

AppleDirections

CONTENTS

NEWS	
Apple's Yellow Box Strategy	1
Strategy Mosaic: WWDC Notes and Reflections	1
Editor's Note: Learning the Lingo	2
Apple Operating System Strategy and Roadmap	7
WebObjects and Java Integrated With Rhapsody	7
Apple Introduces OpenStep Enterprise 4.2, Reduces Pricing	8
Mac OS 8 Shipped With Top Internet Browsers	8
Apple Announces HIDE Award Winners at WWDC	8
Metrowerks Announces Its Rhapsody Porting Tool	9
Apple Gives Early Access to Rhapsody	9
More Than 400 Applications Run on Rhapsody's Blue Box	9
WebObjects to Attract Enterprise Customers	9
New Software Releases	9
Adobe and Claris Sign Up for Rhapsody	10
TECHNOLOGY	
CD Highlights: SDK Edition	11
Technology Feature: Apple's New Development Platform: Code- Named "Yellow Box"	12

APPLE NEWS

Apple's Yellow Box Strategy

One Development Effort Reaches Five Platforms

At the Worldwide Developers Conference (WWDC), Apple outlined for developers a radical software development strategy for Rhapsody, its next-generation operating system. By utilizing the "Yellow Box" APIs, you will eventually be able to deploy applications on a wide range of operating systems including Rhapsody, the Mac OS, Rhapsody for Intel, Windows 95, and Windows NT. By making the Yellow Box programming environment multiplatform, Apple believes it can attract new software developers to the Rhapsody and Mac OS platforms and expand the business opportunities for current Mac OS and OpenStep developers.

Along with support for Java™, Apple also announced that the programming interfaces for the Yellow Box will be exposed as Java language calls. This will enable you to write applications for the new platform completely in Java, thus extending the functional capabilities of Java applications. With the Yellow Box, you will be able to create "best-of-breed" applications, deliver them across different platforms, and bring the benefits of Java to mainstream applications—all in a shorter development cycle.

Avie Tevanian, Apple's senior vice president of software engineering, said: "What we have announced today is a compelling proposition for software developers. As the Internet moves forward and increases the need for heterogeneous networks, the Yellow Box is well positioned to be a unifying force by including all major platforms in a robust, media-rich development platform. Developers can adopt the Yellow Box APIs in the knowledge that their applications can be deployed on multiple platforms."

please turn to page 7

STRATEGY MOSAIC

WWDC Notes and Reflections

*By Gregg Williams,
Apple Directions staff*

Including Some Details You Didn't Get at WWDC

I'm writing this a few days after the Apple Worldwide Developers Conference, and I'm very encouraged by what I saw. The main hall of the San Jose Convention Center (where the conference was held) for the Opening Keynote session the first day, Apple had lots of exciting news to deliver, and developers were much more optimistic about Apple's future at the end of the conference than they had been when they arrived. Now *that's* good news.

There's a reason for the attendees' optimism: Apple convinced them. Apple CEO Dr. Gilbert Amelio and Apple senior vice president of software engineering Avie Tevanian convinced attendees that Apple now has an operating-system strategy that is coherent, sensible, and deliverable. The announcement that Mac OS 8 is on track for delivery as scheduled this July convinced them. Demos of various Apple technologies—including the Mac OS 8 and Rhapsody operating systems, the Rhapsody Blue Box (which ran over 400 Mac OS applications correctly in the Rhapsody Compatibility Lab), and a Java-based QuickDraw 3D demo running on top of Rhapsody—these, most of all, convinced them. Add to that Apple's recent track record in shipping both Mac OS 7.6 and 7.6.1 on time, and you have compelling proof that Apple's fortunes are on the rise again.

With so much being announced at the WWDC, it's easy for important news to get lost in the overall volume of information. For this reason, I've chosen to write on a few subjects that I think deserve your attention. The

please turn to page 3

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EDITOR'S NOTE

Learning the Lingo

A Concise Guide to Dual OS Code Names

I ran across the following tidbit from Allen Harris in the Evangelist discussion last month titled "The Definition of Rhapsody":

As I was browsing through the latest Macway, reading the data about the Prelude to Rhapsody limited release, it occurred to me that I wasn't entirely clear on the exact definition(s) of the word Rhapsody. Most people go through life not really being aware that they don't really know the real definitions of some of the words they may use on a regular basis. So, for the edification of those who may see this:

The American Heritage Dictionary, Second College Edition—rhapsody n., 1. Exalted or excessively enthusiastic expression of feeling in speech or writing. 2. A literary work written in an impassioned or exalted style. 3. Music. A composition of irregular form and an often improvisatory character. 4. In ancient Greece, an epic poem or portion of one suitable for uninterrupted recitation. [Lat. rhapsodia, epic poem < Gk. rhapsodia < rhapsoidos, singer of epic poems: rhaptein, to sew together + oide, song.]

So Rhapsody turns out to be more perfectly appropriate [as the code name for Apple's new operating system] in several of the above senses than perhaps most people realize.

I figured if Allen (scruffy106@aol.com) wasn't clear on the dictionary definition of *Rhapsody*, there are probably even more of us who get tripped up by the latest marketing terms. So, to help you negotiate your way through the maze of bewildering buzzwords and jumbled jargon stemming from the announcements following Apple's recent Worldwide Developers Conference (WWDC), here is a list of official code names and definitions.

Rhapsody

This is Apple's next-generation operating system for PowerPC processor-based systems capable of running the Mac OS. It includes four components: the Core OS, the Blue Box (the implementation of the Mac OS within Rhapsody), the Yellow Box (described below), and the Advanced Mac Look and Feel.

Rhapsody Developer Release

This is a developer-only release of Rhapsody scheduled for release in mid-to-late 1997. It will go to all members of the Macintosh Developer Program and the Apple Media Program worldwide who have signed blanket nondisclosure agreements (NDAs).

Rhapsody Premier Release

This is the second release of Rhapsody scheduled for early 1998. It is meant for early adopters and will include a partially finished human interface and a partial implementation of the subsystem that supports Mac OS software (the Blue Box).

Rhapsody Unified Release

This is the third release of Rhapsody and 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.

Yellow Box

This is the development platform for building desktop, server, and web applications. It's a rich object-oriented environment that is tightly integrated with Java and allows you to deploy applications across five platforms: Rhapsody, Rhapsody for Intel, Windows 95, Windows NT, and the Mac OS. All Yellow Box-based products are an evolution of OpenStep—an operating system-independent, object-oriented application platform. Integrating the cross-platform robustness of OpenStep technologies with Apple's market-leading digital media and graphics technologies will differentiate the Yellow Box from other development platforms.

Rhapsody for Intel

This is Apple's next-generation operating system for Intel-based PCs. It includes three components: the Core OS, the Yellow Box, and the Advanced Mac Look and Feel. Note that it lacks the Blue Box and therefore is unable to run Mac OS software.

Yellow Box for Windows

This is the run-time software (implemented as DLLs, or dynamically linked libraries) that allows Yellow Box applications to run on the

Windows 95 and Windows NT platforms. Applications that use the Yellow Box for Windows will feature a full Windows 95/Windows NT user interface.

NEXTSTEP

This is the original multitasking operating system that NeXT Software developed to run on its proprietary NeXT computers (which are informally known as “black boxes.”). It includes a specific user interface and a framework of prebuilt software objects that make application development faster and easier.

OpenStep

This is a specification for a software development API (application programming interface) that was based on the NEXTSTEP object-oriented framework. This API was designed to be implemented independently of the computer’s operating system, hardware, and user interface. The API for Rhapsody will be a superset of the OpenStep API. In general, when not referring to a specific product, the term to use is *OpenStep*.

OPENSTEP

When the OpenStep API is implemented for a specific platform and made into a product, it is referred to in uppercase letters—for example, OPENSTEP Developer 4.2 for Mach, or OPENSTEP Enterprise for Windows NT and Windows 95. Versions of OPENSTEP exist for Windows 95/NT, Solaris, HP/UX, and Mach.

WebObjects

This is the framework that provides an HTML interface to Yellow Box objects, enabling developers to easily create dynamic web-based applications.

Blue Box

This is the complete implementation of the Mac OS run-time environment hosted on the modern operating system infrastructure provided by Rhapsody. The Blue Box is not an emulation layer; at any given time, it will be based entirely on the same source code and ROM image as the current version of the Mac OS. This will allow the Mac OS environment within Rhapsody to inherit improvements to the Mac OS as it evolves.

Tempo

This is the code name for what is now called *Mac OS 8*. This operating system, scheduled for delivery in July 1997, contains a number of significant improvements, including new human-interface features, increased system stability and performance, a PowerPC processor–native Finder, tighter integration of Internet access through panel-based “assistants,” Personal Web Sharing, and the ability to run Java applets and programs through Mac OS Runtime for Java.

Allegro

This is the code name for the major Mac OS release due in mid-1998.

Sonata

This is the code name for the major Mac OS release due in mid-1999.

Patty Bing-You
Editor

STRATEGY MOSAIC

WWDC Notes and Reflections

continued from page 1

following sections expand upon topics that were covered—or at least mentioned—at the WWDC.

Apple’s Dual OS Strategy

Last month, I wrote about Apple’s dual operating-system strategy, and it’s important to note that Apple reemphasized that strategy at the WWDC. Apple had separate tracks for both the Mac OS and Rhapsody, and Apple executives affirmed that the Mac OS would be around for years to come. (Apple had announced two mid-year major Mac OS releases for 1998 and 1999, code-named *Allegro* and *Sonata*. At the WWDC, Dr. Amelio announced an unnamed Mac OS release for mid-2000.)

The Mac OS will be part of Apple’s dual OS strategy for quite some time. Dr. Amelio positioned the two operating systems as follows: “The Mac OS will continue for years to come, and customers can migrate to Rhapsody at their own speed.” Avie Tevanian, Apple senior vice president of software engineering, is in charge of directing all engineering efforts for all Apple operating systems. He underlined the importance of the Mac OS by saying, “The Mac OS is so important to moving our business forward. We have no plans for Rhapsody to replace the Mac OS any time soon.”

Apple’s Yellow Box Strategy

Easily, the biggest announcement of the WWDC (in fact, the biggest announcement since Apple announced the acquisition of NeXT Software) was that of Apple’s Yellow Box strategy. For the official description of this

strategy, see the article “Apple’s New Development Platform: Code-Named ‘Yellow Box,’” on page 12 of this issue. Here’s my commentary on this strategy.

Before the WWDC, Apple spoke of its dual OS strategy, with the Mac OS and Rhapsody representing the two choices that you have for developing software. Apple’s announcement of the Yellow Box at the WWDC changed the scope of your choice of platforms for delivering software. Apple’s next platform for software development is no longer Rhapsody, but rather the Yellow Box—an “engine” that powers Rhapsody (that is, Rhapsody for PowerPC processor–based computers) and multiple other delivery platforms.

It’s this simple: By writing source code that uses the Yellow Box API (application programming interface), you will be able to recompile the same source code, unchanged, and create high-quality applications for *four* separate delivery platforms:

- The Rhapsody (for PowerPC) operating system
- The Rhapsody for Intel operating system
- Yellow Box for Mac OS

August Apple Directions Online

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

- Yellow Box for Windows (one recompilation reaches both Windows 95 and Windows NT) Apple currently plans for versions of Yellow Box for Windows and Rhapsody for Intel to ship in the same time frames as Rhapsody itself: mid-to-late 1997 for the Developer Release, early 1998 for the Premier Release, and mid-1998 for the Unified Release. Allegro, due in mid-1998, will be the first version of the Mac OS that will run the Yellow Box for Mac OS, but no delivery time frame has been given for the latter.

Apple Clears a Hurdle

Because the technology that allows a Yellow Box application to run on top of Windows 95 or Windows NT is based on licensed technology, there was some concern before the WWDC that you would have to pay a royalty for each copy of applications that use this technology. One big piece of news announced at the WWDC Opening Keynote is that Apple will make this technology available to you through a no-fee license—meaning that you can deploy your Yellow Box applications on Windows 95 and Windows NT without any kind of per-application fee. This is good news indeed, and proof that Apple is being very thorough in ensuring that its OS strategy makes sense from both a business and a technical sense.

Why the Yellow Box Makes Sense

Apple's announcement of the Yellow Box strategy makes its position in the development marketplace stronger than ever. Some developers said they needed a single development platform that would cover both the Mac OS and Rhapsody platforms—now they have it. Others said they needed a single development platform that covers both the Windows and Apple platforms—now they have that, too. And if you're committed to delivering Java applications, you can write Java programs that use the Yellow Box APIs to deliver superior cross-platform applications. (See "Portable Yellow Box Programs," on page 5, for details.)

Apple also believes that the object-oriented nature of the Yellow Box and its development tools—which some OpenStep developers claim has given them a productivity increase of five to ten times—will convince Windows developers to use the Yellow Box platform to develop their products for Windows. Once they have made the decision to do that, they will get ports of their products to the Mac OS, Rhapsody, and Rhapsody for Intel with

virtually no extra effort, thus increasing the number of solutions on those platforms as well.

The Yellow Box also addresses look-and-feel concerns better than other cross-platform technologies. In the past, cross-platform technologies—including Java—could only create minimal, least-common-denominator applications that delivered neither the full "look" (appearance) nor the full "feel" (behavior) of each supported platform. In contrast, the Yellow Box architecture will enable you to create robust, high-quality applications that fully embody their platform's look and feel.

In short, the Yellow Box strategy gives developers a powerful platform for developing compelling and innovative applications to multiple delivery platforms, and it removes many of the objections that they have had about developing for the computers that Apple and its licensees sell.

Apple Technologies in the Yellow Box

Most of the publicity about Rhapsody before the WWDC focused on how Rhapsody will be based on technologies from NeXT Software, namely OpenStep and Display PostScript[™]. Little was said about what Apple technologies would be a part of Rhapsody.

At the WWDC, Apple stated that the following Apple technologies will be a part of the Yellow Box:

- QuickTime (for displaying time-based data, including movies, animation, and music)
- QuickTime VR (for displaying virtual-reality landscapes and objects)
- QuickDraw 3D (for displaying synthetic 3D objects)
- ColorSync (for delivering accurate color between input and output devices)
- a scripting language, based on AppleScript, that is integrated into the Yellow Box frameworks
- QuickDraw GX typography (for delivering advanced typography functions)
- Apple Information Access Toolkit (formerly known by the code name *V-Twin*; for systemwide searching of document contents)

These technologies (including the first three, which constitute the QuickTime Media Layer) will help ensure that Yellow Box applications will maintain Apple's traditional leadership in the areas of multimedia and publishing.

Programming the Yellow Box

It's a simple enough question: "What programming languages can I use to create Rhapsody applications?"—but, as far as I can tell, Apple hasn't really answered the question, not even at the WWDC. I've been asking around, and here are the answers (confirmed by the right people at Apple) I've come up with:

The first answer is the simple one. Apple will make it possible for you to call all Yellow Box routines from within a Java program, so you can program Yellow Box applications in Java.

The second answer is more complicated and reflects the current situation; things may be different in the future. Currently, you can code most of your program in C or C++ , but you must write your human interface using Objective C. The reason for this is that the routines that implement the Yellow Box human interface are written in Objective C and can be accessed only by Objective C.

This is not the answer that some programmers want to hear, but here are some points arguing that the necessity of using Objective C is probably less of an issue than you might think:

- First, you have to rewrite the human-interface parts of your code for a new platform anyway, so having to do so in Objective C is not much of a burden.
- Second, the Yellow Box compilers from Apple and Metrowerks can switch among C, C++ , and Objective C code, even on the same line of source code—so you can program in C or C++ and drop in and out of Objective C when you need to.
- Third, since you can freely mix C, C++ , and Objective C code, you can use a *lot* of your existing C and C++ source code if you're porting an existing application to the Yellow Box—it doesn't force you to recode existing applications from scratch.
- Fourth, the most common reason programmers insist on using C or C++ is to ensure its portability. Since the Yellow Box API will allow you to implement on the Mac OS, Windows 95, Windows NT, Rhapsody, and Rhapsody for Intel, Yellow Box code will be more portable than almost every other cross-platform environment, and the quality of the ported software will be higher.
- Fifth, some programmers object to the un-C-like syntax of today's "classic" Objective C, which resembles that of (gasp!) Smalltalk. To make these programmers more comfort-

able with Objective C, Apple is modifying a future version of its Yellow Box compiler so that it will also accept a second, “modern” syntax that will make Yellow Box calls look more like C++ or Java code. (In many cases, you will not be able to tell whether you’re writing C++ or Objective C code.) This compiler will not be ready for the Rhapsody Developer Release, but Apple will release it as soon as possible.

I should add that several presenters at the WWDC spoke about the eventual availability of a scripting language for programming the Yellow Box. Bertrand Serlet, Apple senior director of Rhapsody engineering, said that “the scripting syntax will be as close to AppleScript as possible”; beyond that, I can’t say anything meaningful about scripting on the Yellow Box until more details become available.

Java in the Yellow Box

As you can see from the platform architecture figures on pages 14 and 15, the various platforms that are based on the Yellow Box are also “100% Pure Java” platforms—that is, they can

run any Java program that meets Sun Microsystems’ definition of being “100% Pure Java.”

Depending on the platform, this Java support is accomplished in one of two ways. On those two platforms where the Yellow Box is part of the operating system (Rhapsody and Rhapsody for Intel), the Java virtual machine will be part of the Yellow Box; in addition, the Java human-interface class libraries (the Abstract Window Toolkit and the new Java Foundation Classes) will be implemented using Yellow Box calls. On the remaining three platforms where Yellow Box functionality is “layered” on top of an existing operating system (Yellow Box for Windows and Yellow Box for Mac OS), the Yellow Box implements Java by providing Yellow-Box-to-Java bridge technology that taps into the platforms’ existing Java virtual machine and user-interface class libraries.

Also at the WWDC, Apple announced that it is joining the efforts of Sun, Netscape, and IBM to develop a second-generation user-interface class library, the Java Foundation Classes (mentioned above). By supporting the JFC on both the Mac OS and Yellow Box platforms, Apple is maintaining its position as a

major player in the Java world, with platforms that are excellent for both using and developing Java software.

Portable Yellow Box Programs

Yellow Box applications produced using Objective C and C/C++ are cross-platform—that is, you can recompile the same source code, and the resulting application will run on any other supported platform. However, what isn’t commonly understood is that the combination of Java and the Yellow Box can be used to create applications that are still portable—that is, they run on multiple platforms without recompilation—but are more powerful than today’s Java applications (which use only the standard Java libraries).

As I mentioned earlier, you will be able to write Java applications that can access all the Yellow Box routines. (In fact, Apple demonstrated this at the WWDC by showing a Java application that manipulated a QuickDraw 3D object, running on top of the current alpha version of Rhapsody. The application also demonstrated drag-and-drop behavior, a feature that Java doesn’t support.) What

Development Choices for the Yellow Box and the Mac OS

Development Choice	Tools Used	Markets for Your Application
Write an application for the Mac OS	Any Mac OS development environment	<ul style="list-style-type: none"> • Mac OS • Rhapsody
Write an application for the Yellow Box using C/C++ and Objective C	Yellow Box development tools from either Apple or Metrowerks	<ul style="list-style-type: none"> • Rhapsody • Rhapsody for Intel • Mac OS • Windows 95 • Windows NT <p>(Note: source code must be recompiled for different platforms)</p>
Write an application for the Yellow Box using Java	Yellow Box development tools from either Apple or Metrowerks	<ul style="list-style-type: none"> • Rhapsody • Rhapsody for Intel • Mac OS • Windows 95 • Windows NT <p>(Note: the same Java program will run “as is” on all of the above platforms)</p>
Modify an existing C/C++ Mac OS application for Rhapsody	Metrowerks Latitude and CodeWarrior	<ul style="list-style-type: none"> • Rhapsody

Apple didn't emphasize—and I apologize if I'm stating the obvious here—is that a Java application calling Yellow Box routines is still a Java application and will run, *unchanged*, on any platform that supports both Java and the Yellow Box.

The implications of this statement are quite compelling. If you want to reach all Java platforms, you can write a totally portable Java application by writing Java code that calls the Abstract Window Toolkit or the Java Foundation Classes. However, if you only (only!) want to reach the Windows 95, Windows NT, Mac OS, Rhapsody, and Rhapsody for Intel platforms, you can write a Java application that is portable among these platforms and offers all the advantages of the Yellow Box platform, including the following:

- Access to prebuilt object classes (resulting in less code for you to write)
- The richer human interface made possible by the Yellow Box AppKit classes
- Access to lower-level system functions through the Yellow Box Foundation Kit
- Access to graphics and multimedia technologies, including QuickTime, QuickTime VR, QuickDraw 3D, scripting, QuickDraw GX typography, ColorSync, and the Apple Information Access Toolkit
- Access to Internet-based mail, messaging, directories, and security services
- The ability to convert existing applications easily to other languages
- The advantages of using Display PostScript as the underlying imaging model (including automatic support for printing and powerful graphics and typography)
- Access to databases through Apple's Enterprise Objects Framework API
- The ability to deploy your application across a mixed network of computers using Apple's distributed object technology
- Support for CORBA (Common Object Request Broker Architecture), a standard for distributed computing

In essence, for the platforms it supports, the Yellow Box is essentially an alternate development environment—you might think of it as "Java Plus"—that enables you to program in Java and still have object-code portability for the resulting programs.

Your Development Choices

Depending on your current situation, your company's objectives, the target markets you want to reach, the desired time frames for

reaching those markets, and other factors, you have a choice of development options. I've summarized these options in the table "Development Choices for the Yellow Box and the Mac OS" on page 5.

Obviously, everyone here at Apple is very excited about the Yellow Box platform, which promises to give you access to four computer platforms with exactly one development effort. You'll have to wait until sometime after mid-1998 to ship a Yellow Box application for the Mac OS, but you should be able to ship all the other versions of your Yellow Box application—with no more effort than a recompile—shortly after the Rhapsody Premier Release ships in early 1998.

But this option may not be for you. If you want to reach the Mac OS market *now*, you can continue creating Mac OS applications. In addition to reaching this market, your application will automatically run on Rhapsody computers, which will be able to run most Mac OS applications through the Rhapsody Blue Box.

If you have an existing Mac OS application written in C or C++ and want to adapt it to work under Rhapsody, you can do so by using a product from Metrowerks called *CodeWarrior Latitude*. Latitude will enable you to get a product to market quickly, but it will run on only one platform (Rhapsody) and it will not take advantage of any Rhapsody-specific features. The value of using Latitude, however, is that doing so establishes your presence in the Rhapsody marketplace and gives you the breathing space you need to develop a full Yellow Box application.

Latitude works by using a set of shared libraries that perform the functions of the Mac OS API for another platform. (Latitude currently supports two versions of UNIX®; a future release will support Rhapsody.) By recompiling your source code with these libraries, you can create a new version of your application for that platform. (The conversion process may require you to rewrite parts of your application, but the effort required is much less than that of rewriting your application from scratch.) See the Metrowerks web site at <http://www.metrowerks.com> for details.

What You Can Do Now

Depending on your plans, you may want to do one or more of the following:

- Are you a member of any of Apple's Developer Programs (Associate, Associate Plus, or Partner)? If not, you should consider joining now. One of the many benefits of

membership is access to developer seedings—including the Rhapsody Developer Release, which is due soon (official delivery date is "mid-to-late 1997"). Be sure to sign the standard blanket nondisclosure agreement, which clears the way for you to be sent the Rhapsody Developer Release automatically as soon as it's ready. For details on joining one of the Developer Programs, go to <http://devworld.apple.com/worldwide/macdp.html>.

- If you're planning to start your Yellow Box development using the Rhapsody Developer Release, try to get your hands on a Power Macintosh 8500, 8600, 9500, or 9600 model. These are the only computers that the Developer Release is guaranteed to work on; Apple is investigating support for additional Macintosh models. If you can afford to wait, the Premier Release, due in early 1998, will support a wider range of computers.

- You can investigate the Yellow Box programming model for virtually free—just download the Adobe™ Acrobat documentation for OpenStep (the basis for the Yellow Box) from the Internet. To do so, go to <http://devworld.apple.com/rhapsody.html> and click the link under the heading "OpenStep Technical Documentation." If you have the May 1997 Tool Chest edition of the Developer CD, you can also find the documentation there.

- If you haven't already, subscribe to the Apple Developer Relations list server. This service, which is delivered to your e-mail address each week by the same people who publish *Apple Directions*, will keep you informed on Mac OS, Rhapsody, and Yellow Box news. This is the fastest way to get developer news from Apple, and it's free. To subscribe, send an e-mail message to the address adirections@thing1.info.apple.com. In the *subject* field (not the body) of the e-mail, type the string "subscribe <your real name>".

- If you have Internet access, visit Apple's Developer World web site (<http://devworld.apple.com/>) regularly. You will find news and other information about the Mac OS, Rhapsody, and the Yellow Box.

- You can send your comments and concerns about Rhapsody to Apple by sending e-mail to rhapsody-dev-feedback@apple.com.

- If you are considering porting an existing Mac OS application to Rhapsody, you can use the current version of CodeWarrior Latitude to get a head start on doing so.

This Is Just the Beginning

The Apple Worldwide Developers Conference marked the beginning of the release of information about Apple's plans for the Mac OS, Rhapsody, and the Yellow Box—and more information is sure to follow as we get closer to the date when the Rhapsody Developer Release becomes available. *Apple Directions* will continue to provide you with information,

but you should also keep informed through Apple Developer News and the Developer World web site (see the previous section for details).

Because of the news from the WWDC, I certainly feel a lot better about Apple's prospects. The Yellow Box strategy looks more attractive than anything I've seen Apple announce in a long time, and the fact that

it has its roots in an existing, commercially proven set of products greatly contributes to my confidence that Apple *will* deliver this technology—and that it will do so on time.

Be sure to stick around for the exciting months ahead. I think you'll enjoy being part of Apple's comeback. ♣

APPLE NEWS

Yellow Box Strategy

continued from page 1

A release timetable and customer testimonials are available at <http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.yellowbox.html>.

For further details, see "Apple's New Development Platform: Code-Named 'Yellow Box,'" on page 12 of this issue.



Apple Operating System Strategy and Roadmap

At WWDC, Apple outlined its plans to implement a strategy in which it will continue to deliver significant and regularly scheduled upgrades to the current Mac OS, while accelerating development of its new and advanced operating system, Rhapsody. Rhapsody will be based on the merging of technologies from Apple and NeXT Software. As well as providing pioneering, next-generation technology, Rhapsody will provide strong backward compatibility for Mac OS software, offering a smooth migration path to the new operating system.

Through this approach, Apple expects to provide customers and developers with a platform for exceptional and cutting-edge applications, while enhancing their current investment in the Mac OS. Apple believes that the advanced technical underpinnings and rapid development environment of Rhapsody will enable developers to create new applications that leapfrog those of other high-end operating systems. Additionally, Apple anticipates that the scheduled enhancements to the Mac

OS will retain its industry leadership in ease of use and multimedia, while further strengthening the software's Internet capabilities.

The first release of Rhapsody is expected to be launched to developers in mid-to-late 1997 with customer releases of the operating system following in 1998. Rhapsody is planned to incorporate features such as preemptive multitasking and protected memory, based on a Mach kernel. It will also include a new Yellow Box API (application programming interface) based on NeXT Software's OpenStep environment. In parallel, Mac OS continues to evolve with a significant upgrade, Mac OS 8, scheduled to be shipped in July 1997.

You can get a detailed roadmap of software releases at <http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.macosupdt.html>.



WebObjects and Java Integrated With Rhapsody

Apple delivered a focused Internet message to developers at the WWDC, discussing how WebObjects technology will build on the company's strength in Internet publishing. Apple also highlighted Internet integration in future operating systems and showed companywide commitment to creating preeminent development and deployment platforms for Java technology.

Apple also confirmed that the Yellow Box development environment will include the WebObjects Frameworks, which provides an HTML interface to its objects, enabling you to easily create dynamic web-based applications

on Rhapsody. Using Apple's WebObjects software, you can create dynamic web sites with the Yellow Box and deploy them on Rhapsody, Rhapsody for Intel, Windows NT, Solaris, and HP-UX servers.

With WebObjects technology, Apple will be able to build on its strengths in Internet publishing and address emerging markets in Internet commerce, Internet business applications, and enterprisewide Internet/intranet applications. WebObjects Enterprise allows businesses to plug web sites into enterprise data and applications for automated order entry, cataloging, customer service, intranet services, and more. Initially designed by NeXT Software for large enterprise customers, the WebObjects platform offers prebuilt components and rapid application assembly tools that give you a head start and allow you to integrate data applications into an Internet/intranet environment.

Presentations throughout the WWDC confirmed the importance of Java to Apple's plans for Rhapsody. At the conference, Apple announced the close integration of Java with the Yellow Box for building robust, content-rich Internet/intranet software applications that run on desktop computers. The Yellow Box will be a key component in three future operating system releases from Apple: Rhapsody, the next version of the Mac OS, and Rhapsody for Intel. The Yellow Box will also ship in a development and deployment platform for Windows, code-named *Yellow Box for Windows*.

You can read the complete press release at <http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.internet.html>.



Apple Introduces OpenStep Enterprise 4.2, Reduces Pricing

At WWDC, Apple announced that it is reducing prices on OpenStep Enterprise and introducing a new version of the product, OpenStep Enterprise 4.2. OpenStep Enterprise 4.2 is an object-oriented development environment running on Windows NT that allows you to assemble, integrate, and deploy dynamic business applications across the enterprise on a variety of operating systems. With OpenStep Enterprise 4.2, you can create applications that can easily be updated to respond to changing user needs. New features include the ability to deploy applications on Windows 95 and Project Builder integration with Intersolv's PVCS Manager source-code management system. The PVCS Manager integration will streamline the development process and speed application development by helping to coordinate code input from multiple programmers.

The repricing means that OpenStep Enterprise 4.2 will now be available at approximately U.S. \$1,500 per developer version. The product was previously available for U.S. \$5,000 per developer version. The prices of the other OpenStep products remain unchanged.

You can obtain more sales information by calling 1-800-879-6398. For more information on OpenStep Enterprise 4.2, see <http://product.info.apple.com/pr/press.releases/1997/q3/q3/970513.pr.rel.openstep.html#OPENSTEPEnterprise4.2>.



Mac OS 8 Shipped With Top Internet Browsers

Continuing its efforts to integrate the Internet into its core operating system, Apple recently announced that Mac OS 8 will have best-of-class Internet access through Netscape™ Navigator and Microsoft Internet Explorer browsers.

"The depth of Internet integration in Mac OS 8 is going to surprise many observers—and delight customers," said Jim Gable, Apple's vice president of platform and software technologies. "The natural extension of this philosophy is to include both of the world's leading browser technologies, giving

customers choices for the best possible Internet experience."

Mac OS 8 provides key Internet features, including integrated installation, setup, and configuration; an automated process for creating a new account with an Internet service provider; single-click access to the Internet through desktop web and mail icons; and single-point access to multiple network configurations. In addition to offering Netscape Navigator and Microsoft Internet Explorer for communicating with the web and other online services, Apple plans to include Cyberdog 2.0 (for building custom Internet access documents) and America Online 3.0 with Mac OS 8. Mac OS Runtime for Java enables you to run cross-platform Java applets outside of a browser.

With Personal Web Sharing and Personal Net Finder, Mac OS 8 also lets you easily access Internet authoring and share content within intranets and over the Internet. Personal Web Sharing enables files and folders served by Personal File Sharing to be accessed by web browsers on any platform. Personal Net Finder provides a Finder-like representation of those files in shared folders.

You can read more details at <http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.access.html>.



Apple Announces HIDE Award Winners at WWDC

Apple announced the winners and runners-up of its 1997 Human Interface Design Excellence (HIDE) Award contest for Mac OS developers at the WWDC. The HIDE Awards (pronounced "Heidi") illustrate Apple's continued support for the Mac OS developer community and recognize superior software from 1996 in the areas of innovation, elegance, look and feel, and overall design.

This year's HIDE Award winners and runners-up were unveiled at an award ceremony that was part of the WWDC. The winners and runners-up follow:

Most Innovative

- Winner—Kai's Power GOO 1.0 by MetaTools

- First Runner Up—Starry Night Deluxe 2.0 by Sienna Software
- Second Runner Up—YOYO Telephone Manager for Macintosh 1.5.1 by Big Island Communications

Most Elegant

- Winner—Starry Night Deluxe 2.0 by Sienna Software
- First Runner Up—CalcWorks 1.5.2 by John Brochu
- Second Runner Up—AMBER: Journeys Beyond 1.0 by Changeling

Best Look and Feel

- Winner—YOYO Telephone Manager for Macintosh 1.5.1 by Big Island Communications
- First Runner Up—Adobe® Illustrator 6.0 by Adobe Systems
- Second Runner Up—Symantec Visual Cafe for Macintosh 1.0 by Symantec Corporation

Best Overall Design

- Winner—YOYO Telephone Manager for Macintosh 1.5.1 by Big Island Communications
- First Runner Up—Starry Night Deluxe 2.0 by Sienna Software
- Second Runner Up—Kai's Power GOO 1.0 by MetaTools

"Although it was difficult to choose from among the finalists, the winners in each area were definite stand-outs," said Cordell Ratzlaff, manager of Mac OS Human Interface and coordinator of the HIDE Awards. "The Best Look and Feel and Best Overall Design winner, YOYO Telephone Manager from Big Island Communications, offers a fun, intuitive, and easy-to-use interface for users' telephone and telephone company services, along with important features such as caller ID and paging."

Continued Ratzlaff, "Kai's Power GOO, by MetaTools, was selected for the Most Innovative award and is a creative entertainment tool with a pioneering interface. It enables users to stretch, grow, animate, and apply a multitude of special effects to images. Starry Night, by Sienna Software, is an educational astronomy program aimed at anyone interested in the night sky. Starry Night received the Most Elegant award and does a beautiful job of making a complex subject simple and engaging."

You can find more information on the HIDE Awards at http://devworld.apple.com/dev/hideawards_rules.html.



Metrowerks Announces Its Rhapsody Porting Tool

At Apple's Worldwide Developers Conference, Metrowerks announced the availability of CodeWarrior Latitude, a porting tool that allows you to port Mac OS applications to the Rhapsody operating system, in addition to UNIX-hosted operating systems. Designed to shorten time-to-market for Rhapsody-native applications, this new addition to the CodeWarrior line of development tools enables you to begin the transition to the new operating system without rewriting all of your source code.

You can find more information on this product and its availability at <http://www.metrowerks.com/home.html>.



Apple Gives Early Access to Rhapsody

To help build momentum for Rhapsody, Apple gave free "Prelude to Rhapsody" software bundles, which included the latest versions of OpenStep and WebObjects development tools, to all the WWDC attendees who registered for the full conference. With these tools, attendees can begin learning the OpenStep programming environment, which is the basis for Rhapsody. The bundle also included WebObjects, Apple's industry-leading tool for easily creating powerful and full-featured dynamic web sites.

If you aren't already a member of one of Apple's Developer Programs (Associate, Associate Plus, or Partner), you may want to consider joining now. One of the many benefits of being a member is access to developer seedlings—including the Rhapsody Developer Release, which is due soon (official delivery date is mid-to-late 1997). For details on joining one of the Developer Programs, see <http://devworld.apple.com/worldwide/macdp.html>.



More Than 400 Applications Run on Rhapsody's Blue Box

During WWDC, you witnessed encouraging progress on Apple's upcoming Rhapsody operating system. Here are some of the conference highlights:

- At the WWDC hands-on lab, about 440 third-party Mac OS-compatible applications were tested on Rhapsody's Blue Box Mac OS compatibility layer; among these, only four applications (including one game that was written in 1984) failed to run.

- During the last day of the conference, Guerrino De Luca, Apple's executive vice president of marketing, demonstrated the full Rhapsody workspace and desktop running on a PowerPC processor-based Macintosh computer. He said that this engineering feat was accomplished only three days before the conference.

- De Luca also said that the Rhapsody team had QuickTime up and running in the Yellow Box on the same day.

Interest in Rhapsody appeared to be running high, with 4,500 webcast viewers tuning into the WWDC keynote speeches on Tuesday, and 3,500 webcast viewers watching various other sessions during the first four days of the conference.



WebObjects to Attract Enterprise Customers

WebObjects technology will be included in the Yellow Box, the code name for Apple's cross-platform, next-generation application development environment. The inclusion of WebObjects Frameworks in the Yellow Box provides an HTML interface to objects, enabling you to easily create dynamic web-based applications. Apple also announced a new tiered pricing structure for WebObjects Enterprise that includes aggressive pricing based on access by workgroups, divisions, and unlimited users. Apple expects both these announcements to increase the market penetration of WebObjects technology.

David Kay, WebObjects product manager at Apple, said, "WebObjects has cut its teeth in the enterprise market where it has been adopted by Fortune 500 companies to integrate mission-critical data applications into Internet/intranet environments. By including WebObjects Frameworks as part of the Yellow Box development environment and reducing prices on WebObjects Enterprise, Apple is signaling that WebObjects technology is a key part of the company's operating system strategy and Internet plans. Developers and customers can adopt WebObjects technology in the knowledge that it will be central to Apple's business strategies moving forward."

You can find details on reduced pricing and availability at <http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.webobjects.html>.



New Software Releases

Apple recently announced a number of new software releases, including the following:

- *Mac OS 8 beta version.* If you are a registered Apple developer, you can download the Mac OS 8 beta release from the Developer World web site. You must enter your Developer World ID to access this "members only" area at <http://gemma.apple.com/bin/login.pl?Tag=&URI=/GS/index.html>.

- *Display Enabler 2.2.2.* This version of Display Enabler fixes the problems that can occur with Mac OS 7.6.1 on NuBus™-based Power Macintosh CPUs and 1710-series Apple-Vision displays. You can download Display Enabler 2.2.2 at <http://support.info.apple.com/ftp/7.6.1/7.6.1flash.html>.

- *New prerelease software.* If you are a registered Apple developer, you can download the prerelease versions of Open Transport and the Text Encoding Converter. To obtain this software, you must enter your Developer World ID at <http://gemma.apple.com/bin/login.pl?Tag=&URI=/GS/index.html>.

- *Mac OS 7.6.1 Update.* A software update for Mac OS 7.6.1, called 54xx/64xx Level 2 Cache Reset, fixes a bug that occurs after you install Mac OS 7.6.1 on Power Macintosh computers or compatibles that are based on Alchemy logic boards with Level 2 caches. These models include the Performa 6360 and Power Macintosh 5400 and 6400 series, as well as Power Computing's PowerBase series and

UMAX Computer's SuperMac C600 and C500 lines. The free update reenables the cache and improves performance on affected computers. It's available for downloading at <http://support.info.apple.com/ftp/7.6.1/7.6.1flash.html>.

- *MRJ 1.0.2 and the MRJ SDK*. You can download Mac OS Runtime for Java (MRJ) 1.0.2 and the MRJ Software Development Kit at <http://applejava.apple.com/>.

- *Mac OS 8 feature list and screen shots*. You can look over screen shots and a feature overview of the beta version of Mac OS 8 at <http://www.macos.apple.com/macos8/screenshot.html>.

- *Cyberdog 2.0*. This updated version of Apple's suite of Internet technologies for the Mac OS is available for downloading at <http://cyberdog.apple.com/>.

- *eMate Classroom Exchange 1.0*. This software allows you to connect one or several eMate devices to a Mac OS computer and transfer information between eMate devices and the computer simultaneously. You can download this software at ftp://ftp.info.apple.com/Apple.Support.Area/Apple.Software.Updates/US/Newton/For_MacOS/Other_Newton_Updates/eMate_Classroom_Exchange.img.hqx.

- *Newton Connection Utilities 1.0*. This software updates Newton Connection Utilities version 1.0b6 for Mac OS to the final release, version 1.0. This software is only for MessagePad 2000 and eMate 300 customers who received the 1.0b6 release. To download this update, go to <http://spock.info.apple.com/ftp.newfiles.html>. You can find the software by looking for it alphabetically—it begins with "NCU."



Adobe and Claris Sign Up for Rhapsody

Publishing powerhouses Adobe and Claris are just two of the companies that have publicly stated their commitment to develop major applications for Apple's Rhapsody operating system.

Claris President Dominique Goupil announced plans to create Rhapsody versions of FileMaker Pro Server, database software that accelerates the performance of FileMaker Pro workgroups, and advanced web-authoring

software for creating World Wide Web pages and sites. Claris has also established a small team of product development engineers who are investigating creative and new applications for Rhapsody.

According to Goupil, "Rhapsody will be ideally suited for Internet and server solutions, and Claris is committed to harnessing its power. We've matched the most appropriate Claris applications with the strengths of Rhapsody. This match leads us to focus initially on creating web-authoring and database server solutions."

In an Adobe interview, Robert Roblin, Adobe Systems' senior vice president of marketing, talks about the Rhapsody operating system and Adobe's commitment to the Macintosh.

To read more on the Adobe and Claris Rhapsody statements, visit their respective web sites at <http://www.adobe.com/newsfeatures/adobeapple/main.html> and <http://www.claris.com/news/docs/rel-rhapsody-c.html>. ♣

Technology

CD Highlights SDK Edition, July 1997

Technology Feature Apple's New Development

Platform: Code-Named "Yellow Box"

CD HIGHLIGHTS

SDK Edition, July 1997

No, we didn't forget to put "System Software" in our title. And, yes, you're right. July is usually the month we deliver the combined System Software and Software Development Kit (SDK) editions of the Developer CD Series. But we had so much worldwide system software to get out last month, we shipped a special System Software Edition in the June Developer Mailing. So, without further to-do, here are this month's new and revised packages.

Apple Guide 2.1.1

Apple Guide is a help system that makes it easier for users to perform new or complex tasks. It interactively walks users through accomplishing a task step-by-step, so they actually learn the task while they perform it.

Here are some of the features of Apple Guide 2.1.1:

- Support for help access from OpenDoc processes
- Support for accessing multiple guide files combining the topic areas, index, and "look" content across all open guide files
- A single and faster search for guide file information
- A Guide Directory resource [type = 'gdir'; id = -16384] that lets you specify a directory for Apple Guide to search for guide files other than the application's directory
- 68K CFM glue code for 68K applications that want to link with the shared library code in AppleGuideGlueLib.68K
- The ability to properly check multiple-type guide files for qualifier routines (QLfy).

You can find more information on Apple Guide 2.1.1 in the developer area of the Apple Guide web site at http://www.macos.apple.com/Apple_Guide/dev/dev.html. For Apple Guide 2.1.1 Release Notes, see http://www.macos.apple.com/Apple_Guide/dev/ag2.1.1notes.html.

Apple Location Manager 1.0.1

Apple Location Manager (ALM) is a free software utility for PowerBook computers that makes it easy for PowerBook users to move from one location to another without having to spend a lot of time manually reconfiguring their computer with every move.

This version of ALM contains a more recent build of ALM 1.0.1—the version bundled with Mac OS 8—and some added guidelines about the upcoming ALM 2.0 release. The ALM SDK contains everything you need to write a Location Manager Module, including a working sample, CodeWarrior and Symantec projects, and an MPW Makefile (your choice). Also included is ALM 1.0.1f6, both debug and nondebug builds. The nondebug version of ALM will only install on a PowerBook running System 7.6. The debug build is not restricted (but use this at your own risk!).

Apple plans to approve ALM for desktop use as part of a general system or hardware release in late 1997; until that time, it only supports PowerBook computers.

You can get more information on the ALM SDK 1.0.1 at http://17.126.23.20/dev/alm/ALM_SDK_Doc.html or check out the ALM Developers Page at <http://devworld.apple.com/dev/alm/index.html>.

AsyncDriverSample1.0b4

This sample shows how you can write a fully asynchronous block device driver for the traditional Mac OS. The sample tries to implement the simplest possible device driver. Instead of communicating with any real hardware, it mounts disk images over the network.

QuickTime IC SDK 1.01

QuickTime IC is an extension to QuickTime that abstracts applications from image-capture devices such as the QuickTake 200 digital camera. With this modular architecture, everyone benefits: application developers, camera vendors, and ultimately, end users. If you're an

application developer, you can easily integrate your applications with camera devices. This, in turn, makes it easier for users to integrate images with their documents, presentations, web sites, and other communications. The image- and camera-savvy applications you create will also help users improve their productivity. Camera vendors also benefit because they no longer need to spend large amounts of time creating image capture applications: they can simply provide components that transparently interoperate with the other parts of the system.

Here is an example of how QuickTime IC works in relation to the other components in the QuickTake 200 product. QuickTake 200 comes with three components:

- Camera Access application
- QuickTime IC system extension
- QuickTake 200 camera component

The Camera Access application leverages QuickTime IC, QuickTime, and other system services. With Camera Access, you can communicate with the QuickTake 200, view images, and transfer them to the desktop. You can also take advantage of image-enhancement functions such as cropping, lightening, darkening, rotating, and so on. You can extend this layer to provide additional functionality.

The QuickTime IC system extension provides all the necessary system-level functions for applications to communicate, view, and even manipulate images from image-capture devices. For example, when you want to see the images stored in the camera, a small component of code resident in the QuickTime IC extension is called upon to display the images in a contact sheet view. Again, you can extend this layer to provide additional functionality.

The final item is the device component. This is the piece of software that allows the camera and QuickTime IC to communicate with each other. When you launch the Camera Access application, a panel shows you the state of the camera (connected or unconnected), the number of images in the camera, and two buttons (one to view images in the camera and the other to transfer images between the

computer and the camera). This camera panel is an example of a camera component. Camera vendors can create components unique to their digital cameras.

As always, this architecture, like Apple's QuickTime, provides complete system-level interoperability ensuring ease of use and true plug-and-play operation.

The sample code shows how to create a QuickTime IC—savvy application, as well as how to create a panel component. Complete API documentation is included as well.

Currently, QuickTime IC is only available for the Mac OS. The Software Development Kit (SDK) includes components that allow QuickTime IC—savvy applications to work with QuickTake 150 and 200 digital cameras. Applications will work with other cameras if the

vendor provides a QuickTime IC camera component. QuickTime IC does not work with the original Apple QuickTake 100 digital camera.

QuickTime VR 2.0

QuickTime VR is a multiplatform software technology that allows you to create a new class of multimedia imagery. With QuickTime VR, you can develop interactive content of just about anything—from the inside of a new condominium complex to the outside of an automobile.

QuickTime VR 2.0 offers a programmer's API, so you can now control how QuickTime VR movies play back in your application or game. Other features include complete control of QuickTime VR movie playback; control of user interface; audio control,

including localized sound and volume control; and the ability to insert video, PICT, and 3D objects into panoramas.

This version of QuickTime VR requires a Power Macintosh with 16 MB of memory.

You can read the QuickTime VR online fact sheet at <http://product.info.apple.com/productinfo/factsheets/quicktimevr.html>. To obtain more information and see exciting samples of this technology, visit the QuickTime VR home page at <http://qtvr.quicktime.apple.com/>.

The Developer CD Team

TECHNOLOGY FEATURE

Apple's New Development Platform: Code-Named "Yellow Box"

By Apple Computer, Inc.

Object-Oriented Development for Rhapsody, the Mac OS, and Windows

Software developers are looking for a "21st-century approach" that will enhance the quality of their products, improve their efficiency, and lead to greater customer satisfaction for years to come. What are the best ways for developers to succeed in the fast-paced—and increasingly web-based—technology marketplace of today while simultaneously preparing for future changes?

- Develop "best of breed" applications.
- Deliver solutions across multiple platforms.
- Shorten the development cycle.
- Bring the benefits of Java to mainstream applications.

Apple and its third-party partners are now bringing to market the application development platform and tools developers need to accomplish those goals.

The 21st-Century Development Solution

Resulting from the union of Apple Computer and NeXT Software, the advanced development platform code-named *Yellow Box* is a set of object-oriented frameworks that are accessible through a consistent and well-designed set of APIs (application programming interfaces) based on the integration of OpenStep, Apple technologies, and Java. This platform will give developers easy access to state-of-the-art technologies from these two industry innovators. It will also embrace—and expand—Java technology, with capabilities designed to bring Java to mainstream applications.

The Yellow Box will serve as the basis for Apple's upcoming modern operating system, code-named *Rhapsody*. Versions of *Rhapsody* are being developed for PowerPC and Pentium processor-based computers.

Not only will this extraordinarily efficient platform enable developers to create robust, media-rich applications for the *Rhapsody* environment, but it will also streamline initial development and let developers deploy a single application on various computer platforms simply by recompiling the code. The Yellow Box will also be available for Windows 95, Windows NT, and the Mac OS.

Wide-Ranging Market Opportunities

Today's demanding computer users want better applications. Specifically, they are looking for

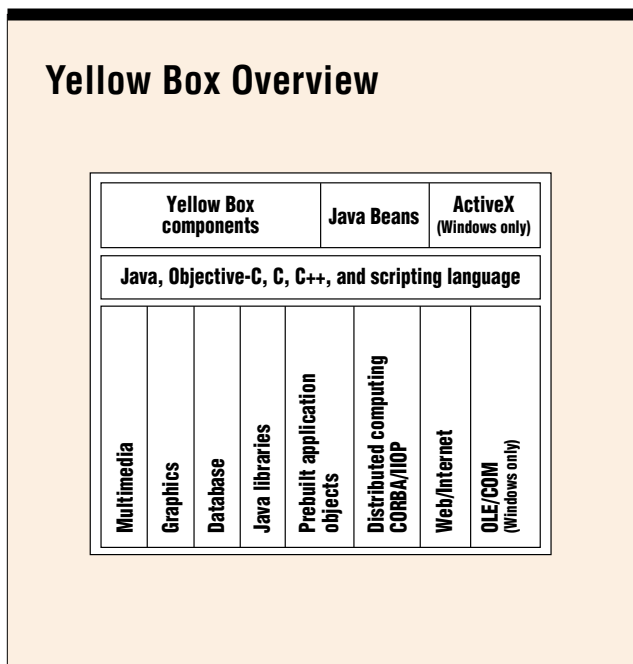
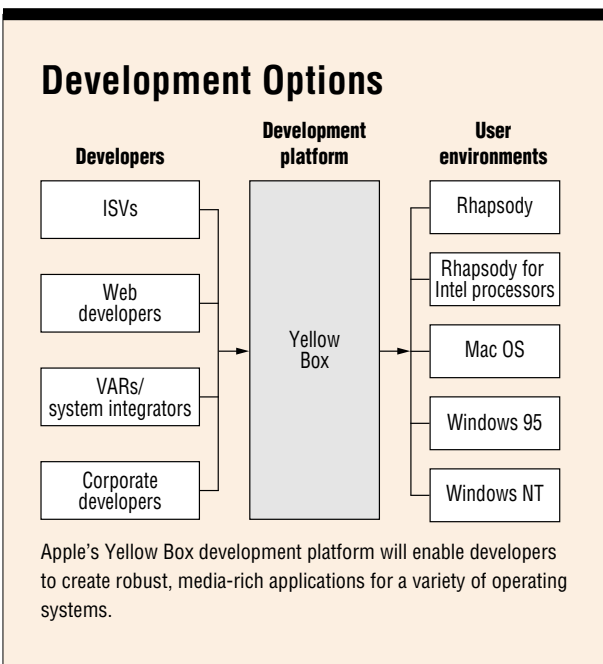
- Applications that are robust and media rich
- Applications that can deliver new capabilities swiftly to respond to rapidly changing needs
- Applications that can run on a wide range of hardware, from portables to desktop computers to servers

The Yellow Box development platform was designed to address all of these concerns, making it ideal for developing applications for

- Content creators in publishing and multimedia
- The higher education community
- Corporate users
- Users in Internet/intranet environments
- Scientific and engineering users

Meeting the Needs of Developers

The Yellow Box platform offers a working environment as superior as the applications it can produce. Apple's feature list for this new application development platform echoes developers' desires to be able to do the following:



- *Create “best of breed” applications.* Once again, Apple is providing developers with the tools to produce a new generation of software. The Yellow Box platform will offer unmatched resources for creating outstanding applications—programs that use the most advanced user interface, multimedia, Internet, and other technologies to create unique user experiences.

- *Develop in the programming language of their choice.* With the Yellow Box, developers can program in C, C++, Objective C, or Java (see page 4 for details). The Yellow Box will also support scripting.

- *Streamline the development cycle.* This platform streamlines application development by providing a number of high-quality prebuilt software components, backed by a visual, object-oriented approach to programming that speeds the creation of additional reusable software components.

- *Deliver global solutions across platforms.* The Yellow Box development platform radically transforms the process of deploying an application across delivery platforms. It allows developers to create applications for Rhapsody, the Mac OS, and Windows simultaneously—without compromising either application quality or user experience. Developers will be able to write a base version of their program using the advanced APIs of the Yellow Box, then create additional versions through a simple recompile process. Unicode

support and internationalization designed into the application classes enable developers to maintain one code base and deploy their products quickly anywhere in the world.

- *Realize the full potential of Java.* The Yellow Box development platform will support the creation of “100% Pure Java” applications, as well as provide libraries that complement and extend Java’s capabilities. Developers will be able to create sophisticated applications by calling the Yellow Box APIs in Java and deploy them in any environment that supports the Yellow Box. These features may well place the Yellow Box in a class of its own as an ideal platform for development in Java.

- *Deliver Internet-ready applications.* By providing seamless access to databases and WebObjects frameworks to create outstanding Internet and intranet client/server solutions, the Yellow Box extends Apple’s already substantial Internet support. In addition, software will be available for integrating Yellow Box applications with high-end database management systems.

The Yellow Box meets the needs of a full spectrum of developers, and is being optimized for the following groups:

- *Independent software vendors (ISVs).* The platform offers a comprehensive set of prebuilt, tested objects, such as text and printing, that speed application development while simultaneously improving the quality of the

finished product. These objects also make it easier to customize and modify applications. A plug-in architecture allows developers or third-party vendors to quickly create add-ons to an application. Localization is very easy, since text can be modified independently from the code of the application itself, and the same source code can be used on different platforms, allowing ISVs to sell their applications to a wider range of customers with little additional effort.

- *Value-added resellers (VARs) and system integrators.* Comprehensive services included in all Yellow Box implementations will make it easy for VARs to develop and customize vertical applications. Support for interactive development and prototyping allows integrators to get feedback from customers more easily in order to satisfy their requirements. Customers can deploy the finished applications on any of the leading desktop computer platforms without further effort from the VAR or system integrator. Internet capabilities will also permit deployment on the World Wide Web.

- *Web developers.* The Yellow Box includes the WebObjects framework, which provides an HTML interface to Yellow Box objects. This enables developers to easily create dynamic web-based applications. Integrated multimedia technologies support the development of state-of-the-art web pages. There are even built-in database integration services. Developers can create small stand-alone web

applications, web-hosted services, web-enabled desktop applications, and extensions to WebObjects. Through Apple's WebObjects software, dynamic web sites developed with the Yellow Box can be deployed on Rhapsody, Windows NT, Solaris, and HP-UX servers.

- *Corporate developers.* Technologies provided in the Yellow Box will allow corporate developers to create enterprise-class applications. The platform supports transparent distribution for client/server multitier applications, integration with relational database and legacy applications, and full Java capabilities. In addition, the Yellow Box architecture allows developers to improve productivity by reusing pieces of software—a necessity for quickly adapting to changes in the business environment.

Yellow Box Architecture

Designed to help developers meet current challenges as well as prepare for future ones, the Yellow Box development platform unites Apple's strengths in multimedia and graphics with the power and robustness of NeXT's proven object-oriented technologies—providing a consistent and powerful set of APIs that address the following areas:

- *Multimedia.* To support the creation of media-rich applications, the development platform integrates Apple's QuickTime Media Layer (QTML), which consists of these technologies:

- QuickTime, the industry-standard architecture for creating, manipulating, playing, and storing multimedia files

- QuickDraw 3D, which supports the creation and rendering of real-time, workstation-class three-dimensional graphics

- QuickTime VR, a virtual-reality tool that provides an interactive user experience of both panoramas and objects

For the first time, the QTML technologies will be accessible through object-oriented APIs.

- *Graphics.* The platform will adopt the PostScript imaging model, which provides WYSIWYG ("what you see is what you get")

The Yellow Box offers a comprehensive set of prebuilt, tested objects that speed application development while improving the quality of the finished product.

functionality across devices and operating systems. In addition, the platform will provide advanced typographic and international language support from QuickDraw GX, as well as support for Apple's ColorSync color-matching technology and Interceptor for direct screen access.

- *Database support.* The platform will incorporate NeXT's Enterprise Objects Framework (EOF) functionality to provide persistent storage through a process of mapping objects

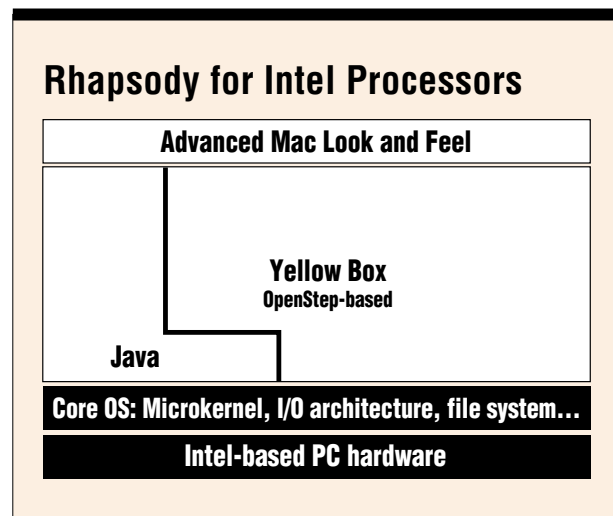
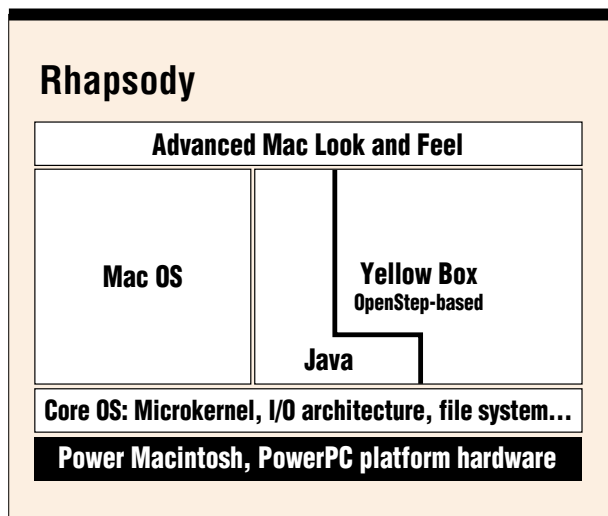
to tables. Access to Oracle, Sybase, Informix, ODBC-compliant, and other powerful databases will be available through add-on products.

- *Java libraries.* Developers will also be able to run "100% Pure Java" applications using the standard libraries that run on any Java Virtual Machine. In addition, Apple is participating in the design of the Java Foundation Classes (JFC) framework and will work to make it fully functional and have it integrate smoothly with the rest of Apple's platform.

- *Prebuilt application objects.* These objects provide out-of-the-box, ready-to-use functionality that significantly reduces the effort required to develop an application. The OpenStep AppKit framework provides sophisticated user-interface functionality that recreates the look and feel of the native operating system on which the application is running. Also included is support for interapplication services, scripting, localization, and sophisticated text handling and imaging. The OpenStep Foundation framework provides functionality common to all applications that insulates them from the specifics of the operating system and offers services such as memory management, internationalization, multithreading support, and file system operations.

- *Distributed computing.* The platform will furnish high-level APIs for transparently developing distributed applications, freeing developers from the necessity of writing low-level network operations. Support for CORBA/IOP (including an object request broker) will make it easy for developers to create robust, flexible applications that work across heterogeneous networks.

- *Microsoft Windows support.* Windows versions of Yellow Box applications will be able



to take advantage of native Windows functionality such as Win32 calls and OLE/COM (Object Linking and Embedding/Common Object Model). Developers can transparently make their applications send messages to OLE-enabled applications such as Microsoft Word. Applications developed on this platform can also leverage ActiveX controls within the Windows environment. This will allow developers to create first-class applications that run on Windows and integrate seamlessly with any other applications on Windows.

- *Internet functionality.* The development platform includes APIs for Internet-based mail, messaging, directories, and security services. It will also utilize Apple's WebObjects framework to support the creation of innately "web-enabled" applications, reinforcing Apple's existing strengths in Internet publishing.

- *Languages.* Developers using the Yellow Box platform will have a great deal of flexibility in choosing a programming language, because it provides C, C++, Objective C, scripting language, and Java support.

- *Component architecture.* Thanks to the platform's built-in component architecture, developers can create applications by assembling reusable components. The component architecture will allow developers to deliver dynamically loadable add-ons to their applications through reusable components stored on palettes and assembled by developers using visual programming tools. This unique feature allows third-party and in-house developers to easily create and distribute extensions and plug-ins for applications. This part of the platform will support the use and creation of Java Beans and the use of Microsoft's ActiveX.

A Platform for Today—and Tomorrow

When developers write to the Yellow Box APIs, their applications can be deployed in four different user environments: Rhapsody, Rhapsody for Intel processors, Yellow Box for Windows, and Yellow Box for Mac OS. These applications will exhibit the appropriate look and feel for the operating system they run on.

Rhapsody will merge Apple's and NeXT's operating system technologies to create a powerful new operating system for Power Macintosh and other PowerPC processor-based computers. The Yellow Box portion of Rhapsody will offer preemptive multitasking, memory protection, multithreading, and symmetric multiprocessing with support from the core operating system, while the Mac OS portion will provide compatibility for current Mac OS applications so that they can run alongside Yellow Box applications. This environment will be the best solution for running Yellow Box applications, encompassing fast hardware, easy system maintenance, a modern operating system, Mac OS application compatibility, and an intuitive user interface.

Apple will also release a version of Rhapsody for systems based on Intel Pentium processors. Although this version will not offer all the benefits available on PowerPC processor-based systems, such as the capability to run Mac OS applications, it will bring new levels of operating system capabilities to users of Pentium-based systems running Yellow Box applications.

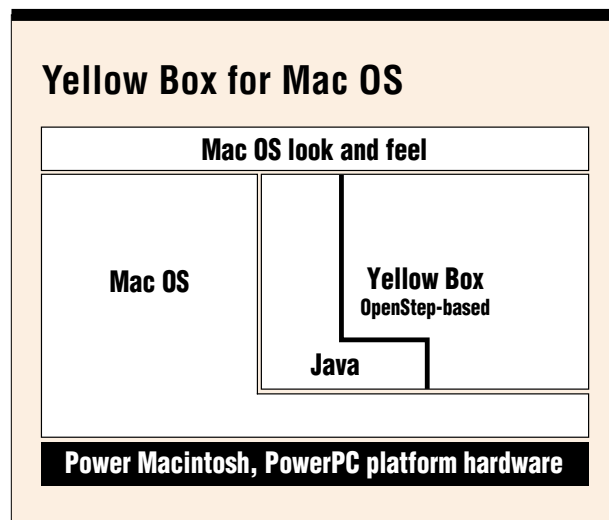
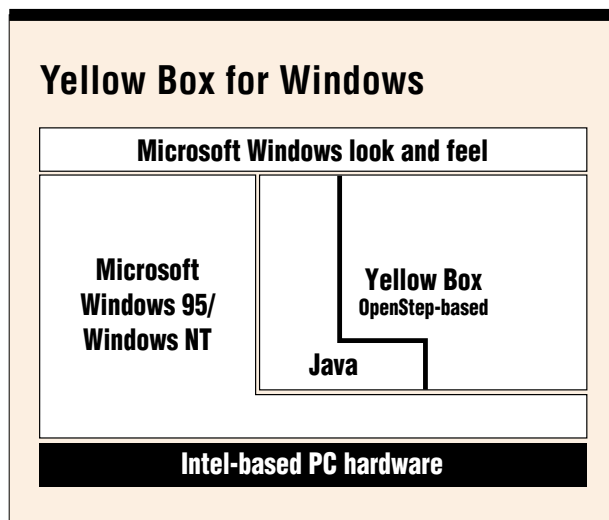
The development platform allows developers to create applications for both the Windows 95 and Windows NT operating systems. Because the platform is implemented on top of the Win32 API, it insulates developers from

many of the usual difficulties of creating a standard Windows application. Of course, the applications carry the native Windows interface.

An upcoming release of the Mac OS will be extended to support Yellow Box applications. This capability will not affect existing Macintosh functionality. Mac OS systems will be able to run both applications developed for the Mac OS and those developed for the Yellow Box. Users will be able to run native Mac OS and Yellow Box applications side by side on their systems. This environment will allow users to take advantage of the powerful PowerPC hardware platform—offering true plug-and-play capabilities and simple, yet powerful, user experiences—with the added capabilities the Yellow Box provides.

Today's Opportunity for Tomorrow's Success

Apple's Yellow Box application development platform provides a new, 21st-century approach for developing tomorrow's applications. Its object-oriented, cross-platform, language-independent approach streamlines the development process and allows developers to radically improve their productivity. Applications developed with the Yellow Box development platform are being tested today in mission-critical environments of Fortune 500 companies, and ISVs are already using the Yellow Box to create the next generation of ground-breaking, "best of breed" applications. ♣



Internet Resources

News

- Yellow Box release timetable—<http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.yellowbox.html>
- Roadmap of Apple operating system releases—<http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.macosupdt.html>
- Integration of WebObjects and Java with Rhapsody—<http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.internet.html>
- OpenStep Enterprise 4.2—<http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.openstep.html#OPENSTEP> Enterprise 4.2
- Mac OS 8 and the Internet—<http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.access.html>
- HIDE Awards—http://devworld.apple.com/dev/hideawards_rules.html
- Metrowerks' CodeWarrior Latitude—<http://www.metrowerks.com/home.html>
- Apple's Developer Programs—<http://devworld.apple.com/worldwide/macdp.html>
- Pricing and availability of WebObjects products—<http://product.info.apple.com/pr/press.releases/1997/q3/970513.pr.rel.webobjects.html>
- Mac OS 8 beta version—<http://gemma.apple.com/bin/login.pl?Tag=&URI=/GS/index.html>
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- Prerelease versions of Open Transport and Text Encoding Converter—<http://gemma.apple.com/bin/login.pl?Tag=&URI=/GS/index.html>
- Mac OS 7.6.1 Update—<http://support.info.apple.com/ftp/7.6.1/7.6.1flash.html>
- MRJ 1.0.2 and MRJ SDK—<http://applejava.apple.com/>
- Mac OS 8 feature list and screen shots—<http://www.macos.apple.com/macos8/screenshot.html>
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- eMate Classroom Exchange 1.0—http://ftp.info.apple.com/Apple.Support.Area/Apple.Software.Updates/US/Newton/For_MacOS/Other_Newton_Updates/eMate_Classroom_Exchange.img.hqx
- Newton Connection Utilities 1.0—<http://spock.info.apple.com/ftp.newfiles.html>
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- OpenStep documentation—<http://devworld.apple.com/rhapsody.html>
- Apple's Developer World—<http://devworld.apple.com/>

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- Apple Guide 2.1.1 information—http://www.macos.apple.com/Apple_Guide/dev/dev.html
- Apple Guide 2.1.1 release notes—http://www.macos.apple.com/Apple_Guide/dev/ag2.1.1notes.html
- Apple Location Manager (ALM) 1.0.1—http://17.126.23.20/dev/alm/ALM_SDK_Doc.html
- ALM developers page—<http://devworld.apple.com/dev/alm/index.html>
- QuickTime VR fact sheet—<http://product.info.apple.com/productinfo/factsheets/quicktimevr.html>
- QuickTime VR home page—<http://qtv.quicktime.apple.com/>