the replacement for the Mac OS. Now that Rhapsody has replaced Copland as the next operating system Apple is working on, doesn't that mean that Rhapsody will replace the Mac OS and that further investment in Mac OS software is a waste of resources?

No, not at all. Let me state Apple's position as clearly as possible: *Rhapsody is not a replacement for the Mac OS; rather, both operating systems are part of a dual OS strategy.* It's true that in the past, Copland consumed most of Apple's development resources and the Mac OS was neglected, but Apple has learned from that mistake and has reallocated its resources to ensure that the Mac OS remains a powerful, innovative operating system.

In this article, I'll discuss why Apple is pursuing a dual OS strategy, why the Mac OS will continue to be a strong and vibrant market for you, and what Apple expects Rhapsody to deliver to customers and developers. However, if you don't remember anything else from this article, remember this: Apple has a dual OS strategy in which both the Mac OS and Rhapsody are vital to Apple's success.

please turn to page 2

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STRATEGY MOSAIC

Dual Strategy

continued from page 1

Why a Dual OS Strategy?

Apple has recommitted to the Mac OS as a direct result of its realization that to succeed, it must pursue a dual OS strategy. Here are the most important arguments for such a strategy:

- Apple realized that it could not deliver all the features the market demands in one operating system. Some customers need such OS features as full memory protection, preemptive multitasking, multithreading, and symmetric multiprocessor support. Apple attempted to add such features to existing Mac OS features in Copland and was unable to do so without significant compromise on both sides. That failure indicates that the solution is to have two operating systems that follow different goals.

- Two operating systems provide a better "fit" for customers. The Mac OS and Rhapsody are meant to serve two different (but overlapping) audiences. Some customers will want the additional performance and stability for mission critical applications that Rhapsody will offer, or they will need software that is available only for Rhapsody. Other customers will have their needs met entirely by the Mac OS. In this way, the Mac OS and Rhapsody are similar to Windows 3.1/95 and Windows NT, two operating systems that have coexisted for years.

- The existence of two operating systems ensures that many Mac OS users who cannot or do not wish to make the transition to Rhapsody will still be supported by Apple. By continuing to invest in the Mac OS, Apple is protecting the investments of these customers and ensuring that they are not left behind.

The Future of the Mac OS

The message of Apple's dual OS strategy is that innovation will continue on the Mac OS platform and that it will be an even stronger platform for software development than it is today. The following sections give details that support this message.

A Guaranteed Audience for Mac OS Software

You may be concerned that customer adoption of Rhapsody will mean a decrease in the demand for Mac OS software. For the

foreseeable future, that will not be the case. The reason for that is Rhapsody's built-in support for the Mac OS and Mac OS software.

Mac OS support is a key component of Rhapsody's success. Rhapsody will include a subsystem (called the *Blue Box*) that will allow Rhapsody to run almost all Mac OS software that doesn't directly manipulate the hardware; this includes applications, extensions, and desk accessories. The Blue Box is essential to Rhapsody's success because it will allow the operating system to survive its early days as a commercial product. Until such time that the collection of software that supports the modern Rhapsody APIs (application programming interfaces) is as rich and varied as that of the Mac OS, customers will be able to adopt Rhapsody with the assurance that if the software they need isn't available for Rhapsody, they can find it in the existing collection of high-quality Mac OS software.

The Blue Box will ensure that Rhapsody users will still be customers for Mac OS software. In fact, whenever Rhapsody is adopted by a customer who isn't currently using the Mac OS, that person will actually *increase* the audience for Mac OS software.

Apple's Commitment to the Mac OS

In terms of scheduled releases, Apple has committed to continued yearly major releases of the Mac OS. This release schedule begins with the release of Mac OS 8 this July, followed by major releases in the middle of 1998 and 1999 (code-named *Allegro* and *Sonata*, respectively). In addition, Apple has committed to releasing two Mac OS updates between Mac OS 8 and Allegro.

On the engineering side, Apple has shown its recommitment to the Mac OS in the most tangible way possible: by increasing its engineering staff. According to Steven Glass, vice president of Mac OS engineering at Apple, the number of Mac OS engineers is now six times greater than the number of Mac OS 7 engineers two years ago, when Apple was directing most of its attention to Copland.

Glass also says that the Mac OS engineers have a different focus than they did in the past. Before, they spent a lot of their time inventing new APIs for you to adopt. Now the focus is on improving the operating system's performance and stability and on making focused improvements to the operating system that deliver value to the customer.

Innovations in Mac OS 8

You can look at Mac OS 8 to gauge Apple's commitment to the Mac OS. Apple is innovating on several levels, with many improvements coming from technologies originally planned for Copland.

One of the largest areas of innovation in Mac OS 8 is that of the human interface. By advancing the human interface in Mac OS 8, Apple intends to maintain its industry leadership in graphical user interfaces and offer a human interface that is more powerful and easier to use than those of competing platforms. Here are some of the new human-interface features you'll see in Mac OS 8:

- A new "platinum" appearance for the Mac OS human interface
- Pop-up windows, which minimize themselves as a rectangular title bar at the bottom of the screen
- Spring-loaded folders, which allow the user to drop a file into a folder nested several levels deep in one drag operation
- Contextual menus, which allow the user to display a pop-up menu of useful actions that relate to the current selection
- A scalable interface that uses "short menus" and "view by button" options to enable users to customize the Finder to different levels of complexity
- Live scrolling of a window's contents as the user moves the scroll bar's "thumb"

Mac OS 8 also contains a number of other improvements:

- Increased system stability and performance
- A PowerPC processor–native, threaded Finder, which is faster and more responsive to the user
- Tighter integration of Internet access through panel-based "assistants" (similar to Apple Guide guides) that help users set up and maintain their Internet accounts
- Personal Web Sharing, which enables users to serve their own web pages to the Internet or an intranet from their own computers

- The ability to run Java™ applets and programs through Mac OS Runtime for Java

Future Innovations in the Mac OS

Beyond Mac OS 8, Apple is currently determining the feature sets for Allegro and Sonata, the Mac OS releases scheduled for delivery in mid-1998 and mid-1999, respectively. Apple is focusing not only on further improving performance and stability, but also on delivering exciting new features and enhancements that will keep you and your customers happy. With this in mind, I can tell you about a few technology tidbits that are due to arrive before Allegro.

As I wrote in last month's Strategy Mosaic, "DVD—Taking Software Beyond CD-ROM," Apple will soon release Macintosh computers that contain DVD-ROM drives. To support these drives, Apple will be making two additions to Mac OS system software. First, it will add support for UDF (Universal Disk Format), the volume format used on DVD-ROM discs. Second, Apple will improve the Hierarchical File System (HFS), the result being an enhanced file system code-named *HFS Plus*. This file system will support a smaller allocation block size (to decrease the space wasted by small files), a larger maximum file size, and a larger maximum volume size.

As I mentioned earlier in this article, Mac OS 8 will include contextual menus, which are pop-up menus that include choices that are meaningful for the currently selected item. Help items are standard in every contextual menu, while other menu items can be generated by either the active application or by contextual menu plug-in software.

Apple will soon deliver *Apple Data Detectors (ADD)*, a pattern-matching technology you can employ to help customers accomplish useful tasks. Using ADD, you can create programs (also called *data detectors*) that recognize, for example, a valid e-mail or web address, phone number, or social security number. You can use a data detector and a corresponding "action" program to generate a contextual menu item that will perform a

useful task based on the recognized text. For example, with the ADD technology and the right detector and action, you could implement the following behavior: When you select some text that contains "408-555-8752" and display the contextual menu, you get a menu item labeled "Dial 408-555-8752"; if you choose that menu item, the computer dials that number for you.

The ADD technology itself should be available to users by the time you read this; a version that you can use to add this technology to your products will be available later this year.

Key Mac OS Technologies Will Continue to Move Forward

While Apple has put some technologies into "maintenance mode" (see the box "Myth: Maintained = Dead" on page 4), Apple will continue to improve those technologies that it sees as key to the health of the Mac OS platform. The following are the most visible Mac OS technologies that Apple will continue to improve:

- The QuickTime Media Layer, or QTML (QuickTime, QuickTime VR, and QuickDraw 3D)
- Java (as implemented by Mac OS Runtime for Java)
- The Mac OS user experience

In addition, Apple has big plans for MacApp, its software development framework. MacApp Release 13 is due later this year; a beta version is scheduled for release in late May. (For more details, see "MacApp Release 13: A Major Update," on page 14 of the April 1997 issue of *Apple Directions*.)

Apple has plans for continued improvements to MacApp after Release 13. In response to developer requests for a cross-platform framework and a transition path to Rhapsody, Apple is working on a Windows version of MacApp and, later, a Rhapsody version that will make it possible for existing MacApp programs to be ported to Rhapsody. The goal is eventually to make it possible for you to have one source code base (containing code specific to each platform, as needed) from which you can compile Rhapsody, Mac OS, and Windows 95/NT versions of the same program.

Rhapsody: An Industrial-Strength OS

Rhapsody is not a replacement for the Mac OS. Rather, it is a new, industrial-strength operating system from Apple for suitably

July Apple Directions Online

The July issue of *Apple Directions* will be available by June 15 on the web at <http://www.devworld.apple.com>.

configured PowerPC processor-based computers. Rhapsody is a direct response to customer requirements for a “modern” operating system that delivers such features as full memory protection, preemptive multitasking, multithreading, and symmetric multiprocessor support. The sections that follow describe Rhapsody more fully and explain its benefits.

The Audience for Rhapsody

Rhapsody has a number of features that distinguish it from the Mac OS, and it is for these features that customers will adopt it. Some users will adopt Rhapsody because of its robustness, stability, and performance. Others will adopt it because of the new applications that can be created using the Rhapsody feature set and the object-oriented tools with which Rhapsody applications are built. Finally,

some users will adopt Rhapsody because of its ability to take advantage of advanced hardware designs (for example, support for multiprocessor computers).

As time goes on and more software is created expressly for Rhapsody, more customers will move over to Rhapsody. Some users will even move to Rhapsody to run their Mac OS software: Such software running in the Blue Box cannot crash the entire computer when it malfunctions. However, the customers most likely to be early adopters of Rhapsody will be those running publishing, new media, Internet, and web authoring software on desktop and server computers.

The Releases of Rhapsody

Apple plans to make Rhapsody available in three separate releases across a one-year peri-

od. The first release, the Rhapsody Developer Release, is a developer-only release that is scheduled for mid- to late-1997. It will definitely go to all members of the Macintosh Developer Program (Partner, Associate, and Associate Plus members) who have signed blanket nondisclosure agreements (NDAs), as part of the normal software seeding process. Apple is also exploring other ways of getting this release to developers. (If your company is already a program member but has not signed a blanket NDA, which is also called a “Prototype License Agreement and Nondisclosure,” you can get one by calling Apple Developer Support at 408-974-4897 or 1-800-633-2152 or by accessing the web page at http://devworld.apple.com/devsecure/MTS_NDA.html.)

Because the only function of the Rhapsody Developer Release is to get a version into developers’ hands for application development as quickly as possible, it will not have the Mac OS–like human interface that will be released to the public in later versions.

The second release, the Rhapsody Premier Release, is scheduled for early 1998. It is meant for early-adopter customers and will include a partially-finished human interface and a partial implementation of the subsystem that supports Mac OS software (the Blue Box). The third release, the Rhapsody Unified Release, is scheduled for mid-1998. It is the first release of Rhapsody meant for widespread public use, and it will include the first full implementation of the Rhapsody human interface and the Blue Box.

The Advantages of Using Rhapsody

Rhapsody includes a number of features that customers will value:

- It is a “modern” operating system that will deliver such features as full memory protection, preemptive multitasking, multithreading, and symmetric multiprocessor support.
- It will allow customers to run most Mac OS software (that is, almost all software that doesn’t directly manipulate hardware).
- It will retain the Mac OS ease of use and an enhanced human interface that Mac OS users will be comfortable with.
- It will combine the best Apple and NeXT technologies, including Apple’s human-interface, multimedia, color management, font, and scripting technologies, along with NeXT’s imaging model, internationalization technology, and object-oriented development environment and tools.

Myth: Maintained = Dead

Last March, Apple announced that several Mac OS technologies (including Game Sprockets, Open Transport, OpenDoc, and Cyberdog) were going into “maintenance mode.” Some developers took that statement as proof that Apple was abandoning the Mac OS, even though Apple stated that “most of the elements of the Mac OS are maintained in this sense today—yet customers and developers use them daily.” Apple’s point is a good one—would anyone say that the Mac OS is dying because Apple hasn’t added any features to QuickDraw recently?

Because it’s important to understand how and where Apple is supporting the Mac OS, I’ve been asked to clarify what Apple means by “maintenance.” Here is the definition I came up with, one that has been approved by Apple engineering managers:

Maintenance includes bug fixes, improvements in performance and reliability, and changes needed to ensure that a technology’s current API will continue to work with new releases of the Mac OS. The fact that a technology is in maintenance mode will not prevent Apple from enhancing it at some future point to meet developer and customer needs.

Here are several data points that prove that a technology in maintenance mode is not frozen in stasis:

- After Apple put Cyberdog and Game Sprockets into maintenance mode, it released new versions of them: Cyberdog 2.0 (a major revision), DrawSprocket 1.1.2, and InputSprocket 1.2. (The SoundSprocket technology has been moved to the Apple Interactive Media Group and will evolve as part of QuickTime and QuickTime VR.)
- A new version of Open Transport, version 1.2, will ship with Mac OS 8. This version will fix some significant bugs that are present in the current version.
- As mentioned in the main text of this article, Apple will enhance the Hierarchical File System (HFS) to support DVD-ROM drives. (This is an example of Apple enhancing a maintained technology to meet a customer need—in this case, to enable the Mac OS to handle the next new form of mass storage.)
- Apple will ship OpenDoc 1.2 and Cyberdog 2.0 as part of Mac OS 8.

Another thing to keep in mind is that all these technologies will work in the Rhapsody Blue Box. This means that you can use them without worrying about losing part of your potential audience—both Rhapsody and Mac OS customers will still be able to run your software.

- It will embrace existing and emerging multimedia and Internet standards, including TCP/IP, Java, and the QuickTime Media Layer (QuickTime, QuickTime VR, and QuickDraw 3D).

- Rhapsody will be a good operating system for running server applications, and many of the modern operating system features of Rhapsody make it an attractive platform for developers who want to create full-featured server solutions.

In addition, Rhapsody is built upon development technologies that will help you create powerful applications in much less time than you currently need for Mac OS applications:

- The software objects that are included in the OpenStep operating system will provide you with a lot of software that you would otherwise have to write. In addition, the object-oriented nature of writing Rhapsody software will enable you to modify and extend existing objects instead of having to write them from scratch.

- OpenStep and its associated development tools offer a development environment that allows you to be much more productive than ever before. For example, I saw someone build an OpenStep application that was a superset of the SimpleText text editor, com-

plete with scrolling windows and a customized About box, in under 15 minutes. This application was built using an OpenStep development tool called *Interface Builder*, which enables you to use visual programming to create human-interface elements (for example, menu items) and instances of OpenStep classes (for example, modal dialog boxes) and specify interactions between items (for example, causing the About box to appear when its menu item is selected).

- Rhapsody will offer you a platform for cross-platform development. You will be able to recompile Rhapsody applications to run under multiple operating systems. In particular, Rhapsody will enable you to reach three important platforms—Rhapsody, Windows 95/NT, and Intel computers running a new OS (as yet unnamed) that is a port of Rhapsody without the Blue Box on Intel computers—and you can reach these platforms simultaneously with one development effort and one set of code to write, debug, and maintain. It's important to note that this cross-platform strategy isn't just a promise that may or may not be fulfilled—NeXT already offers the technology that enables you to port OpenStep programs to Windows 95 and Windows NT, and that technology will be a part of Rhapsody.

A Dual-OS, Multiple-Platform Strategy

The Apple community is beginning a period of transition, not from Mac OS to Rhapsody, but from a single-OS, single-platform strategy to a dual-OS, multiple-platform strategy.

This new strategy will mean choices for customers. Mac OS customers will have a choice of operating systems, and both Mac OS, Windows 95/NT, and Intel-computer customers will have a wider choice of applications from which to choose.

In addition, Apple's new strategy will mean choices for you. You can continue to create Mac OS software, knowing that Apple will continue to improve on the Mac OS platform and that there will be a continuing market for your software. In addition, you will soon be able to start developing Rhapsody software. This will enable you to develop software in less time, create innovative products that would be impossible on the Mac OS platform, and reach new customers in the Windows 95 and Windows NT markets.

Mac OS or Rhapsody? It's not a transition that Apple will force on you, but a choice that you will make based on the products you want to create and the markets you want to reach. It will be your choice as to whether, how, and when you will adopt the Rhapsody platform. ♣

APPLE NEWS

QuickTime 3.0 Unveiled

continued from page 1

one of the highest levels of interoperability with all major video file formats.

QuickTime 3.0 also supports industry-standard digital audio file formats, including Wave, AIFF, Sound Designer II, AU, and MPEG Layer 2, as well as many common still image, animation, and MIDI formats. Since the QuickTime architecture is fully extensible, new media types, compression schemes, and file formats can be readily supported as they emerge.

Media Abstraction Layer Promotes Compatibility and Innovation

One of the most significant features of the QuickTime 3.0 software architecture is the Media Abstraction Layer. The Media Abstraction Layer ensures that QuickTime's underlying media technologies can be

enhanced or accelerated without affecting compatibility with existing applications.

For example, QuickTime 3.0 introduces support for the DVCAM file format. Through the Media Abstraction Layer, existing applications can immediately use this important new media format without requiring software modifications.

For developers, the Media Abstraction Layer greatly reduces the cost of supporting emerging technologies. The Media Abstraction Layer means that QuickTime-enabled applications are ready to take advantage of the latest technology advances—including multiprocessing and Intel's MMX processor technology—regardless of the platform.

"QuickTime remains the only multiplatform environment for digital media authoring to deliver the level of seamless functionality and no-compromises quality required by broadcast professionals," said John Molinari,

president and CEO of Media 100. "QuickTime is at the heart of our Media 100 digital video systems, used by over 10,000 communicators worldwide—enabling programming of video, animations, compositing, and 3D graphics that might be impossible to do otherwise. Our company remains firmly in support of Apple, and QuickTime is central to our product offerings on both the Macintosh and Windows NT platforms."

Isaac Babbs, general manager of the Audio Video Division at Macromedia, is enthusiastic in his support of QuickTime. "QuickTime for Mac and Windows is the ideal solution for Macromedia's stringent cross-platform and quality requirements, and we are proud to be supporting Apple and QuickTime as a codeveloper of the 3.0 standard," said Babbs. "Final Cut, a software product under development for digital video editing, compositing, and effects being previewed at NAB [the National

Association of Broadcasters show], is being designed with QuickTime as the first cross-platform open system media layer allowing hardware independence. Using the latest versions of QuickTime on both Windows and Macintosh system software, Final Cut will work with a variety of digital video hardware.”

“Indeo video’s interactivity, combined with QuickTime for Windows’ flexible architecture, will create a powerful PC multimedia authoring environment,” said Kevin O’Connell, Intel Indeo Video product manager. “Through the QuickTime Media Layer, content developers will get direct access to Indeo video’s unique multimedia features, including live ‘blue screen’ compositing, processor scalability, video assist protection, and real-time video effects. What’s more, Indeo video’s MMX technology enhancements let QuickTime take advantage of the high performance Intel’s latest Pentium processors deliver.”

QuickTime 3.0 has garnered widespread industry approval, with many leading multimedia companies committing to support QuickTime 3.0 in their products and 66 companies endorsing the QuickTime architecture.

QuickTime 3.0 Features

Here are some of QuickTime 3.0’s most significant developments:

- *Support for the DVCAM format.* With its built-in support for the DVCAM file format, QuickTime 3.0 makes it possible for all existing QuickTime-enabled applications to work with DVCAM streams today. DVCAM data can be played back, edited, and combined with other digital video standards like Motion JPEG (M-JPEG). Because DVCAM data can be used from any QuickTime-enabled application, DVCAM sound and video can easily be converted to other formats for delivery to CD-ROM, the Internet, or Video CD. QuickTime

provides full software support for DVCAM, so that virtually any computer running QuickTime can access, display, and manipulate DVCAM data.

- *Accelerated visual effects.* QuickTime 3.0 contains enhancements that standardize the way QuickTime-based applications work with visual effects and transitions. QuickTime’s support for visual effects consists of three key elements:

- Transparent support for both software-based and hardware-accelerated visual effects rendering, which makes it easy for video-editing applications to use visual effects without regard for the underlying implementations

- A complete set of built-in software-based effects, including cross-fade, chroma keying, SMPTE wipes, and color adjustments; developer-defined effects and transitions are possible through a powerful plug-in architecture

- Standardization of effects descriptions within the media composition

This uniform representation ensures that user-specified effects sequences are accurately rendered across the widest possible range of hardware and software configurations. In addition, this standardization allows plug-in effects added later to be accessible from existing applications.

- *Expanded support for M-JPEG.* QuickTime 3.0 now supports four different formats of M-JPEG compressed video, a compression technique used in most desktop video production hardware. QuickTime’s comprehensive implementation allows video professionals and editors to work with M-JPEG video independent of the hardware originally used to capture the video. QuickTime 3.0 adds support for OpenDML M-JPEG and Avid Video Resolution (AVR) M-JPEG, in addition to QuickTime’s current support for both Apple-defined M-JPEG formats.

Developers can license QuickTime 3.0 for redistribution with applications, titles, and media clip libraries that support QuickTime. For additional licensing information, contact Apple Software Licensing (512-919-2645 or sw.license@apple.com).

More information about QuickTime 3.0 is available at <http://quicktime.apple.com/>.



QuickTime 3.0 Receives NAB Award

As we went to press, we learned that QuickTime 3.0, the latest release of Apple’s industry-standard digital media software, received *Television Broadcast Magazine*’s “Editors Pick of Show” Award for the advancement of the art and science of television broadcast at the recent National Association of Broadcasters (NAB) show.

“QuickTime 3.0 solves the problems our readers are most concerned with,” said Michael Silverglide, editor of *Television Broadcast Magazine*. “A flexible, functional, and high-quality environment is crucial to broadcast professionals working with many types of media simultaneously. QuickTime 3.0 delivers on these requirements with its multiplatform support, uncompromising interoperability, and performance. *Television Broadcast Magazine* applauds industry successes such as this, and this Pick of Show award from NAB recognizes Apple’s efforts and innovation with QuickTime 3.0.”



Apple Plans Continued Improvements to Open Transport

Since Apple’s restructuring last March, there have been some developer concerns over the fate of Apple’s Open Transport networking architecture, which was labeled as being in “maintenance mode.” (For more on what this term means, see the box “Myth: Maintenance = Dead” on page 4.) Here is a definitive statement on the future of Open Transport from Richard Ford, product manager for Open Transport:

“Mac OS continues to be Apple’s premier and mainstream operating system. It ships on over 1 million new systems each quarter and is also made available through retail channels, which allows current customers to upgrade their Mac OS-compatible computers. Apple has committed to deliver annual major Mac OS releases, as well as periodic system updates between major releases. Further updates to Open Transport will accompany each update to the Mac OS.

Corrections

On page 1 of the May 1997 issue of *Apple Directions*, we reported that UMAX Computer Corp. was offering a \$1,299, Mac OS-based computer containing an 80-MHz PowerPC 603e processor. The correct speed for the processor is 180 MHz, and the price has since been reduced to \$1,199. We apologize for the inadvertent error.

—The *Apple Directions* Staff

"As of Mac OS 7.6, Open Transport is installed by default on all systems and includes Open Transport 1.1.1 and the new Open Transport/PPP 1.0. Mac OS 7.6 supports all PowerPC processor-based Mac OS compatible systems, as well as machines that are 32-bit clean and use a Motorola 68040 or 68030 processor. A previous version of the Mac OS, version 7.5.3, had been a transition release for Open Transport—users had the option to run either Open Transport or the old 'classic' networking software. Open Transport/TCP delivers substantially better performance than the technology it replaced, MacTCP, providing all Apple customers with a powerful, modern foundation on which to build new and exciting Internet applications.

"For developers, Open Transport offers a market that continues to grow by over 4 million units each year. Since Open Transport is delivered with every copy of Mac OS (sold either with a new computer or as a retail product), the market for new Open Transport-based products and upgrades offers substantial business opportunities for developers. In addition, there are the technical benefits of Open Transport, including APIs that simplify development of transport-independent applications, native code on Power PC processor-based systems, and a human interface, consistent across all protocols, that reduces the amount of technical support needed to support your product.

"Apple has recently delivered several new technologies that take advantage of Open Transport to offer new capabilities with excellent performance. These include Apple ATM Networking Software, Macintosh Runtime for Java (MRJ), Personal Web Sharing, and AppleShare IP 5.0 (which is currently in a beta version). Through adoption of Open Transport, these technologies deliver dramatically improved performance over older versions that used classic networking.

"As a result of the recent restructuring, Apple has changed its previously announced plans for many technologies. Open Transport is one of the technologies affected. In particular, Apple has canceled the Open Transport 1.5 release and has replaced it with a series of smaller Open Transport releases that deliver bug fixes and new features as part of each update to the Mac OS. Another significant change is that Apple will require users to update to the latest version of the Mac OS to use the latest version of Open Transport.

"The first release under this new plan is

Open Transport 1.2, which will accompany Mac OS 8 in July. This update to Open Transport will include over 40 high-priority bug fixes and performance enhancements that will increase the overall stability and performance of Mac OS systems. Future releases of Open Transport will continue to tune performance, reduce the possibility of system crashes, and offer additional features that were previously part of Open Transport 1.5—most notably, single-link IP multihoming, which will provide new opportunities for developers of Internet server software (such as web, FTP, and e-mail servers). The Open Transport evangelism and marketing staffs are actively working with developers to prioritize new features for potential inclusion in future versions of Open Transport."



Hot New Products Take the Field

Apple's spring lineup of hot new products includes the first 300-MHz desktop computer, new Power Macintosh computers for K-12 education, a new line of high-performance Power Macintosh computers, the fastest laptop computer on the market, the QuickTake 200 digital camera, the MessagePad 2000, and the Twentieth Anniversary Macintosh.

First 300-MHz Desktop Computer

At an unprecedented speed of 300 MHz, the new lightning-fast Power Macintosh 6500/300 computer is blowing the doors off the competition. Following closely on the heels of Apple's introduction of the PowerBook 3400—the fastest laptop computer currently available—the new Power Macintosh 6500 series gives you a choice of systems ranging in speeds from 225 to 300 MHz, all with accelerated multimedia features; built-in Internet access capabilities; and advanced video capture, editing, and publishing options. The announcement reflects Apple's drive toward a simplified desktop series under the strength of the Power Macintosh brand.

Equipped With New Motorola PowerPC Chip

The new high-performance PowerPC 603e chip significantly enhances the performance of the Power Macintosh 6500 systems in areas such as media capture, creation, editing and publishing, 2D and 3D graphics, and proces-

sor speed. Based on in-house tests running real applications, the new Power Macintosh systems complete tasks up to twice as fast as Pentium processors with MMX technology running at 200 MHz. (Performance may vary depending on the tasks being performed.)

Performance

The Power Macintosh 6500 minitower systems are equipped with powerful integrated hardware and software components. Each come with a minimum 256K level 2 cache, with 512K standard on the 6500/275 and 6500/300 systems; 32 MB to 64 MB of RAM (expandable to 128 MB); a 3 GB or 4 GB hard drive; and 16-bit CD-quality stereo sound with SRS "surround sound" and integrated dual-mode subwoofer. Iomega Zip drives are standard in three models, allowing you to easily transfer large files, back up critical applications, and expand storage capacity. The ATI RAGE II graphics acceleration chip features video and graphics performance previously seen only in high-end systems. The advanced multimedia functionality of the 6500 series includes accelerated QuickTime and QuickTime MPEG for impressive full-screen, full-motion movie playback; accelerated QuickDraw and QuickDraw 3D for fast, fluid handling of complex 2D and 3D graphics; and accelerated video capture for video editing, Internet videoconferencing, and general-purpose image input.

Other standard features include 2 MB of video RAM to support millions of colors on 17-inch monitors, a built-in 12x-speed CD-ROM drive, a built-in 33.6 Kbps modem for fast "single-click" connectivity to the Internet, and advanced telephony capabilities such as digital voicemail and send/receive fax.

Configurations and Availability

The Power Macintosh 6500 series is available in five different configurations. Additionally, each system comes with an array of powerful, high-quality applications and CD-ROMs. The Power Macintosh 6500/300 and Power Macintosh 6500/275 systems are scheduled to ship in limited quantities later this spring. The Power Macintosh 6500/225 and 6500/250 models are scheduled to ship immediately. You can get pricing and configuration information at <http://product.info.apple.com/pr/press.releases/1997/q3/970404.pr.rel.300mhz.html>.

A complete description of features and a full list of the preinstalled home software is available at the Power Macintosh 6500/300

web site at <http://entripowermac.apple.com/6500/6500-300.html>.

PC-Compatibility Power Macintosh Systems Unveiled

Apple just introduced two PC-compatible computers: the Power Macintosh 7300/180, which has a 180-MHz PowerPC 604e RISC processor and a 166-MHz Intel Pentium processor; and the Power Macintosh 4400/200, which has a 200-MHz PowerPC 603e RISC processor and a Cyrix PR166 6x86 processor. These solutions are targeted primarily at business and education customers who want the power and ease of use of a Macintosh computer, but who also need Windows compatibility. The 166-MHz Intel Pentium processor PCI card is also available as an upgrade card, allowing PCI-based Power Macintosh computers to run DOS and Windows applications.

Because the PowerPC processors in the new PC Compatible 7300/180 and 4400/200 Power Macintosh systems work independently from the Pentium or Cyrix processors on the 12-inch PC Compatibility Cards, customers can run Macintosh and DOS/Windows applications concurrently and instantly switch between Mac OS and DOS/Windows environments. Data can also be cut and pasted between environments. In addition to standard Macintosh networking capabilities, Power Macintosh systems installed with the PC Compatibility Card support MS-DOS and Windows networking applications and services using Novell NetWare IPX/SPX, TCP/IP, and NETBEUI protocols over the built-in Ethernet network connection. The cards provide fast multimedia and application performance through the high-resolution accelerated graphics ATI Video as well as on-board Sound Blaster 16 support for high-fidelity audio output.

Apple will also offer the PC Serial and Parallel Card, a new PCI card that features both an RS-232 and a bidirectional ECP parallel port. This card allows you to connect legacy IBM-compatible or PC peripherals to a PC Compatibility Card. Apple plans to make the new PCI card available in June 1997.

A complete list of Power Macintosh 7300/180 features and benefits is available at http://powermacintosh.apple.com/Products/7300_180.html.

You can view a list of Power Macintosh 4400/200 features and benefits at http://powermacintosh.apple.com/Products/4400_200.html.

For pricing and availability, see <http://product.info.apple.com/pr/press.releases/1997/q3/970404.pr.rel.pc-pmsys.html>.

Small Business Power Macintosh Computers Announced

In conjunction with the recent announcement of the Power Macintosh 6500 and 4400 models, Apple unveiled the Apple Small Business Macintosh series of computers. The new Small Business Macintosh 6500 and 4400 systems are designed to provide users with a comprehensive small business solution right out of the box. Initially, Apple will ship the Small Business Macintosh 6500/250 and the Small Business Macintosh 4400/200. The computers are bundled with industry-standard software and feature a built-in fax modem, 12x-speed CD-ROM drive, digital answering system, and speakerphone. Small Business Macintosh computers are preinstalled with leading business software, including Microsoft Office, Norton Utilities, Now Up-To-Date and Contact, Jian BizPlan Builder, and MacPublisher.

Apple Macintosh 6500/250

The flagship product in the series is the Apple Small Business Macintosh 6500/250, part of the new line of Power Macintosh 6500 systems. It comes with a 250-MHz PowerPC 603e RISC processor with 256K level 2 cache, 48 MB of RAM, 2 MB of video RAM, a 4 GB hard disk, and a 1.4 MB floppy disk drive. Hardware features include a built-in 12x-speed CD-ROM drive; a 100 MB Zip drive; and a fax modem that transmits data at up to 33.6 Kbps, and transmits faxes at up to 14.4 Kbps. The new Macintosh also features a built-in speakerphone and digital answering machine as well as six internal expansion slots and six external expansion ports.

Apple Macintosh 4400/200

The Apple Small Business Macintosh 4400/200, part of the new line of Power Macintosh 4400 systems, is based on a 200-MHz PowerPC 603e RISC processor with 256K level 2 cache, 32 MB of RAM, 2 MB of video RAM, a 2 GB hard disk, and a 1.4 MB floppy disk drive. It also comes with a built-in 12x-speed CD-ROM drive; built-in speakerphone and digital answering machine; and a fax modem that transmits data at up to 33.6 Kbps, and transmits faxes at up to 14.4 Kbps. The 4400 series Small Business Edition also includes six internal expansion slots and six external expansion ports.

Pricing and Availability

The Apple Small Business Macintosh 6500/250 will be available at an estimated retail price of U.S. \$2,599, and the Apple Small Business Macintosh 4400/200 will be available for an estimated retail price of U.S. \$1,999. The Small Business Macintosh series will be available through retail channels as well as through distributors, VARs, and resellers.

For a list of features for both of these computers, see the Small Business web site at <http://smallbusiness.apple.com/Bundles/hardware.html>. You'll find a list of the preinstalled software and resources at <http://smallbusiness.apple.com/Bundles/prodrev.html>.

New PowerBook 3400 Is Fastest Laptop on the Market

With its 240-MHz 603e PowerPC processor, "hot-swappable" expansion bay that can contain a CD-ROM drive or a third-party Zip drive, 12.1-inch color screen, four-speaker sound system, and built-in Ethernet and modem connections, Apple's fast new PowerBook 3400 is the first laptop computer that can actually be considered a viable alternative to its larger desktop cousin.

For an in-depth article on the new PowerBook 3400, see "New PowerBook 3400 Is Fastest Ever" in the April 1997 issue of *Apple Directions*. For more information, visit the PowerBook web site at <http://powerbook.apple.com/>.

For a very favorable review of the PowerBook 3400c, Apple's top-of-the-line color portable computer, see product reviewer William Casey's comments in the April 14 issue of the *Washington Post* at <http://www.washingtonpost.com/wp-srv/WPlate/1997-04/14/027L-041497-idx.html>.

Casey writes about the new PowerBook: "The 3400c is not a radical departure from what came before it. Instead, it embodies the best of what 1997 technology can deliver in terms of high performance and usability. In concrete terms, it offers virtually all the power and convenience of a desktop computer packaged in a modest-sized unit. That sounds like hyperbole, but it's a computer that for me fulfills—at long last—the promise of the last two PowerBooks I bought, both of which turned out to be satisfactory but not the over-performing near-desktop machines I'd imagined."

QuickTake 200 Digital Camera Is Compact, Lightweight, and Easy to Use

Apple's new QuickTake 200 Digital Camera gives you everything you need for easily capturing, editing, and sharing digital images on computers, television, or videotape. With a look and feel similar to a traditional camera, the Apple QuickTake 200 is very simple to use, but its digital technology offers more functionality than any other similarly priced product.

For more information on the QuickTake 200 Digital Camera, see "The Apple QuickTake 200 Camera" in the April 1997 issue of *Apple Directions*, or visit the digital camera web page at <http://www.imaging.apple.com/cameras/cam-main.html>.

Apple's MessagePad 2000 Ships

Apple recently began shipping the MessagePad 2000—a mobile computer for the business professional and one of the fastest handheld Internet computers on the market. The MessagePad 2000 offers the versatility of a laptop computer and includes e-mail, fax, and Internet access capabilities, as well as personal productivity software, all in an ultra-light 1.4-pound unit. Incorporating the 160-MHz StrongARM processor, the MessagePad 2000 performs up to ten times faster than current handheld computers in the market and works easily to exchange data with both Windows-based and Mac OS-based computers.

"A lot has been said about putting the functionality of a business computer into a handheld computer," said Jim Groff, senior vice president of the Information Appliance Division at Apple. "In demonstrating the MessagePad 2000 over the past few months, we have showed a lot of people worldwide that it is achievable. The MessagePad 2000 has set a high standard for mobile computing—one that competitors will have a hard time matching."

Large Software Library

The MessagePad 2000 incorporates a new version of the award-winning Newton operating system, which enables the MessagePad to support additional functionality such as voice recording and a 16-level gray-scale screen. The computer comes preconfigured with a web browser and e-mail client software (optional modem and Internet Service Provider required for Internet access), a word processor, a spreadsheet (available in most configurations), and Newton address book, calendar, and notes applications. Because it includes

Apple's Newton Connection Utilities, the computer can exchange data with many major Windows and Macintosh personal information management applications, including Microsoft Schedule+ 7.0, Lotus Organizer 2.1, and Claris Organizer 2.0. The MessagePad 2000's Auto Dock feature makes these data transfers easy. The MessagePad 2000 can also transfer data to and from Microsoft Excel or Word on both Windows and Mac OS-based systems.

Weeks of Run Time on a Single Charge

Four AA alkaline batteries or a rechargeable battery pack with one-hour recharge will power the device for up to six weeks of normal usage. The computer has two Type II PC Card slots that support many wired and wireless communication solutions already shipping for the Newton operating system, as well as expansion for applications and memory cards. An "instant on" feature lets you quickly begin working—there's no waiting for the device to start up.

Many Standard and Optional Features Available

The MessagePad 2000 comes standard with 5 MB RAM and 8 MB of ROM, Cirrus Voyager chip set, and a power-efficient, backlit screen with 16-level gray scale. The entire width of a fax or web page can be scaled to view, and the screen can rotate 360 degrees, which means that users can view and work on the screen horizontally, vertically, or upside down, depending on their preference. A built-in microphone and speaker enables users to record and play back voice dictation. Options include a lightweight, touch-type keyboard (standard in some configurations), NiMH rechargeable battery pack, AC adapter, and additional flash memory cards. Built-in software enables direct printing to serial, IrDA, and LocalTalk printers. The optional Print Pack allows printing to parallel printers.

Broad Support by Software Developers, Systems Integrators

The Newton OS is supported by more than 250 solution providers and 300 systems integrators and value-added resellers. Several major hardware developers, including Digital Ocean, Harris, and Schlumberger, are building their own information appliances based on the Newton operating system. Third-party "vertical" applications include health care patient record management, field service route delivery, and sales force automation.

The estimated retail price of the MessagePad 2000 in the United States, including a word processor, e-mail package, and web browser applications, is approximately \$949. Retail prices may vary depending on channel, dealer, and country.

You can read the full press release on this product at <http://product.info.apple.com/pr/press.releases/1997/q2/970324.pr.rel.msgpad.html>.

Anniversary Macintosh Scheduled to Ship

Apple's Twentieth Anniversary Macintosh computers offer a glimpse into the future of computer design. With its rich features of polished metal casing and Italian leather, the Twentieth Anniversary Macintosh makes a profound visual statement. The innovative, flat-panel design features a total entertainment center, including a television tuner, CD player, and computer. Inside the sleek, 2-inch-thick housing, there's an active-matrix display, hard disk and floppy drives, a CD-ROM drive, an AM/FM tuner, a PowerPC 603 RISC processor, an Acoustimass sound system by Bose, a cable adapter for composite video, and a custom keyboard with a detachable trackpad.

"We were looking to define a radically new solution in Industrial Design when we began designing the Twentieth Anniversary Macintosh," said Jonathan Ive, Apple's senior director of Industrial Design. "Its smooth integration of personal computer and consumer appliance are clear indications of the future of technology design."

The sound system of the Twentieth Anniversary Macintosh was custom-designed by Bose Corporation, the world's leading audio technology company. Two-inch, wide-range speakers flank the Twentieth Anniversary Macintosh and are augmented by a separate Acoustimass module that delivers deep, rich bass.

The result is the first computer sound system that envelops the user and provides an uncanny sense of interactivity with what takes place on screen. The Acoustimass module, designed to be placed on the floor and out of sight, also cleverly hides the power supply and is connected to the main unit with just one cable.

Using only the best available active-matrix screens, the Twentieth Anniversary Macintosh offers a bright, flat-panel display that renders lifelike images in thousands of colors. The same design also contributes to a slim CPU footprint, which greatly simplifies placement

of the Twentieth Anniversary Macintosh in home or office.

In addition to the CD-ROM drive and 12.1-inch active-matrix screen, the Twentieth Anniversary Macintosh concept features a fast 250-Mhz PowerPC processor, a 2 GB hard disk, and 32 MB RAM to run any applications. Standard Macintosh SCSI and serial ports also are included, as well as an s-video input port with composite video feeds.

The Twentieth Anniversary Macintosh is scheduled to ship in June, and U.S. customers will be able to purchase the special edition for approximately U.S. \$7,500. Actual prices may vary, depending on resellers. Interested buyers can register their intent to purchase at <http://www.twentiethanniversary.apple.com>.

Apple has set aside a number of Twentieth Anniversary Macintosh computers for purchase by members of the Apple Developer Program. Special ordering and pricing information will be sent to program members who reside in the United States, Germany, France, the United Kingdom, and Japan as soon as it is available.



Mac OS 7.6.1 Update Delivers Better Reliability

Apple recently released Mac OS 7.6.1 Update, a set of system software enhancements that improves the overall reliability of the Mac OS and brings the benefits of Mac OS 7.6 to the most recently introduced Mac OS-based systems. This release is not intended to deliver any new features, nor does it deliver updates to technologies already available through download sites on the Internet and online services.

Mac OS 7.6.1 Update is Apple's rapid response to feedback from customers and developers on Mac OS 7.6. Here are some of its enhancements:

- Nearly all type 11 errors are now properly classified as type 1 or type 2 errors. These errors cause the active application to quit, but allow customers to save their work in other applications before restarting the computer.
- Customers with 68030- and 68040-based computers will benefit from an updated CFM-68K Runtime Enabler, which allows these computers to use applications that take advantage

of the Code Fragment Manager (CFM).

- PowerBook customers will benefit from improvements in serial device compatibility, PC storage cards, and removable CD-ROM drives.

Mac OS 7.6.1 Update is available electronically, free of charge, at <http://support.info.apple.com/ftp/7.6.1.html>.

In the United States, customers may order Mac OS 7.6.1 Update on four floppy disks for U.S. \$10 (plus tax and shipping/handling) by calling 1-800-293-6617. Customers running a localized version of Mac OS 7.6 should not install the U.S. version of Mac OS 7.6.1 Update. Localized versions of the update will be released within approximately 90 days of the U.S. version. The European mirror site is at <ftp://ftp.info.euro.apple.com/Apple.Support.Area/Apple.Software.Update>.

The Mac OS 7.6.1 Technote, which presents a detailed list of changes, is posted at <http://www.devworld.apple.com/dev/technotes/tn1096.html>.



Mac OS and Rhapsody Release Update

As a result of Apple's restructuring, the company has changed its delivery schedule for Mac OS releases in 1998. Instead of issuing two major releases in 1998, code-named *Allegro* and *Sonata*, Apple will release only one Mac OS release, *Allegro*, in mid-1998. *Sonata* is scheduled to ship in mid-1999. To make the latest system improvements readily available, Apple will ship two minor system updates (instead of one) between Mac OS 8 and *Allegro*.

Rhapsody's anticipated ship date remains unchanged: the Rhapsody Developer Release is due in mid-to-late 1997, the Rhapsody Premier Release is due in early 1998, and the Rhapsody Unified Release is due in mid-1998.



Adobe Will Support the Rhapsody OS

MacWEEK writer Matthew Rothenberg recently interviewed Adobe Systems President Charles Geschke, and during this interview, Geschke affirmed Adobe's commitment to the

Mac OS platform. Geschke predicted that after a transition period, all the company's professional software will be Rhapsody-native. He went on to say that in two or three years Adobe's applications "would all be on Rhapsody, and there wouldn't be any concept of another Apple operating system at that point."

Geschke also anticipates an easy transition to Rhapsody's Display PostScript™ imaging model, which is based on Adobe's own technology.

You can read the complete *MacWEEK* article at http://www.macweek.com/mw_1115/nw_geschke.html.



OpenStep Documentation on the Apple Developer CD

For those of you who want to get ahead on the Mac OS and OpenStep operating system transition, you can now download Adobe™ Acrobat versions of *Discovering OpenStep: A Developer Tutorial*, *AppKit Reference*, *Foundation Reference*, and *Topics in OpenStep Programming* from the NeXT web site at <http://www.next.com/Pubs/Documents/Download/apple.html>.

The *Discovering OpenStep* book is considered to be a good place to start learning about OpenStep.

If you're a member of an Apple Developer Program, you can find this documentation on the May 1997 Edition of the Developer CD.



Personal Web Sharing 1.0 Ships

Apple recently announced the shipment of its Personal Web Sharing 1.0 server software. Designed for individuals and small workgroups, this new product enables web publishing without the dedication of a separate computer as a server. Based on Internet standard protocols, Personal Web Sharing extends Apple's traditional file-sharing capabilities to intranet-based webs.

According to Jim Gable, vice president of Platform and Technologies Marketing,

Personal Web Sharing is a natural evolution of something Apple has always done. "Apple has offered networking capabilities with its Personal File Sharing technology for years. Personal Web Sharing is the same concept with Apple now supporting Internet standards," said Gable. "We feel this product is an excellent multiplatform web-publishing solution for groups that need to share information such as sales reports, curriculum information, draft proposals, meeting minutes, and so on—without having to work around the schedule of a dedicated server administrator."

Based on technology licensed from Maxum Development, Personal Web Sharing 1.0 is a complete publishing solution for an intranet. Personal Web Sharing includes Claris Home Page Lite, which allows customers to easily create their own web pages. This version of Home Page masks the ability to view HTML and is designed for customers who are unfamiliar with HTML creation.

The Personal Web Sharing software runs as a background application controlled by the Web Sharing control panel, which allows users to turn the sharing server on and off, designate a shared folder, and designate which file, if any, will be displayed as a home page for the server. Because Personal Web Sharing runs in the background, there is minimal performance impact on foreground applications even when the server is under a heavy load. Moreover, while it's acting as a web server, the computer remains free for other uses. Access privileges are acquired from the standard Mac OS Users and Groups control panel. Like any other shared folder, access to the web folder can be granted on an individual or group basis, with passwords if desired.

Users of Personal Web Sharing can also share files over an intranet without creating HTML pages. The software's Personal NetFinder component not only allows users to simply drop a file into the appropriate folder for sharing, but permits web browsers to display listings of files in a shared folder. This function facilitates the search for documents because icons for all the files in each folder are shown within the browser window. Personal NetFinder provides information on each file's name, size, kind, and last modification date, and it can display headers and footers on listing pages, which can be used to display title graphics and links to other pages.

More information on Personal Web Sharing pricing and configuration is available at

<http://product.info.apple.com/pr/press.releases/1997/q3/970409.pr.rel.web.html>.

Personal Web Sharing will also be integrated with the Mac OS 8 operating system, which is scheduled for completion in July of 1997. Personal Web Sharing can be purchased now at <http://www.software.net> or <http://www.buydirect.com>.



Apple Announces QuickTime's OMF Importer

QuickTime's OMF (Open Media Framework) Importer, a new extension to QuickTime, was recently introduced by Apple. This extension streamlines the media creation process for producers of digital media content by allowing them to use QuickTime-enabled tools to manipulate the audio and video stored in OMF-formatted files.

OMF was developed by Avid Technology in cooperation with other industry partners in the post-production and broadcast industries. Because OMF is a high-end post-production format, it has not been widely supported by desktop video-editing applications. QuickTime's OMF Importer now makes it easy for QuickTime-enabled tools to work with this important professional media format.

Users of OMF media now have instant access to the broad range of QuickTime-enabled multimedia and video production tools. Award-winning video software products—including Adobe After Effects, Adobe Premiere, Avid Cinema, and Radius Edit, as well as Macromedia's much-anticipated Final Cut—were all written to support QuickTime. With QuickTime's OMF Importer, users can directly access OMF files from their existing video tools. This direct access makes it easy to repurpose professional content for Internet or CD-ROM delivery using tools such as Terran Interactive's MovieCleaner Pro. Furthermore, users don't have to go through a time-consuming conversion process, because QuickTime's OMF Importer allows them to use OMF files directly without first having to convert them to the QuickTime Movie format. And because the OMF files are accessed directly, no recompression is required, so full image fidelity is maintained.

With QuickTime's OMF Importer, QuickTime users will be able to see and hear the contents of OMF files without requiring any hardware or application software updates. QuickTime 3.0 contains all the software decoders necessary for viewing and manipulating the supported OMF media types. Users can thus access OMF files on any QuickTime-enabled system, including Windows NT, Windows 95, and the Mac OS. QuickTime's OMF Importer provides access to audio and video media assets in OMF files; future releases are expected to support additional features found in OMF media files.

More information about OMF is available from the OMF Developers' Desk at Avid Technology (1-800-949-6634 or 508-640-3400) and at <http://www.avid.com/omf/>.



Apple Brings the FireWire Digital Video Standard to Market

Apple recently became the first computer vendor to provide operating system support for FireWire. FireWire technology—developed by Apple and approved as the IEEE 1394 high-performance serial bus standard—enables fast, easy, and economical transfers of digital information between a personal computer and peripheral devices such as digital video camcorders. It will foster the development of new digital video-editing capabilities for the Mac OS. Apple will deliver this support through a software extension to the Mac OS that developers can use to create solutions for connecting FireWire-enabled peripherals to Mac OS-based computers.

Developers can use the FireWire 1.0 API (application programming interface), along with their own software and a FireWire PCI card and cable, to offer customers a complete solution for connecting high-speed peripherals to the computer. Companies such as Miro, Digital Processing Systems, and Radius have announced solutions that allow a Power Macintosh computer to work directly with a Sony or a Panasonic DV camcorder using the FireWire interface. Customers can use these solutions for nonlinear video editing or still-image capture of digital video data. Other companies, such as Adaptec and Texas

Instruments, have announced products for development of FireWire solutions.

FireWire provides many advantages over other peripheral interconnection technologies. The cables are as simple to connect as telephone cords—they don't need screws or latches. And, unlike SCSI technology, FireWire is autoconfiguring, so it eliminates SCSI device ID conflicts and the need for terminators. FireWire is also a hot plug-and-play technology, which means that a user can disconnect and then reconnect a device without needing to restart the computer. FireWire is fast: It can transfer digital data at 200 megabits per second, and an increase to 400 megabits per second is planned for later in 1997. In addition, the FireWire technology supports expansion—up to 63 devices can be attached on the same FireWire bus. Finally, FireWire includes support for isochronous data transfer, which provides guaranteed bandwidth for real-time video and audio streams.

FireWire 1.0 is available to developers immediately. Developers interested in obtaining the API can make the request by e-mail (firewire@apple.com). FireWire 1.0 is provided to customers through FireWire solutions from third-party developers. Apple also plans to make FireWire 1.0 available with the release of Mac OS 8.

FireWire PCI-card solutions are compatible with any Power Macintosh or Mac OS-based computer with an available PCI slot and Mac OS 7.6 or later.

For additional information on FireWire, see <http://www.firewire.org> or <http://www.firewire.apple.com>.



New Software Releases

Here are some of the new software releases that Apple recently announced.

Metrowerks C/C++ Compiler Updates

You can now download from the Internet version 1.7.1 of the Metrowerks MPW tool C/C++ compilers and linkers and the

Metrowerks IDE C/C++ 1.7.1 update at <http://www.metrowerks.com/db/updates.qry?function=list&sw=cw11>, <ftp://ftp.metrowerks.com/pub/updates/>, or <ftp://ftp2.metrowerks.com/pub/updates/>. If you are connecting from Europe, you may want to try the mirror site at <ftp://ftp.promo.de/pub/Metrowerks/mirror/updates/>.

Newton Toolkit for Windows, Version 1.6

Apple recently announced the availability of Newton Toolkit for Windows 1.6, an object-oriented development tool that enables Windows programmers to develop software for Newton OS-based mobile computers, including the new MessagePad 2000. Newton Toolkit for Windows 1.6 includes an object-oriented programming environment and complete documentation. The retail price for the kit is expected to be U.S. \$150. You can order online at <http://www.devcatalog.apple.com>.

Mac OS Version 7.6.1 Update

For an overview of what's new in this system software release, see the story "Mac OS 7.6.1 Update Delivers Better Reliability" on page 10. The Mac OS 7.6.1 Technote, which presents a detailed list of changes, is posted at <http://www.devworld.apple.com/dev/technotes/tn1096.html>.

You can download this update from several online services and web sites. To get started, visit <http://support.info.apple.com/ftp/7.6.1.html>.

Apple Disk Copy Version 6.1.2

Disk Copy 6.1.2 is a utility that will mount disk images on your desktop, make exact copies of floppy disks from a disk image, convert disk images from one format to another, and create a disk image from a mounted volume or individual folder. This new version includes these enhancements:

- Disk Copy can now mount images directly from an AppleShare 5.0 server, over an AppleTalk or TCP/IP connection.
- The Mount Image and Convert Image commands now include a Skip button during checksum verification.
- If Disk Copy 6.1.2 is in the foreground and a disk is inserted, the Create Image From Disk command will automatically start.

- Disk Copy can image nonmountable disks.
- Support for Macintosh Application Environment has been improved.
- Some AppleScript recording anomalies have been corrected.
- Aspects of the interface have been improved.

You can download this program at <http://support.info.apple.com/ftp/swhome.html>.

Cyberdog 2.0

The latest version of Cyberdog, Apple's Internet communications extension that will be integrated into Mac OS 8, can now be downloaded at <http://cyberdog.apple.com/download/dodownload.html>.

PowerTalk Migration Tools, Version 1.0

In response to the discontinuation of PowerTalk development in Mac OS 7.6, Apple has assembled documents and tools to help you migrate your code away from this set of utilities. You use the Business Card Exporter to transfer personal catalog (business card) information to a tab-delimited text file. You can also export business card information in formats used by some popular e-mail programs. You use the AppleMail Reader to read AppleMail documents when PowerTalk is not installed. You can download these migration aids at <http://gemma.apple.com/dev/powertalk/powertalk.html>.

Claris Em@iler, Version 2.0

The new version of this powerful e-mail management tool is now shipping. Product and ordering information are available at the Claris web site at <http://www.claris.com/products/claris/emailer/site/emailer.html>. ♣

Business & Technology

CD Highlights System Software Edition, June 1997

Business Feature A Copyright Primer for Multimedia Developers

CD HIGHLIGHTS

System Software Edition

Since little technical documentation has been released recently (besides the Rhapsody Open-Step documentation on last month's disc), and lots of worldwide system software needs to get out, we decided this month to replace the regularly scheduled June Reference Library Edition of the Developer CD Series with a System Software Edition, featuring worldwide versions of Mac OS 7.6, the 7.6.1 Update, Open Transport 1.1.2, QuickDraw 3D 1.5 and 1.5.1, QuickDraw GX 1.1.5, and QuickTime 2.5. Other new and revised packages are listed below.

Disk Copy 6.1.2

Disk Copy 6.1.2 is a utility application that will mount disk images on your desktop, make exact copies of floppy disks from a disk image, convert disk images from one format to another, and create a disk image from a mounted volume or individual folder. Using DiskScripts and AppleScript, it can be used to automate software installations and disk image manipulation.

Drive Utilities

This package contains Disk First Aid 7.2.2, a disk repair utility, and a new version of Drive Setup 1.2.3, a program that lets you partition, initialize, and update fixed and removable disks.

Gestalt Selectors List 3.7

This document lists all selectors known to the creator of the Gestalt Selectors List for use with the Gestalt Manager. These can include selector codes installed by Apple system software or by third-party software. The information in this list is useful for programmers who use the Gestalt Manager with their software (even using externals, as with HyperCard, 4th Dimension, and so on). *Note: This is not an Apple product. It is provided on an as-is basis.* Apple is not responsible for any problems you may encounter in its use.

Macintosh CD-ROM Setup 5.3.2

This folder contains the network installation version of Apple's CD-ROM driver.

Sample Code Update

- *ARPSample1.0b1.* The Open Transport ARP module provides an ARP service that is used by the Open Transport TCP/IP stack. This sample demonstrates how you can get direct access to the ARP module—for example, to add and remove ARP cache entries.
- *FinderDragPro.* FinderDragPro demonstrates how to use the Drag Manager's flavor-TypeHFS and flavorTypePromiseHFS routines

and, to a lesser extent, how to interact with the Finder through Apple events. This sample serves as an illustration for Technote 1085; you may find it useful with or without the tech note.

- *MoofWars 1.01.* MoofWars is a DrawSprocket sample game that shows a few techniques for fast drawing of sprites as well as a scrolling, tiled background. With about 1,400 sprites on the screen, this code can achieve 15 frames per second on a Power Macintosh 7100/66 computer and more than 30 frames on an Power Macintosh 8500/120 computer. Thanks to DrawSprocket, this sample game takes full advantage of page flipping—with fewer sprites on the screen, a Power Macintosh 8500 computer fully loaded with video memory can achieve 66 frames per second with full-screen 640-by-480 pixel animation.

- *NeoTextBox97.* This routine is a replacement for the Toolbox call TETextBox, with some added features, such as returning the bottom edge of the text as drawn. NeoTextBox is also described in *develop* Issue 9 ("The TextBox You've Always Wanted," page 31).

- *TPIFile1.0b1.* TPIFile is a sample TPI module that lets you open a "TPIFile" endpoint, connect that endpoint to a Mac OS file using FSSpec, and then read that file using standard Open Transport API calls (for example, OTRcv). This sample requires Open Transport 1.1.1 or later.

The Developer CD Team

BUSINESS FEATURE

A Copyright Primer for Multimedia Developers

By J. Dianne Brinson and
Mark F. Radcliffe

New multimedia technologies make it easier than ever to combine film and television clips, music, graphics, photographs, and text into a software product. Unfortunately, these technologies *also* make it easier for you to infringe on someone's copyright without even realizing it. And ignorance of copyright

laws could jeopardize your project's schedule and budget.

Multimedia law is a complex and evolving area of the law. As a multimedia developer, you often have to weave together bits and pieces of "content" plucked from radically different industries. Over the years, each of these industries has developed its own set of legal rules for intellectual property protection, leaving you and your lawyer to sort through stacks of

legal tomes. In this article, we offer some ideas on avoiding copyright infringement in the

Editor's note: This article is designed to provide information on copyrights. It is not legal advice. Don't make copyright decisions armed only with information contained in this article—obtain professional legal advice first.

United States and dispel some common copyright myths. This article is, of course, no substitute for professional legal advice. But it gives you, in plain English, enough information to speak intelligently to your lawyer or a content provider.

A Case Study

Perhaps the best way to illustrate the nuances of copyright law is to review the efforts of a fictitious multimedia developer, Productions, Inc., in creating an interactive training product called *You Can Do It*.

Let's assume that this product's script was written by a freelance writer. The product begins with an excerpt from a recording of Julie Andrews singing "Climb Every Mountain." It ends with a photograph of Lauren Bacall shown above the words "Good luck."

In this example, if the Productions staff didn't obtain permission to use the recording of "Climb Every Mountain" or the photo of Lauren Bacall, *You Can Do It* infringes three copyrights: the copyright on the song, the copyright on the Julie Andrews recording of the song, and the copyright on the photograph. Productions is also infringing Lauren Bacall's right of publicity (which is separate from copyright) by the commercial use of her image. Furthermore, if Productions didn't acquire ownership of the

script from the freelance writer, Productions doesn't have clear title to *You Can Do It*, and its distribution may infringe the writer's copyright of the script.

So, what is Productions risking in this situation? If any of the copyright owners challenge Productions, the owners may be able to get a court order preventing further distribution of this multimedia product. And this type of revenue loss isn't one that most companies can afford to risk.

Three Steps to Avoiding Copyright Infringement

Here are three steps to help you avoid copyright infringement:

1. *Assume that most of the third-party material you will want to use in your multimedia product is protected by copyright.* At the beginning of your multimedia project, play it safe by budgeting time and resources for copyright issues. Most of the material that you use is probably protected for two reasons.

First, the types of third-party works that you'll most likely want to use—text, graphics, film and television clips, music, and photographs—are the types of works that are protected by copyright. In copyright terminology, these are all "works of authorship." (Software and interactive multimedia works

themselves are also copyrightable "works of authorship.")

Second, under current copyright law, it's easy to get copyright protection. Copyright protection arises automatically when an "original work of authorship" is "fixed in any tangible medium of expression." It's not necessary to file a copyright registration application to get copyright protection (although there are some good reasons for doing so). Most works easily meet the "originality" requirement, because a work is original in the copyright sense so long as it owes its origin to the author—that is, it was not copied from some preexisting work. A work can be original without being novel or unique. Only minimal creativity is required to meet the originality requirement, and no artistic merit or beauty is required.

A work can incorporate preexisting material and still be original. An example is a multimedia title that contains a clip from a famous classic film. When preexisting material—in this case, the film clip—is incorporated into a new work, the copyright on the new work covers only the original material contributed by the new author. And if the preexisting material is protected by copyright, the new author must get permission to use that material.

Five Common Licensing Myths

There are a number of myths out there concerning the necessity of obtaining a license for use of copyrighted materials. Here are five. Don't make the mistake of believing them:

Myth 1: "The work I want to use doesn't have a copyright notice on it, so it's not copyrighted, and I'm free to use it." Most published works contain a copyright notice. However, for works published on or after March 1, 1989, the use of a copyright notice is optional. The fact that a work doesn't have a copyright notice doesn't mean that the work is not protected by copyright.

Myth 2: "I don't need a license because I'm using only a small amount of the copyrighted work." It is true that *de minimis* copying (copying a small amount) is not copyright infringement. Unfortunately, it's rarely possible to tell where *de minimis* copying ends and copyright infringement begins. There are no "bright line" rules.

Copying a small amount of a copyrighted work is infringement if what is copied is a qualitatively substantial portion of the copied work. In one case, a magazine article that used 300 words from a 200,000-word autobiography written by former President Gerald Ford was found to infringe the copyright on the autobiography. Even though the copied material was only a small part of the autobiography, the copied portions were among the most powerful passages in the autobiography.

Copying any part of a copyrighted work is risky. If what you copy is

truly a tiny and nonmemorable part of the work, you may get away with it (the work's owner may not be able to tell that your work incorporates an excerpt from the owner's work). However, you run the risk of having to defend your use in expensive litigation. If what you are copying is tiny, but recognizable as coming from the protected work, it is better to get a license. You cannot escape liability for infringement by showing how much of the protected work you did not take.

Myth 3: "Since I'm planning to give credit to all authors whose works I copy, I don't need to get licenses." If you give credit to a work's author, you are not a plagiarist (you are not pretending that you authored the copied work). However, attribution is not a defense to copyright infringement.

Myth 4: "My multimedia work will be a wonderful showcase for these copyright owners' work, so I'm sure they won't object to my use of their work." Don't assume this. Even if they're willing to let you use their works, they'll probably want to charge you a license fee. Content owners view multimedia as a new market for licensing their material. (The posting of copyrighted information on online bulletin boards has become a hot issue, so to be safe, get permission before you post another person's work.)

Myth 5: "I don't need a license because I'm going to alter the work I copy." Generally, you cannot escape liability for copyright infringement by altering or modifying the work you copy. If you copy and modify protected elements of a copyrighted work, you will be infringing the copyright owner's modification right as well as the copying right.

2. *Analyze how you'll be using copyrighted material in your multimedia product.* A copyright owner has five exclusive rights in the copyrighted work. These rights allow the owner to control use of the work by others:

- *Reproduction right.* The reproduction right is the right to copy, duplicate, transcribe, or imitate the work in fixed form.

- *Modification right.* The modification right (also known as the *derivative works right*) is the right to modify the work to create a new work. A new work that is based on a preexisting work is known as a *derivative work*.

- *Distribution right.* The distribution right is the right to distribute copies of the work to the public by sale, rental, lease, or lending.

- *Public performance right.* The public performance right is the right to recite, play, dance, act, or show the work at a public place or to transmit it to the public. In the case of a motion picture or other audiovisual work, showing the work's images in sequence is considered "performance."

- *Public display right.* The public display right is the right to show a copy of the work directly or by means of a film, slide, or television image at a public place or to transmit it to the public. In the case of a motion picture or other audiovisual work, showing the work's images out of sequence is considered "display."

With the widespread use of scanners and digital editing software, whole new copyright issues have arisen. The following example illustrates how what one developer might construe as "borrowing" a photographic image can result in several copyright infringements.

Example: A developer scans a photographer's copyrighted photograph, alters the image slightly by using digital editing software, and includes the altered version of the photograph in a multimedia encyclopedia that the developer sells to consumers. If the developer uses the photograph without permission, the developer infringes the photographer's copyright by violating the reproduction right (scanning the photograph), the modification right (altering the photograph), and the distribution right (selling the altered photograph as part of the multimedia encyclopedia).

3. *Get a license if you need one.* You need permission—known as a *license*—to use a third party's copyrighted work if your intended use of the work would, without a license, infringe any of the copyright owner's exclusive rights. (See the text box "Five Common Licensing Myths" on page 14 for licensing

issues of which you should be aware.) If you use material from someone else's copyrighted work in your multimedia product, at the very minimum you will have to copy the work. And if you copy the work without getting a license, you'll be infringing the copyright owner's exclusive reproduction right. Therefore, you need a license authorizing you to reproduce the material. You may need a license of other exclusive rights as well. For example, if you're licensing music for a video game that will be used in a video arcade, you'll need a public performance license. However, a video game used at home does not need such a license.

What About the Internet?

Some people think that copyright law and other laws do not apply in cyberspace. Don't make that mistake. The laws discussed in this article *do* apply to the Internet.

If you use copyrighted material on your web site, you could find yourself in court defending against charges of copyright infringement. And if you copy copyrighted graphics from someone else's web site and use them in your multimedia product without permission, you are opening yourself up to a lawsuit for copyright infringement—just as you would be if you found graphics in a magazine and scanned them for use in your product.

Don't make the mistake of thinking that it's OK to copy and use anything you find on the Internet. Although you are free to copy public domain material you find on the Internet (discussed later in this article), much of the material that is on the Internet is protected by copyright.

When You Don't Need a License—Fair Use, Public Domain, or Facts

You don't need a license in three circumstances: (1) if your use is "fair use"; (2) if the work you use is in the public domain; or (3) if the material you use is factual or an idea.

For the first circumstance, "fair use," it's often difficult to tell whether a particular use of a work is fair or unfair. The courts make such determinations on a case-by-case basis by considering four factors:

- *Factor #1: Purpose and character of use.* The courts are most likely to find fair use where the use is for noncommercial purposes. They are least likely to find fair use where the use is commercial.

- *Factor #2: Nature of the copyrighted work.* The courts are most likely to find fair use

where the copied work is a factual work or a work that has already been distributed. They are least likely to find fair use where the copied work is creative or fictitious, or the work has never before been published.

- *Factor #3: Amount and substantiality of portion used.* The courts are most likely to find fair use where what is used is a tiny amount of the protected work. They are least likely to find fair use where much of the protected work is used. If what is used is small in amount but substantial in terms of importance—the heart of the copied work—a finding of fair use is unlikely.

- *Factor #4: Effect on the potential market for or value of the protected work.* The courts are most likely to find fair use where the new work is not a substitute for the copyrighted work. They are least likely to find fair use where the new work is a complete substitute for the copyrighted work.

And, finally, if your multimedia work serves traditional "fair use" purposes—criticism, comment, news reporting, teaching, scholarship, or research—you have a better chance of falling within the bounds of fair use than you do if your work is sold to the public for entertainment and commercial purposes.

A Definition of Public Domain

You don't need a license to use a public domain work. Public domain works—works not protected by copyright—can be used by anyone. Because these works are not copyrighted, no one can claim the exclusive rights of copyright for such works.

The rules regarding what works are in the public domain vary from country to country. A work in the public domain in the United States may be protected by copyright in Canada or other countries.

There are several ways in which works fall into the public domain in the United States:

- *Expiration of the copyright.* A copyright that was in existence before January 1, 1978, and was renewed, has a term of 75 years. All copyright terms run to the end of the calendar year in which they expire. Consequently, in 1997, all works first "published" before January 1, 1922, are in the public domain in the United States. In some countries in Europe, documents enter the public domain 50 years after the death of the copyright owner.

- *Failure of the copyright owner to renew the copyright.* Under the 1909 Copyright Act, copyright protection lasted 28 years. A copyright

owner could obtain an additional term, known as a *renewal term*, by filing an application to renew in the 28th year. The Copyright Renewal Amendment of 1992 eliminated the requirement of filing a renewal application for works published between 1964 and 1977, inclusive. Renewal is not required for works created after 1977. However, before 1992, a number of works entered the public domain because the copyright owner failed to file a renewal application.

- *Failure to use a copyright notice on publicly distributed copies of a work (for works published before March 1, 1989).* Under prior law, the distribution of copies without copyright notices resulted in the forfeiture of copyright protection. For works distributed before January 1, 1978, forfeiture was automatic. For works publicly distributed after that date, the copyright law provided ways around the defect created by distribution without notice.

No License Required— Ideas, Facts, or Your Own Works

You don't need a license to copy facts or ideas from a protected work. The copyright on a

work does not extend to the work's facts. This is because copyright protection is limited to original works of authorship, and no one can claim originality or authorship for facts.

Naturally, you don't need a copyright license for material that you create yourself. However, you should be aware that the rules regarding ownership of copyright are complex. You shouldn't assume that you own the copyright if you pay an independent contractor to create the work (or part of it). In fact, generally the copyright in a work is owned by the individual who creates the work, except for full-time employees working within the scope of their employment and copyrights that are assigned in writing.

Copyrights—Take a Conservative Approach

If you're going to be successful in the multimedia industry, you need to understand the basics of copyrights and several other laws that govern this area. Ignorance of copyright laws can be costly. At the very least, having to get copyright licenses late in your project

cycle could delay your ship date and impact your budget. And, worst case, if you illegally use copyrighted material, you could be forced to stop product shipments and could incur liability for millions of dollars in damages.

The best strategy is to take a conservative approach. Early in your project, budget time and resources to copyright issues. And to be safe, obtain professional legal advice before you ship your product. ♣

This article is based on material from the Multimedia Law and Business Handbook by J. Dianne Brinson and Mark F. Radcliffe. Dianne Brinson teaches Law for Internet Users at San Jose State University's Internet Education Institute, and Mark Radcliffe is a partner at Gray, Cary, Ware, and Freidenrich. The Multimedia Law and Business Handbook is available from Ladera Press in Menlo Park, California, 1-800-523-3721. Copyright 1997 by J. Dianne Brinson and Mark Radcliffe (mradcliffe@qcwf.com).

Internet Resources

News

- QuickTime 3.0—<http://quicktime.apple.com/>
- Power Macintosh 6500 series configurations—<http://product.info.apple.com/pr/press.releases/1997/q3/970404.pr.rel.300mhz.html>
- Power Macintosh 6500/300—<http://entripowermac.apple.com/6500/6500-300.html>
- Power Macintosh 7300/180 features and benefits—http://powermacintosh.apple.com/Products/7300_180.html
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- Twentieth Anniversary Macintosh—<http://www.twentiethanniversary.apple.com>
- Mac OS 7.6.1 Update—<http://support.info.apple.com/ftp/7.6.1.html> (European mirror site—<ftp://ftp.info.euro.apple.com/Apple.Support.Area/Apple.Software.Update>)
- Mac OS 7.6.1 Technote—<http://www.devworld.apple.com/dev/technotes/tn/tn1096.html>
- *MacWEEK* interview of Adobe's Charles Geschke—http://www.macweek.com/mw_1115/nw_geschke.html
- OpenStep documentation—<http://www.next.com/Pubs/Documents/Download/apple.html>
- Personal Web Sharing pricing and configuration—<http://product.info.apple.com/pr/press.releases/1997/q3/970409.pr.rel.web.html>
- Personal Web Sharing purchase sites—<http://www.software.net> and <http://www.buydirect.com>
- QuickTime's OMF Importer—<http://www.avid.com/omf/>
- FireWire—<http://www.firewire.org> or <http://www.firewire.apple.com>
- Metrowerks MPW tool C/C++ compilers and linkers and IDE C/C++ 1.7.1 update—<http://www.metrowerks.com/db/updates.qry?function=list&sw=cw11>, <ftp://ftp.metrowerks.com/pub/updates/>, or <ftp://ftp2.metrowerks.com/pub/updates/> (European mirror site—<ftp://ftp.promo.de/pub/Metrowerks/mirror/updates/>)
- Newton Toolkit for Windows 1.6—<http://www.devcatalog.apple.com>
- Apple Disk Copy 6.1.2—<http://support.info.apple.com/ftp/swhome.html>
- Cyberdog—<http://cyberdog.apple.com/download/dodownload.html>
- PowerTalk Migration Tools—<http://gemma.apple.com/dev/powerstalk/powerstalk.html>
- Claris Em@iler 2.0—<http://www.claris.com/products/claris/emailer/site/emailer.html>
- Nondisclosure agreements for developers—http://devworld.apple.com/devsecure/MTS_NDA.html