AppleDirections

APPLE NEWS

Mac OS Licensing Strategy Is Working

Dataquest has released numbers for personal computer market share, and its Mac OS specialist, James Staten, noted that "licensing the Mac OS is starting to pay off for Apple Computer." According to Dataquest's U.S. 1996 cumulative shipment statistics, vendors of Mac OS–based computers ("Macintosh clones") shipped enough Mac OS–based systems to buoy the Mac OS platform's 1996 market share. Dataquest totals for the year show that without its licensees, Apple's share of the U.S. market was 6.7 percent, putting it in fifth place. Add the clone makers, and the share rises to 7.8 percent, good enough for fourth place in the rankings. Dataquest predicts that the impact of licensing will grow even more in 1997, as the number of Mac OS–based computer vendors in the market rises into the double digits.

One factor that should stimulate sales of Mac OS computers in the near future is the round of price cuts that occurred among top Mac OS computer manufacturers this week. Here's a summary of recent price reductions:

• Apple introduced a new line of Power Macintosh and PowerBook products, all hitting aggressive price and performance benchmarks.

• Umax took the lead at the low end of the Mac OS–based computer market, offering a model with an 80-MHz 603e CPU priced at $1,299. As of publication time, the Umax computer was the lowest-priced Mac OS–based system available.

• Power Computing has said it will reduce prices as much as 21 percent on its Power Tower Pro, PowerCenter, and PowerBase lines.

Staten commented on this overall trend: "We see these moves as very positive for Apple

STRATEGY MOSAIC

DVD—Taking Software Beyond CD-ROM

Edited by Gregg Williams,
Apple Directions *staff*

[Editor's note: Depending on whom you ask, DVD *stands for* Digital Video Disc *or* Digital Versatile Disc. *Regardless of which way it's spelled out, DVD is in your future. DVD players will connect to television sets and play DVD movie discs with a higher quality than laser discs. Apple is readying its plans to bring DVD-ROM drives to Power Macintosh computers. They're faster than most CD-ROM drives, and DVD-ROM discs hold more than seven times as much information as CD-ROMs.*

To get the latest information on DVD, I talked to John Cook and Peter Zan, both of whom are working on DVD adoption within the Apple Interactive Media Group.]

What Is DVD?

AD (Gregg Williams): *Before we get started, perhaps you could say something about what DVD is.*

Peter Zan: DVD is the next generation of optical storage technology. It's essentially a higher capacity CD that can hold video and audio as well as computer data. The first DVD-ROMs will hold 4.7 gigabytes of data; eventually DVD-ROMs will hold 17 gigabytes of information!

John Cook: DVD-Video is the standard that is being heavily promoted by the consumer electronics companies and the big Hollywood studios. The DVD-Video player essentially becomes the replacement for laser discs and eventually the VCR in your home. It gives you high-quality video and audio, but the data formats you can use are highly

Apple**Directions**

EDITOR'S NOTE

What Isn't New?

It was the day after Apple's restructuring, and I was having a hard time writing this column. I had a lot of really great ideas I'd been planning to tell you about, but every time I started to put something down on paper, I realized that either the project or the person in charge of the project had changed. Suddenly, instead of having a few cool new things to write about, everything was new. So, I did a quick analysis of the situation and took the easy way out—I decided to tell you what *hasn't* changed. Since I titled last month's column "What's New?", an obvious title for this column was "What Isn't New?"

   I'm not stupid. I reasoned that what's new at Apple AR (after restructuring) probably takes up a good two-thirds of the Apple pie chart, so it would be a lot easier to write about what isn't new. And amidst all the recent changes at Apple and in Apple Developer Relations, the one thing that stands out in my mind as unchanged is Apple's continued commitment to its developers. If anything, that commitment is stronger than ever. The way I look at it, my goal (and ADR's goal) is to get you the kind of information and support—both business and technical—that you need to make the right development decisions. That goal hasn't changed.

   Because the restructuring occurred shortly before we sent this issue of *Apple Directions* to the printer, the following information is fairly general. Still, it will give you some insights into the restructuring plan and the impact it will have on Apple as a whole and on specific Apple product lines. As soon as more information becomes available, we'll provide you with additional details—in future issues of *Apple Directions,* in Apple Developer News, and on the Developer World web site (**http://devworld.apple.com/**).

   With that said, here are some highlights from a couple of the press releases Apple posted about the restructuring events, along with the web site addresses (URLs) where you can get more details:

   • Apple press release, March 14, 1997, "Apple Computer Details Restructuring Plans"—**http://product.info.apple.com/pr/press.releases/1997/q2/970314.pr.rel.restructure.html**. In this press release, Gil Amelio, chairman and chief executive officer of Apple, talks about the recent restructuring plan and outlines his priorities. "The top priorities guiding our reorganization are the rapid delivery of distinctive products for our loyal business, education, and home customers, and the development of a robust next-generation operating system to carry them into the future," Amelio said. "We can best achieve these goals by streamlining our organization, simplifying our product lines to deliver fewer but much stronger models, and stopping investments in activities that are not central to these core businesses."

   • Apple press release, March 14, 1997, "Apple Computer Restructuring: the Technology FAQs"—**http://product.info.apple.com/pr/press.releases/1997/q2/970314.pr.rel.faq.html**. This frequently-asked-questions (FAQ) document discusses Apple's product and technology priorities. "Much of the restructuring in software engineering is targeted to support Mac OS and Rhapsody development plans. As before, Apple's goal is to deliver market-leading, Internet-ready operating systems for its customers and provide industry leadership in multimedia, human interface design, ease-of-use, and plug and play. On the hardware side, Apple will simplify its product line. This process has already begun with recently announced high-performance Power Macintosh systems, industry-leading PowerBook products, and the new entry-level Macintosh products scheduled to be introduced in April."

   A number of Macintosh-related publications have reacted favorably to the restructuring, and you can read their responses at these web sites:

   • The *MacWEEK* article "Developers to Apple: 'You have our support' "—**http://www.macweek.com/mw_1111/nw_developers.html**.
   • Don Crabb's *MacWEEK* column—**http://www.macweek.com/mw_1111/op_crabb.html**.
   • *Macworld*'s article, "Mac Faithful Unfazed by Latest Announcement"—**http://www.macworld.com/daily/daily.1127.html**.

—Patty Bing-You, Editor

DVD

continued from page 1

constrained. Most movies targeted for DVD players will be coded with MPEG-2 for video and AC-3 or MPEG-2 for audio. But a DVD-ROM can and will hold various formats used in today's computers, as well as MPEG-1, MPEG-2, and AC-3.

Of course, when we speak of DVD, we're referring to DVD-ROM. The DVD-ROM drive is what's eventually going to replace today's CD-ROM drives in personal computers. That's not to say that DVD computers won't be able to play DVD movie discs. Personal computers with DVD-ROM drives will be able to play DVD-Video material if they are configured with the right combination of additional hardware and software.

AD: *Which includes what?*
John: A DVD-ROM drive, UDF (Universal Disk Format) software to read the DVD data files and interpret the DVD control codes, hardware or software to decode the MPEG-2 video and AC-3 audio, hardware to decrypt copy-protected movies, and an application to view the movie.

AD: *What are the advantages of DVD? What can it do for developers?*
John: Well, the biggest thing DVD will provide to developers is freedom from the space constraint they have today when they develop a CD-ROM–based title. It used to be that we would look at the 650 megabyte capacity of a CD-ROM and think that was a lot of disc space available. But today's titles have grown because of things like high-quality 3D graphics, full-motion video, and CD-quality "surround sound." What we see happening in the development community is that a developer has either had to throw away a lot of good material or ship the title on multiple CD-ROMs.

AD: *Or they would compromise the quality of the audio . . .*
John: That's right, or the video. The DVD disc format removes those constraints by moving us from 650-megabyte CD-ROMs to 4.7-gigabyte DVD drives—that's over seven times as much storage. Also, a DVD disc looks exactly like a CD-ROM—it has the same form factor—and DVD-ROM drives give us

backward compatibility. *[Editor's note: The first generation of DVD-ROM drives will not be able to read "one-off" CD-R discs, which includes Photo CD discs. However, this limitation is supposed to be removed in the second-generation DVD-ROM drives, due in late 1997.]*

AD: *Meaning you can continue to play today's CD-ROM titles on a DVD-ROM drive?*
John: That's correct.

> **DVD discs give us over seven times as much storage as CDs and backward compatibility with CD-ROM drives.**

Opportunities for Using DVD

AD: *What kinds of developers do you see taking advantage of DVD?*
John: We've found that there are three situations where developers are going to be interested in DVD. One is where the developer is space-constrained today, saying, "I just can't fit all of this data onto a CD"—for example, these kinds of phone-directory discs that ship on four, five, or six CDs. We've seen some industry data suggesting that more than 5,000 titles today ship on multiple CDs, and they could all take advantage of DVD's extra capacity.

The second kind of situation where developers are going to be interested in DVD happens when a company has a good idea and access to good content, but they just can't

put the title on a single CD without compromising either the amount of material they use or the quality of their video or audio. Unfortunately, some people have made those compromises just to get their title to market. With DVD just around the corner, those people can take today's title and pretty easily migrate it to DVD by simply going back in and reencoding their video in something like an MPEG-1 or MPEG-2 format and their audio in AC-3 format.

AD: *So the second situation involves taking an existing title and bringing out a deluxe or enhanced edition.*
John: That's a good way of thinking about it. Another thing we've also talked about with some developers is their need to ship multiple-language versions. Today, they take a CD title and do different CDs for English, French, Spanish, and German. With DVD, they have enough disc space that they conceivably could put all of those different language versions on a single DVD-ROM—which would also reduce the number of titles they'd have to stock.

AD: *And the third situation?*
John: Probably the most interesting situation we've found is when developers see DVD and realize that they can use it to do something totally different. Maybe they've had an idea for a new game, a reference work, a museum tour, or a travel guide—something that just couldn't be done acceptably well within the constraints of the CD-ROM format. These are the people whom we're really excited about working with. They will understand the DVD format and the encoding technologies, and they will use them to make exemplary DVD products—titles that will get people excited about DVD.

DVD Data Types

AD: *What kinds of data types can you put on a DVD-ROM?*
John: There are no real constraints on what formats developers can use—it's fairly open-ended. They can certainly take advantage of all

of the DVD-Video formats, such as MPEG-2 and AC-3 audio, but they don't have to limit themselves to those formats. If they choose, for example, to use MPEG-1 on a DVD-ROM, they can do that. If they want to use Cinepak, a common compression standard, that won't be a problem, either. Here are the two biggest issues we see today: How much crossover does a developer want to have between the consumer player and home computers? What are the advantages of being able to play the same DVD-ROM on both, and what constraints do developers need to put on themselves to do so?

AD: Is there any possibility for DVD-ROM titles that would work on both Mac OS and Windows PCs?
John: There should be a way to do that—just as you have hybrid titles today, where the runtime engine has to be OS-specific, but the media assets don't. So we definitely see that as being a way for people to be able to support the Mac OS as well as Windows 95 on the same disc.
Peter: Just to jump in here, one idea that's come up is that perhaps the run-time engine should be a Java™ applet. Now because the Mac OS and other operating systems support Java, theoretically a content developer can press one DVD-ROM that will run on multiple operating systems—as long as the OS supports Java.

Apple's Approach to DVD

AD: What is Apple's approach to the DVD market? What is Apple doing?
John: A number of things. One major emphasis is for Apple to take a leadership position in bringing people, both developers and customers, from CD to DVD. On the developer side, we want the Macintosh to be the platform of choice for DVD content creation, regardless of the platform that the final title runs on.

First we have to educate developers about DVD. We have to use our developer publications, our developer technical services to educate the community on both the business and technical sides of DVD. Second, we have to be sure that developers have the tools they need to take advantage of this format. A lot of that revolves around encoding video and audio into higher-quality formats such as MPEG-2 and AC-3. It was gratifying to find that a majority of the solutions out there happen to be Macintosh-based. Third, we have to make sure that the developers of future versions of today's media authoring tools—tools like the Apple Media Tool, Macromedia's Director, and mFactory's mTropolis—are aware of what the DVD format can do. Apple is pursuing a heavy evangelism effort with such companies to make sure that future versions of their tools make good use of DVD.

Here inside Apple, we're working to ensure that the key Apple technologies that content developers depend on are also aligned with what's possible in the DVD format. For example, we're making sure that we bring MPEG-2 video and AC-3 audio support into QuickTime. That's been a lot of our focus over the last six months, and it's going to be a continuing focus throughout the next several months and beyond as we help move the developer community from CD to DVD.

DVD on Macintosh

AD: You've been talking about developer-related issues. What's Apple doing to bring DVD to customers, and when will we see the first DVD-based Macintosh computers?
John: We want to make sure that, as quickly as possible, we get DVD-ROM drives into as many different Macintosh models as possible. We're targeting the first Macintosh models with DVD-ROM drives in them to be introduced by the end of 1997. We might be able to do it sooner, but we're leaning towards waiting for the arrival of the second-generation drives because of the incompatibility between first-generation drives and Photo CD and CD-R.

AD: Will there be DVD-enabled PowerBook computers?
John: We think that getting a DVD drive as soon as possible into a PowerBook is very important, for a couple of reasons. First, it would become an incredible entertainment system—when you're not using

---

DVD-Related Web Sites

http://www.ima.org/cp/dvd/index.html
The Interactive Multimedia Association (IMA) DVD Initiative page.

http://www.ima.org/cp/dvdsig/index.html
The IMA DVD Special Interest Group page. This page points to a good FAQ (frequently asked questions) page, as well as lists of DVD suppliers and disc-replication facilities.

http://www.videodiscovery.com/vdyweb/dvd/dvdfaq.html
A FAQ (frequently asked questions) page about DVD.

http://www.dolby.com/tech/ac-3mult.html
A technical paper on the Dolby AC-3 audio format.

http://www.tacmar.com/index.html
Includes the results of a 1996 study on user adoption of DVD.

http://www.osta.org/html/ostatech.html
Technical information on UDF (Universal Disk Format), the file system format used by DVD.

http://www.unik.no/~robert/hifi/dvd/
Links to DVD information and news.

http://www.km.philips.com/dvd/
Philips's DVD page.

http://www.wiredinc.com/
Home page of Wired Incorporated, which sells MPEG and DVD solutions.

http://www.c-cube.com/ftrstry/dvd.html
An overview of DVD from the C-Cube web site.

your PowerBook for business, you can do things like play really great interactive games. Second, given its portable form factor and its high-quality audio and video, it should make an incredible sales presentation tool as well.

AD: *What about DVD in the mainstream Power Macintosh computer line?*
John: You'll see DVD coming into the mainstream product line in 1998. Here, we expect DVD to catch on more slowly in the business market, just as CD-ROMs did. However, we're hearing a lot of interest in DVD-ROMs because of their ability to store extremely large amounts of data in a compact, easily duplicated, read-only format.

AD: *Where else can you see Power Macintosh computers with DVD-ROMs being used?*
John: Another interesting area where we think there is going to be some potential over time is the education market. Today there are a lot of education titles on laser disc, but the equipment makes it very hard to use such titles in the classroom. You've got three boxes, a Macintosh, a laser disc player, and an NTSC monitor—it's expensive and cumbersome. It's a natural progression to see laser disc titles migrate to the DVD format. Then all of a sudden you have next-generation education Macintosh models with DVD-ROM drives that can play education titles with the same quality as the laser disc but a lot more conveniently and with much more interaction.

One area that's always been important, we think, is business training and learning; businesses need technology for teaching their employees the skills they need to do their jobs. Take a hotel chain, for example, that wants to make sure that its people use consistent practices, but has a high turnover rate of staff. One very attractive idea has been to put multimedia-based training onto CD-ROM and use that to train new employees in a cost-effective way. So far, that hasn't worked—largely, I think, because the smaller-sized video and the poor-quality audio turned people off. I think that the same idea on DVD-ROM has an excellent chance of working because it will give the user an experience that is much more like sitting in front of a laser disc or a television set.

DVD Adoption Rate
AD: *How long will it be before DVD becomes pervasive?*
Peter: Based on the research I've done, the

growth rate for DVD over the next couple of years is pretty amazing. Because DVD-ROM drives are still more expensive, there will still be a place for CD-ROM drives for the next 18 months or so. Eventually, however, CD drive manufacturers are going to be moving to DVD, because it's a superset of CD and the cost is expected to fall as the volume increases. So within 18 months you may not be able to purchase a CD drive, whether it be a CD-audio drive or a CD-ROM drive—they'll all be DVD drives. And if you look at the forecast for the installed base of DVD, the number of DVD-ROM drives far outstrips DVD-Video players. Over the next year and a half, there's expected to be an installed base of over 1.5 million DVD-ROM devices worldwide, as opposed to approximately 470,000 DVD-Video players.

AD: *How much more will people be willing to pay to buy a computer with DVD-ROM?*
Peter: We know that people are willing to pay a premium for DVD—initially this will be anywhere from $250 to $500 more for a computer that has DVD-ROM over a similarly configured machine with a CD-ROM drive. At the same time, we also know that DVD manufacturing is ramping up, which will drive costs down. So over the next year and a half to two years, we expect to see DVD-ROM prices basically be the same as or less than what CD-ROM prices are today. The research I've been doing indicates that within the next 18 months, DVD-ROM is going to be here and it's going to be as widespread as CD-ROM is today.

Getting Started With DVD
AD: *What do developers need to do to get started with DVD?*
John: I think the first thing that developers need to do is to start thinking about the format and understanding what the potential is. As a part of that process, they need to understand that they don't have to throw away everything they've done today—that the tools, the content, and the procedures they've been using are still good. They have to understand they can take the stuff that they're doing today and move forward in one of several ways.

Developers also have to look at what the business opportunity is for them—how quickly they should move over to DVD, how long it will be before they can get a proper level of payback for their efforts. If they create cross-platform titles, they can reach the entire 1.5

million installed number that Peter mentioned—and you can bet that anyone with a DVD-ROM drive will be hungry for good content.

Another thing that developers need to do is to start rethinking their processes. There are a couple of "gotchas" or drawbacks with DVD-ROM development today. CD title developers are accustomed to pressing their own "one-off" discs in house, which gives them faster turnaround during the testing phase. You can't do that on a DVD-ROM today. The process that you go through with DVD today is that you create a disc image, usually on a hard drive; then you transfer that to a digital linear tape, a DLT. That tape is in turn sent to a pressing plant, which creates a glass master DVD-ROM and sends it back to you so you can do your testing. In fact, it's a lot like CD development was in 1987 or 1988.

Resources are being created to identify what developers will need—for example, pressing plants and post-production facilities that can handle MPEG-2 video and AC-3 audio encoding. We want to make sure that we can steer people in the development community to those folks and say, "OK, here's a list of six disc manufacturers; here's a list of twelve companies who do MPEG encoding."
Peter: We've also been working with various authoring tool developers to make sure these tools are in place for content developers so they can take their current CD-ROM content and port that to DVD, or actually take advantage of DVD and deliver new, compelling titles that really exercise the technology and showcase Apple technologies.

AD: *And how is Apple going to deliver that information to developers?*
John: Several different ways. We intend to keep the information flowing through Apple's developer publications, such as *Apple Directions* and Apple Developer News [Apple's weekly news bulletin delivered by e-mail]. We'll also be talking about DVD at the Apple Worldwide Developers Conference in a breakout session on AV technologies.

Another good resource for developers is all the information that's out on the web—especially the IMA, the Interactive Media Association. They know a lot about DVD, and helping the multimedia development community make the transition from CD to DVD is one of their main charters. They have a pretty active web site today with pointers to a lot of resources, including some technical working

groups that will be working through a lot of important issues to help kickstart the industry and get it moving forward. *[Editor's note: For the web address of the IMA and other useful sites, see the text box "DVD-Related Web Sites" on page 4.]*

Bundling Opportunities

AD: Will DVD titles be available when the first DVD-equipped Power Macintosh computers arrive?
John: Yes, they will. Not only that, since DVD titles will initially be limited, Apple may bundle some DVD titles with its first DVD-equipped computers.

AD: So does Apple have all the cutting-edge DVD titles it needs for bundling yet?
John: We're working on it, but we're also interested in hearing from developers who have good ideas.

AD: So if developers think they have a good idea for a DVD title . . . ?
Peter: If they're in the United States, they should contact John Willing (willing@apple .com). For Europe, which will have different bundling appropriate for European markets, they should contact Chris Broad (broad1@ euro.apple.com). We're still in the process of creating a contact for our Asian developers.

AD: What kinds of titles are you looking for?
Peter: For the consumer market, we'll be looking for games, "edutainment," even video titles. Further out, we want to have various bundles depending on the markets we go after, whether it's education or home or business. In addition, different markets—the United States and Europe, for example—will have different needs, which is why we have a European contact for bundling.

AD: What are the guidelines that Apple uses to evaluate titles for possible bundling?
Peter: We have a bundling group that'll be evaluating developers' ideas for DVD titles, and they already have some guidelines in mind. First of all, they want PowerPC processor–based applications. Second, they're very interested in titles that use the Internet. Third, they're very interested in titles that take

advantage of other Apple technologies. For example, if the title takes advantage of Quick-Draw 3D and it's bundled with a Power Macintosh model that has a 3D accelerator, that title shows off our hardware. The same goes for other key Apple software technologies, like QuickTime or QuickTime VR.

> Within 18 months, you may not be able to purchase a CD drive—they'll all be DVD drives.

Another important factor that will make a title desirable is what we call "replayability." Look at what happens with Disney home videos. When people go out and buy a Disney video for their children, they don't play it once and put it away—it gets played over and over again. So replayability is big on our list.

Market awareness of the title and the developer are also important. Obviously we want to work with all of our developers, and some are not as widely known as others, but it does help in certain instances to hook up with well-known companies. When companies that have some market awareness help promote DVD, we hope that will encourage some of the lesser known developers to be aggressive in supporting DVD-ROM also.

DVD and the Internet

AD: You said that Apple is interested in DVD titles that use the Internet. What sorts of things do you have in mind?
John: There are several things developers can do. First, if you recognize that the bandwidth across the Internet is never very high but that a DVD-ROM can store incredible amounts of high-quality sound, graphics, and video, you realize that DVD and the Internet complement each other. I think there are some very exciting possibilities for DVD titles that get "fresh"

data that drives the program from the Internet but use content from the DVD-ROM to give the customer a great audiovisual experience. Just as a trivial example, a travel-planning program might store an interactive tour of Paris on the DVD-ROM but go to the Internet to get the latest currency exchange rates for a spreadsheet that helps you budget your trip.

Second, since a DVD-ROM can hold immense amounts of information, I think some companies will be interested in putting a lot of data they want to sell on a DVD-ROM, but in a "locked" form, and giving the discs away. Users can then browse through a catalog of the data, select what they want, and pay for it over the Internet through a credit card transaction that gives them access to the data. You could sell just about anything this way—software, clip art of various kinds, demographic data, whatever.

Finally, developers should look at using the Internet to enhance a stand-alone DVD title—in other words, you've got a DVD title that's interesting on its own, but if you have a connection to the Internet, you get something extra from it: maybe additional information, downloadable enhancements, news from your company—whatever you can think up.

Conclusions

AD: So what do you want developers to remember about DVD?
John: Developers should know that Apple is taking a leadership position in bringing both customers and developers to DVD-ROM, just like we did several years ago with CD-ROM. We anticipate having a DVD-ROM drive in a Power Macintosh computer by the end of the year. Eventually, you'll see DVD-ROM drives going into the entire product line.

We also want to make sure that developers understand that DVD-ROM is the future—it's going to replace CD-ROM drives in the next two years—and that it's a technology that will create new business opportunities for them. DVD is faster than CD-ROM, and it provides much more storage. Together, those two things will make it possible for developers to create software that just can't be done on CD-ROM. ♣

APPLE NEWS

Mac OS Licensing Strategy

and the Mac platform. Products such as these at prices that offer parity or advantage over x86 rivals should encourage a strong replacement market in 1997, which could allow Apple and the Mac platform to grow [its market] share this year."

The full report on this topic, titled "Mac Market Less Gloomy Thanks to Licensees," is available for $95 from Dataquest at http://www.dataquest.com/. The report is dated February 10, 1997.

If you're a member of Dataquest Interactive (which you can join free of charge), you can find an abstract of the above report and purchase the full report at http://www.dataquest.com/register/abstracts/pcis-ww/pcis-ww-da-9702-ab-0001.html.

■ ■ ■

Amelio Presents Apple's Internet Strategy

According to Apple's chairman and chief executive officer, Dr. Gilbert Amelio, the Internet is just another form of publishing and is therefore a key market for Apple. Dr. Amelio made this statement during a presentation of Apple's Internet and intranet strategy at the InternetWorld trade show last March. According to Amelio, Apple is extending its expertise in the publishing arena to take full advantage of the Internet and intranets as new media for publishing. Amelio outlined four key points of the strategy:

• Apple is extending its expertise in publishing to the Internet and intranets.

• Macintosh is the platform of choice for Internet and intranet publishing.

• Apple's technology developments support the company's Internet and intranet publishing initiative.

• Apple and the Macintosh Internet developer community offer a rich suite of Internet and intranet publishing solutions.

You can review the two press releases on this topic at http://product.info.apple.com/pr/press.releases/1997/q2/970312.pr.rel.keynote.html and http://product.info.apple.com/pr/press.releases/1997/q2/970312.pr.rel.4points.html.

■ ■ ■

Rhapsody Hands-On Lab at WWDC

One of the best reasons to attend this year's Worldwide Developers Conference (May 13–16, San Jose, California) is to learn about Rhapsody and get hands-on access to it. In addition to about 20 sessions covering various aspects of Rhapsody, Apple will be hosting a Rhapsody Hands-On Lab.

At the Rhapsody Hands-On Lab, you can try out the latest development version of Rhapsody. In addition, this lab will give you your first opportunity to test the performance of applications, extensions, and control panels on the Rhapsody compatibility feature (also known as the *Blue Box*). If your software doesn't directly access hardware, it has an excellent chance of running within the Blue Box. Bring software on floppy disk, CD-ROM, or an external SCSI hard disk. Details on how to register for the Rhapsody Hands-On Lab will be available soon.

In addition to an extensive Rhapsody track of sessions, WWDC will also include tracks on the Mac OS, interactive media, Internet technologies, and hardware—and you will get a chance to network with Apple people and other developers. For more information on the WWDC, see the web site at http://devworld.apple.com/mkt/WWDC/index.html; you can register online at this site. If you don't have web access, you can fax a request for information to 408-777-9610.

■ ■ ■

Metrowerks to Develop Rhapsody Porting Tools

Apple has finalized a development agreement whereby Metrowerks will create new software development tools that facilitate the transition from the current Mac OS to Apple's next-generation operating system, code-named *Rhapsody*. Metrowerks will deliver a Rhapsody-hosted version of CodeWarrior and introduce a new product, CodeWarrior Latitude, that will allow developers to port Mac OS applications to Rhapsody more quickly.

CodeWarrior Latitude, which will be released later this year, will include a porting library that allows Mac OS applications to be ported to UNIX-based operating systems. (Rhapsody is based on Mach, a version of UNIX®.) Metrowerks will retarget this porting library to Rhapsody so that programmers can take Mac OS applications that use Mac OS APIs (application programming interfaces), MacApp, or Power-Plant, and link them to the Latitude library. Programmers can thus produce applications that take advantage of advanced Rhapsody services, such as preemption, memory protection, and multithreading, without having to rewrite base code. Using CodeWarrior Latitude, most developers should be able to complete their first port of a stable Mac OS application to Rhapsody within a month.

CodeWarrior Latitude is the most recent step that Metrowerks is taking—in concert with Apple—to help developers quickly and easily support Rhapsody. Not only will Metrowerks deliver a full CodeWarrior solution, complete with compilers, programming tools, and debuggers for both operating systems, but each phase in Metrowerks' strategy is focused on creating a smooth transition from the Mac OS to Rhapsody.

First, Metrowerks will ensure that its compilers will build Rhapsody applications within the environments of CodeWarrior for Mac OS and Apple's Project Builder for Rhapsody. Metrowerks expects to add Objective C support to the CodeWarrior C compiler (as used by CodeWarrior for Mac OS) by the time of the Apple Worldwide Developers Conference in May 1997.

Next, Metrowerks will implement interoperability between Objective C objects, C++ objects, and Object Pascal objects in September 1997. Metrowerks will deliver these new CodeWarrior programming tools as part of its regular CodeWarrior for Mac OS subscription at no additional charge to subscribers.

Finally, the CodeWarrior IDE (interactive development environment), programming tools, and compilers will be ported to Rhapsody. Metrowerks' CodeWarrior IDE will have versions on the then-current version of the Mac OS and on Rhapsody. The first developer release of CodeWarrior for Rhapsody is scheduled to coincide with Apple's developer release of Rhapsody.

Once the porting of the CodeWarrior IDE to Rhapsody has been completed, both CodeWarrior for Mac OS and CodeWarrior for Rhapsody will build the following:

• Mac OS applications for 680x0 and PowerPC platforms

• Rhapsody applications for the PowerPC platform

• Windows 95 and Windows NT applications for the x86 platform

• Applications for embedded platforms including the Sony PlayStation and U.S. Robotics' Pilot organizer

You can review the complete press release on this agreement at **http://product.info.apple .com/pr/press.releases/1997/q2/970220.pr.rel. metrowerks.html**.

■ ■ ■

Apple Defines a Product Road Map for WebObjects

At InternetWorld last March, Apple presented a 1997 road map for WebObjects, the award-winning web development platform from recently acquired NeXT Software. The road map is a commitment to NeXT customers and Apple developers for continued product development and enhancements, including support for the new Apple operating system, code-named *Rhapsody.* WebObjects is the market-leading platform that allows developers to create dynamic web applications rapidly.

Apple's road map outlines plans for the next three releases of WebObjects. Details of this product road map are available at **http:// product.info.apple.com/pr/press.releases/1997 /q2/970312.pr.rel.webobjects.html**.

■ ■ ■

Tempo Will Be Called Mac OS 8.0

Apple has decided to call the next major release of its Macintosh operating system *Mac OS 8.0.* (Its current code name is *Tempo.*) One of Mac OS 8.0's new features is a multitasking, PowerPC processor–native Finder, which, for example, enables users to launch applications while copying multiple files in background

mode. The Mac OS 8.0 Finder will also include folders that automatically open and windows that pop up from the bottom of the screen to help customers get more organized. All the best Internet services will be integrated, so customers can connect, browse, and share information around the world—all with the industry-best ease of use. Assistants will help customers get online in minutes, with seamless access to best-of-class e-mail and web browsers. And with Mac OS 8.0, users will be able to utilize the web to share information with anyone, across multiple platforms. Mac OS 8.0 is scheduled to ship in mid-1997.

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, code-named *Allegro* and *Sonata,* in 1998, Apple will release Allegro in mid-1998. To make the latest system improvements readily available, Apple will ship two system updates (instead of one) between Tempo and Allegro.

■ ■ ■

Mac OS Market Share Rises to 11 Percent in Dealer Channel, Says Computer Intelligence

According to Computer Intelligence (CI), based in La Jolla, California, the Mac OS platform market share in the United States dealer channel grew from 8 percent in November 1996 to 11 percent in January 1997. During the same period, CI estimates that the Windows/Intel platform sales declined from 92 percent in November 1996 to 89 percent in January 1997. CI attributes much of the gain to the success of Mac OS–based computers, particularly those from Motorola.

According to a Computer Intelligence report dated March 1997, the following platforms showed the indicated percentage change in unit growth of U. S. dealer sales from January 1996 to January 1997:

x86	–5.1%
Mac OS	+61.4%
All PCs	–0.6%

Looking at these numbers, you can see that the Mac OS platform gained market share in

the dealer channel, with a growth rate dramatically higher than the x86 platform from January 1996 to January 1997.

You can read a copy of the complete press release at **http://www.ci.zd.com/news/ macos.html**.

■ ■ ■

Correction to CFM-68K Runtime Enabler Released

The January 1997 issue of *Apple Directions* reported that, because of an intermittent bug, customers with 680x0-based Macintosh computers should stop using the CFM-68K Runtime Enabler and any programs that depend on it. Apple has now released a corrected version of the CFM-68K Runtime Enabler.

Version 4.0 of the CFM-68K Runtime Enabler corrects all known problems with previous versions and allows applications that require the Code Fragment Manager—such as LaserWriter 8.4, Cyberdog, America Online 3.0, and Microsoft Internet Explorer 3.0—to run on 680x0-based machines. You can download the U.S. version of this software at **ftp://ftp.apple .com/Apple.Support.Area/Apple.Software .Updates/US/Macintosh/System/CFM-68K/**.

■ ■ ■

New Software Releases

Apple has released a number of new (or improved) software products that you'll probably want to know about:

• *Castanet Tuner for Mac Java, alpha 6 version.* An alpha version of Marimba's Castanet Tuner is now available for the Mac OS. To use it, you'll need Internet Config and Mac OS Runtime for Java (MRJ). You can download the Castanet alpha 6 version at **ftp://ftp.marimba .com/pub/release/mac/tuner.hqx** and **http:// www.marimba.com/tunein/**.

You can download Mac OS Runtime for Java at **http://www.applejava.apple.com/text/ download.html**, and you can obtain Internet Config from **ftp://ftp.marimba.com/pub/ release/unsupported/inetconfig1_3.sit.hqx**.

For background information on this new technology, check out Gregg Williams's article in the March 1997 issue of *Apple Directions,* "Apple's Java Strategy Moves Forward." In this

article, Williams lays out Apple's Java-related plans for 1997 and describes how Marimba's Castanet technology will enrich the Java experience on the Mac OS platform. The complete article is available on the Developer World web site at **http://devworld.apple.com/mkt/informed/ appledirections/mar97/stratmosaic.html**.

• *AppleShare IP 5.0, beta 3 version.* Apple-Share IP 5.0 combines traditional file sharing using TCP/IP and AppleTalk with File Transfer Protocol (FTP) capabilities, a POP3/SMTP mail server, an HTTP web server, and an AppleTalk print server, providing users with a one-stop productivity solution for shared information and resources. The AppleShare IP 5.0 beta version provides developers with an expanded set of network services, including traditional file sharing, FTP, mail, print, and web services. This release includes many AppleShare IP reliability and performance improvements, and it introduces support for Apple's print server. This free release is unsupported at this time, but Apple will review developer feedback through an AppleShare IP discussion group, which you can join at **http://appleshareip.apple .com/appleshareip/index.html**.

You can download the new AppleShare IP beta version at **http://appleshareip.apple.com/ appleshareip/text/download.html**. The official Apple press release on this software is also available on the web at **http://product.info .apple.com/pr/press.releases/1997/q2/970312. pr.rel.appleshare.html**.

• *Apple MAE, Update 3.* Apple has posted Update 3 for the Macintosh Application Environment (MAE). MAE is open systems software that enables UNIX workstation users to easily run unmodified 680x0-based Macintosh productivity applications. This update, which includes enhancements made as a result of Apple's internal testing, is for existing MAE 3.0 installations only. You can download this software at **http://www.mae.apple.com/info/ update33.html**.

• *Apple Disk Copy, version 6.1.* This is the latest version of Disk Copy, a utility that lets you 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 folder. With DiskScripts and AppleScript, you can use Disk Copy to automate software installations and disk image

manipulation. You can download this new release at **ftp://ftp2.info.apple.com/Apple .Support.Area/Apple.Software.Updates/US/ Macintosh/Utilities/Disk_Copy_6.1.sea.hqx**.

• *MkLinux, Developer Release 2.1.* Apple is supporting a project of the Open Software Foundation Research Institute (OSF-RI) to port Linux, a freely distributed version of UNIX, to a variety of Power Macintosh platforms. MkLinux (Microkernel Linux for the Power Macintosh) operates on the OSF RI Mach 3 (Mk) microkernel, running in native mode on the PowerPC processor. This new release of MkLinux supports more Power Macintosh models, including Power Macintosh 6100, 7100, 8100, 7200, 7500, 7600, 8500, and 9500 computers. You can download the 2.1 release at **http://www.mklinux.apple.com**.

In addition, Prime Time Freeware is working with Apple to make the MkLinux releases available on CD. The MkLinux Developer Release 2.1 is one of two CDs in the MkLinux Reference Release and can be purchased separately or as part of the Reference Release. The MkLinux Reference Release, which includes the MkLinux DR 2.1 CD, a second reference CD-ROM packed with documentation and reference materials, and a 360-page book, is available for U.S. $50.00. For additional details, see the Prime Time Freeware site at **http://www.ptf.com/**.

■ ■ ■

QuickTime VR 2.0 Tools and Marketing Support Offered

QuickTime VR 2.0 Authoring Tools Suite and the book/CD-ROM package, *Virtual Reality Programming with QuickTime VR 2.0,* are now available for ordering through the Apple Developer Catalog Online. Apple is encouraging tool developers to add QuickTime VR 2.0 support to their 3D and multimedia authoring tools, and to create new QuickTime VR content creation tools.

QuickTime VR 2.0 includes these features and improvements:

• A Mac OS system extension for Quick-Time VR.

• An API that lets QuickTime VR 1.0 or 2.0 content be played back using the QuickTime VR 2.0 system extension. The API includes support for integrating video, 3D sprites, and sounds into QuickTime VR panoramas and objects.

• Many new object features, such as the ability to zoom in on objects, pan on zoomed-in objects, and create hot spots on objects. QuickTime VR also includes improved support for object animation.

• An improved user interface; movies are played back in QuickTime Movie Player and include a Control Strip with buttons for zooming, hot spot identification, and moving back in a scene.

• Improvements in the stability, error messages, and memory usage of the Authoring Tools Suite.

Apple plans to ship QuickTime 2.5 for 32-bit Windows in the second quarter. Shortly after that, expect to see a QuickTime VR 2.0 extension for 32-bit Windows, a new Quick-Time plug-in to support QuickTime VR 2.0 playback and features, and an Asset XTRA to support QuickTime VR 2.0 authoring in Macromedia Director.

For projects that need Windows support before 32-bit Windows support is available, or for projects that need 16-bit Windows support, continue to use QuickTime VR 1.0. (You can use the version 2.0 stitcher program, then dice your movie using version 1.0.) For your convenience, the QuickTime VR 1.0 tools and PDF documentation are included on the Quick-Time VR 2.0 Authoring Tools Suite CD-ROM.

For more information on QuickTime VR and its benefits, go to **http://qtvr.quicktime .apple.com/**. In addition, Apple is looking to help developers who want to create Quick-Time VR utilities and software titles that use QuickTime VR. If you're interested in creating such software, send an e-mail message describing your ideas to David Palermo (palermo@apple.com).

QuickTime VR 2.0 Authoring Tools Suite and the book/CD-ROM package, *Virtual Reality Programming with QuickTime VR 2.0,* can now be ordered at **http://www.devcatalog .apple.com/www/adccat/@287295prkpdm/ product.html?record@403+from@hotlink**. ♣

CD HIGHLIGHTS

CD Highlights: Tool Chest Edition, May 1997

This month's CD features a big pile of new and revised sample code and snippets, thanks to Michelle Wyner, the DTS Sample Code Warrior. If you'd like to provide feedback about sample code, fill out the Sample Code Survey at **http://reg.devworld.apple.com/ samplesurvey.qry**, or drop Michelle a line (mwyner@apple.com).

In addition to updates to several of the language kits, here are this month's new and revised packages.

ADB Key Spy 1.0.1b3

This package provides something of a replacement for GetKeys: It maintains a key map that reflects the state of each keyboard attached to the Macintosh through the Apple Desktop Bus (ADB). ADB Key Spy contains code illustrating the following techniques:

• Building a system extension
• Using the ADB API (application programming interface)
• "Patching" ADB service routines
• Building, installing, and using a driver
• Mapping physical key codes to virtual key codes

AsyncDriverSample 1.0b4

AsyncDriverSample shows how to write a fully asynchronous block device driver for the traditional Mac OS. This sample tries to implement the simplest possible device driver and therefore doesn't communicate with any real hardware; instead, it mounts disk images over the network.

CFM-68K SDK

CFM-68K is a run-time architecture for 680x0-based Macintosh applications and shared libraries. This architecture is modeled after the Power Macintosh run-time architecture and uses the CFM (Code Fragment Manager) to provide shared library support for 680x0

Macintosh computers. CFM-68K run-time applications and shared libraries can coexist and run simultaneously with classic 680x0 run-time applications.

Version 4.0 of the CFM-68K Runtime Enabler fixes the problem described in Technote #1084 and updates the interfaces required for preemptively threaded applications. The SDK (software development kit) includes documentation describing the changes.

This package includes the following components:

• CFM-68K 4.0, Code Fragment Manager for 680x0 Macintosh computers
• ObjectSupportLib, version 1.2
• Updated Apple Thread Manager, now included in the CFM-68K Runtime Enabler

DumpARPCache

A tiny sample that shows how to view the Open Transport ARP cache.

Folder Watching

These applications demonstrate how to write a background task that uses Apple events to pass on task-related information to another application. Here are some of the topics they cover:

• Writing a faceless background application that performs a task
• Sending and receiving application-specific Apple events
• Receiving AppleScript subroutine Apple events
• Using the Notification Manager to notify users through alerts, a flashing menu bar icon, and sound
• Using PBCatSearch on files between modification dates
• Writing a script application that runs in idle time

JPEG Sample

This sample demonstrates how to compress and decompress JPEG images with QuickTime. It uses the FCompressImage function, but the CompressImage counterpart function could also be used. Although the sample strictly demonstrates JPEG compression and decompression, you could use this sample as a framework for other types of compression (except for the decoding of the JPEG header).

Mac OS Runtime for Java 1.0.1b1c2

Mac OS Runtime for Java (MRJ) is Apple's implementation of the Java run-time environment from Sun Microsystems. With MRJ, Mac OS applications can use Java applets and applications.

MRJ 1.0.1 implements version 1.0.2 of Sun's Java. MRJ 1.0.1 includes Apple Applet Runner, which is a stand-alone application that runs Java applets, and Apple Applet Viewer, an OpenDoc viewer you use to put Java applets into OpenDoc documents.

MRJ 1.0.1 works on computers with 68030, 68040, or PowerPC processors. You also need Macintosh System 7.5 or later, a minimum of 8 MB of RAM (16 MB is strongly recommended), and at least 7 MB of free disk space.

This software is being made available to Apple developers only and is not for public distribution. Apple is finishing work on MRJ 1.0.1 and the SDK and plans to post them to **http://applejava.apple.com/** by the end of March 1997. For details, see the document About This Pre-Release of MRJ.

MacCalendar 1.1b1

MacCalendar is a Control Strip module that displays a calendar when you click its icon in the Control Strip. The calendar display is configured using a separate application, MacCalendar Setup.

MP Threaded Sort

This application shows off picture sorting through the Thread Manager and MP. It features live window dragging, and it continues to run when the mouse button is down; it even continues to run when you're in Macsbug.

ProcDoggie 2.1b1

ProcDoggie is a full-blown application that demonstrates a variety of techniques related to the Process Manager, including

• Getting a list of running processes
• Getting information about a running process
• Launching a processes, with and without opening documents

RAMDisk 1.4d5

This sample demonstrates how to write a simple Mac OS block device driver, in this case a RAM disk. It also demonstrates how to bundle a system extension (INIT), driver (DRVR) and control panel (cdev) in one file—to achieve maximum functionality while minimizing the number of items in the System Folder.

Rhapsody/OPENSTEP Documentation

OPENSTEP documentation applies to Rhapsody! That means you can develop OPENSTEP applications today and use the same source base for Rhapsody later.

Discovering OPENSTEP: A Developer Tutorial

This book introduces NeXT's OPENSTEP 4.0 Developer product by guiding you through the creation of three applications of increasing complexity. The tutorials demonstrate and explain programming techniques, Objective-C fundamentals, common APIs, and use of the development tools. Along the way they present summaries of important concepts and paradigms. *Discovering OPENSTEP* also includes a chapter directing you to programming resources, further information, and services such as training and support. An appendix offers a concise discussion of object-oriented programming.

Object-Oriented Programming and the Objective-C Language

This document is an introduction to the principles of object-oriented programming in NextStep and the official description of the Objective-C language. Objective-C is very easy to learn and use, since it adds very little syntax to the C programming language. Its dynamic nature allows you to accomplish things not possible in most other object-oriented languages. This title is for any NextStep programmer.

Appkit Reference

This is the complete reference for OPENSTEP Application kit classes and protocols. The Appkit provides everything the user sees and touches: windows, buttons, formatted text, and so on.

Foundation Reference

This is the complete reference for OPENSTEP Foundation classes and protocols. Foundation is the heart of any OPENSTEP application, providing memory management and crucial classes such as NSArray, NSString, and NSThread.

Topics in OPENSTEP Programming

This document provides detailed discussions of the concepts behind the Foundation Kit, the architecture of the OPENSTEP Text System, and the unique Services functionality that allows applications to share functionality easily.

Set Folder Windows

This little AppleScript droplet is used to set up drive and folder windows in preparation for burning a CD. It requires the scriptable Finder from System 7.5 or later. It seems to be more reliable than SWAt at setting things up right, since it uses the Finder rather than directly manipulating desktop information.

TradDriverLoaderLib 1.0b4

This library provides a bunch of routines helpful for installing traditional Mac OS device drivers (DRVRs). It mimics the API of the PCI DriverLoaderLib library as much as possible, which makes TradDriverLoaderLib easier to use in an environment supporting both PCI native drivers (ndrv) and traditional Mac OS drivers (DRVR).

The Developer CD Team

Usability Testing

In Which Doc Reveals the Benefits—and the True Cost—of Usability Testing

By Pete Bickford

It happens all the time. I'll be sitting through some demo when the programmer points to an object on screen and mouths those dreaded words: "This next part is kind of different, but it seemed like a neat idea, so we went with it."

The programmer then smiles gleefully and proceeds to show off his "innovation." In the past, these "kind of different" features have ranged from ghastly orange custom scroll bars to screens packed with every Hayes modem setting known to man. (Here, the programmer pointed to the hundreds of checkboxes and radio buttons while beaming, "See! You can set them all from one window!")

Now, Ma Bickford always said that if you can't say something nice, don't say anything at all (a restraint that is virtually absent from the human-interface profession). Nevertheless, I do try to be tactful, and usually respond with a hearty "Gosh! That's really . . . *interesting.* What did your usability testing say about it?"

At which point the programmer tends to utter a complex stream of syllables that goes something like, "Uh . . . err . . . well . . . you know . . . we . . . uh . . . well . . ." ending in ". . . didn't actually get a chance to do much testing on it."

I'm sure you, gentle reader, can imagine how surprised I am to hear this.

Testing Code Instead of Software

By now we've figured out as an industry that software ought to—oh . . . actually work if it's going to be sold to a customer. To ensure this, many shops hire software testers at a ratio of *at least* 1:1 to their programmers. The idea is that programmers aren't very good at testing their own code.

Strangely, the same shops often treat the actual *usability* of the software as a sort of luxury that can safely be squeezed into the workload of the programmers (whose lives tend to center around Toolbox traps and obscure data structures). And although most developers have by now at least heard the term *usability testing,* surprisingly little of their code will ever be exposed to it. In this way, it's much like the word *documentation*—some ten or fifteen years ago.

> The truth is that some of the most effective usability testing is incredibly simple, takes only a few minutes, and costs only about $7 per subject.

Lab Coat Not Required

If we are even a little kind, we can safely assume that programmers really do care that the software they create is actually usable. When asked why they don't *check* to make sure, the answers you'll hear are generally something like these:

- "Usability testing is too specialized/difficult."
- "We don't have the time."
- "Usability testing costs a lot of money."

All of these, I assure you, are vicious lies spread by the makers of video cameras and lab coats in conjunction with the ever-powerful one-way mirror manufacturers' lobby. The truth is that some of the most effective usability testing is incredibly simple, takes only a few minutes, and costs only about $7 per subject. Moreover, there is documented proof that what you learn from doing usability testing pays itself back many times over by slashing your user support costs and helping you avoid design pitfalls.

A Brief Lesson in Conducting a Usability Test

The following are some instructions for carrying out a basic usability test:

Step 1: Find a user. A real user (as in, "someone who will be using your system"). If you can't find one of these, find someone a lot like the people who will be using your system—someone who has the same kind of technical and occupational expertise.

Caution: If you're developing an in-house system, resist the temptation to use a manager as a test subject, unless the actual system will be used exclusively by managers. Too many designers give in to this temptation, since the real users are considered "too busy" or "not important enough" to participate in a usability test. So instead they send their managers, a system is designed around *them,* and the result is something unusable by the rank and file.

Step 2: Set the user down with a drawing or prototype of your system. The important thing about prototypes is to remember that they are not "real." They should be designed quickly and thrown away quickly. The prototype only needs to be good enough to get the basic ideas across.

Step 3: Explain to users that you're there to find the areas of the system that are confusing or difficult, and that any place they run into trouble is an opportunity for you to make the system better. "Mistakes" are not the user's fault—they just point out trouble spots in the system.

Step 4: Ask users to perform a set task using the system. Explain to them that you will not be offering any help, and that they should "think aloud" so you can tell what they're thinking as they try to work the system.

Step 5: Watch users quietly and note the areas where they do unexpectedly well or where they run into trouble. And here's the hardest part: You absolutely must resist the temptation to give "hints" or point out parts of the system that they "overlooked."

Step 6: At the end, ask them about the areas of the system that you noted, then thank them and give them a project T-shirt for their trouble.

Step 7: Use the results.

Total time for the test: usually under 30 minutes.

Total cash outlay: $7 per user (for the T-shirts).

If you're keen on spending money, you can hire consultants and do a lot of videotaping behind one-way glass; however, you'll get 90 percent of the benefit by just using the above techniques. The important thing is to get out there and "just do it." If you try an interface out on four people, you'll usually find three of them hitting the same problems. Any such problem will need to be fixed (or, if there's nothing that can be done, at least documented).

Win Friends and Change Minds

Usability testing finds problems with your product that you never could have guessed were there. For instance, you'll sometimes discover that wording that is natural to you gives entirely the wrong impression to a regular user. Other times, you'll find that buttons and menus that seem obvious to you are ignored or overlooked by users who either don't notice them or don't interpret them as being important to solving the problem at hand. It's these little things that add up to a sense of anxiety and confusion on the part of the user. A few minutes spent fixing these things can make all the difference—but first you have to know that the problems are there.

Usability testing is also useful from a political level within an organization. For one, it's the evidence that matters when trying to settle an argument between different design approaches. Engineers of good conscience can have hellacious battles arguing which interface design is the best for solving a given problem. Although designs can take hundreds of hours to code, a few hours of usability testing can often settle the question.

Another thing to remember is that usability testing can be *wonderful* public relations for your project. By taking the time to go out and recruit target users to help in your usability testing and product design, you'll have gone a long way toward spreading goodwill and the sense that you really care about your customers' needs.

The All-Important Paradox of Usability Testing

There is, however, one great paradox to usability testing: Although you can use it to find out from users what went wrong, it's usually unproductive to then ask them how to make the design right. Users, as much as we love them, are not designers—they seldom have knowledge of the technical possibilities for solving a problem in the optimal way.

So, given a really unusable system, they'll generally suggest a system exactly like it as a solution—with the one or two things that bugged them the most changed in some way. In the pre-Macintosh days, you often heard users ask for smaller type so that they could see more information on the screen at one time (remember 132-column screens?). Thankfully, the designers of the Macintosh looked beyond the immediate request (smaller characters) to the underlying need (to see more data) and created a system where you could view information using multiple windows. The lesson: While you need to notice what the user's problems are, you as a designer are responsible for looking beyond the surface to discover the underlying issues and offering a real solution.

Keeping Us Honest

Well-organized development teams include marketers, engineers, graphic artists, documentation folks—and, yes, human-interface designers. Over the course of the project, it's almost guaranteed that arguments are going to arise over some aspect of the human interface. And, though the human-interface designer will often have the best solution (I naturally offer myself as a shining example of this), nobody on the team has a monopoly on the truth.

In the end, there is only one judge of how good the human interface is, and that person is the user. By doing usability testing on your product in the development stage, you stand a much better chance of passing muster when your product is "usability tested" in the marketplace.

Best wishes,
Doc

This month's article is a reprint of Pete Bickford's June 1994 column. Unfortunately for us, Pete has left Apple to pursue other opportunities. We thank him for over four years of excellent columns on human-interface issues. Look for a book from him, tentatively titled Easy to Use: A Developer's Guide to the Art of Human Interface Design, *to be published later this year by Academic Press Professional. You can reach Pete at pbickford@human-computing.com.*

Developer Spotlight How Corel Made Its Mark in the Mac OS Market: Corel Corporation recently ported its first product to the Mac OS platform, and so far they're extremely pleased with the results. In the first four months of CorelDRAW shipments, they earned U.S. $7 million in revenues.

DEVELOPER SPOTLIGHT

How Corel Made Its Mark in the Mac OS Market

By Kris Dalebout Newby,
Apple Directions *Staff*

When development manager Ian LeGrow asked Corel Corporation's management if he could port Windows-based CorelDRAW to the Mac OS platform, the idea was received less than enthusiastically.

"In the summer of 1995, my managers were under the impression that the Macintosh was near death," says LeGrow. "But after discussing the size of the Mac OS installed base and the ease of porting a Windows-based product, they let my team have a go at it."

Now, two years later, Corel views the Mac OS platform in a whole different light. The sales of CorelDRAW have exceeded all expectations, bringing in U.S. $7 million in the first four months of shipments. The company is now in the process of moving three other products to the Mac OS platform.

"We're very committed to the Mac OS platform now," says Warren Tomlin, CorelDRAW product marketing manager.

A Programmer's Proof of Concept

"As a PC-focused company, the first thing that we had to overcome was the preconception that the Mac platform was harder to develop for," says LeGrow. "An early port of Corel Gallery, our clip art collection, actually turned out to be much simpler than we anticipated, and this gave us the confidence to tackle the more complex PC-to-Mac conversion of Corel-DRAW."

In 1995, CorelDRAW was a feature-rich graphics application that included a large clip art gallery and texture-mapping capabilities. At first, Corel management gave LeGrow a month to test the feasibility of the conversion. The initial team of three Mac OS programmers was pleasantly surprised by the outcome: The porting process would be less difficult than

expected because the company had developed the Windows version of CorelDRAW using Microsoft Foundation Classes (MFCs), and because the code was "32-bit clean."

By the time the project was under way, CorelDRAW's Mac OS development team had grown to about 15 core programmers plus a team of 10 programmers from Millennium Computer Corporation. During the last couple months of development, 15 other testers and documentation people were added. They used Metrowerks CodeWarrior as their primary development tool, relying heavily on its cross-platform, fast compile-and-link cycle development features.

"The PowerPlant framework in CodeWarrior helped us leverage a lot of our Windows code, and Metrowerks' dialog editor, Constructor, made the process of redoing interface dialogs quick and easy," says LeGrow.

Midway through the project, a few Corel team members attended Apple's Worldwide Developers Conference (WWDC) and returned with two resources that helped their project significantly: the WWDC

CD-ROM, which included Apple's new grayscale specification, and the business card of Pete Bickford, Apple's former human-interface guru. Soon after, Bickford met with their development team to provide them with ideas on how to redesign the CorelDRAW interface to more closely follow Mac OS user interface guidelines.

Eleven months after the core team began porting CorelDRAW to the Mac OS platform, they handed the product off to manufacturing.

"Overall the process went quite smoothly, and it was much easier to port than originally expected," says LeGrow. "I felt it was quite a feat to complete a product of this complexity in under a year."

Advice for Windows Converts

In hindsight, Ian LeGrow offers these words of advice to other Windows programmers facing their first port to the Mac OS platform:

• *Hire expert Mac OS programmers.* There are many subtleties of the Mac OS human interface that you can't learn from reading Apple's human-interface guidelines.

Developer Toolbox

Development Systems

Every developer on the Mac OS team has either a Power Macintosh 9500/132 or a Power Computing PowerTower Pro 225 computer with 128 MB of RAM and two 17-inch monitors. Many of the testers work with lower-end models, such as Power Macintosh 6100 and Performa computers.

Favorite Development Tools

Corel uses Metrowerks CodeWarrior as the foundation of their development system. Source control is done with Metrowerks CodeManager. This product's compatibility with Microsoft SourceSafe is crucial to code sharing across platforms. Resources are managed with Metrowerks' Constructor and Mathemaesthetics' Resorcerer. Most programmers use Metrowerks' Debugger, but some team members depend on Jasik's Debugger. Corel has scripted the entire build process using the MPW shell script and AppleScript.

Hire programmers who have developed Mac OS applications before, so you're sure they really understand how to design a proper interface. Hard-core Mac OS programmers are also crucial when it comes to debugging and optimizing. It takes years of experience to learn the subtleties of any platform.

• *Leverage common code.* At the beginning, identify a common-denominator feature set for both platforms. This forms your porting baseline. Then write a layer to map Windows functions to their corresponding Mac OS counterparts. When moving from Windows to the Mac OS, this mapping can be quite close, since the Macintosh Toolbox provides a much richer environment than the Windows equivalent does. With the CorelDRAW conversion, about 80 percent of the code base was shared. In the next release, they're planning to ship simultaneous Mac OS and Windows versions.

• *Customize your interface for Mac OS user preferences.* Adopt Mac OS interface conventions and technologies where it counts. (This is where hiring experienced Mac OS programmers really pays off.) Corel's Mac OS programmers, for example, made sure that CorelDRAW supported important Mac OS–specific technologies, such as Macintosh Drag and Drop, ColorSync, AppleScript scripting, and the Apple Guide help system. They knew that Microsoft's Object Linking and Embedding (OLE) technology wouldn't be in high demand by Mac OS users.

• *Plan for the long term.* When planning a PC-to-Mac OS port, look beyond the current project with an eye toward the future. Because Corel approached the CorelDRAW port with a long-term outlook, they were able to leverage much of this earlier work when they later ported Corel Print House. This port only took four months.

Marketing Gets MACWORLD Fever

Warren Tomlin, CorelDRAW's product manager, describes the initial reaction of the Corel marketing team when they were handed their first Mac OS product to sell: "The marketing team was cautiously optimistic."

"We recognized the need for a product like CorelDRAW in the Mac OS market," adds Tomlin, "but it was new territory for us. The thing that finally won us over was the astronomical number of graphic designers and desktop publishers using Macintosh computers.

"With the Mac OS version of CorelDRAW, we took the same 'feature-rich' approach that's helped us be successful on the Windows

platform," says Tomlin. "We typically offer our products at a very competitive street price, then add performance value to win the business. With the current CorelDRAW Suite 6, we offer Mac OS users the WordPerfect word processor, an illustration program, a 3D modeling and rendering function, texture mapping, photo-editing capabilities, and 25,000 clip art images, all for a suggested retail price of $398."

Tomlin describes some of his theories on why CorelDRAW is doing so well in the Mac OS marketplace:

• *Competitive price point, high value.* When CorelDRAW was first introduced, it sold for a $99 street price at a time when competitors were selling graphics programs for well over $300. "At that price, it was almost worth buying CorelDRAW for the clip art and fonts alone," says Tomlin.

• *A void in the hobbyist market.* Though there are many excellent professional graphics packages available on the Mac OS platform, these products were prohibitively expensive and complex for "weekend" artists. CorelDRAW filled this market void nicely.

• *A single standard for mixed environments.* Often companies that own both Windows-based and Mac OS–based computers prefer to standardize on a single product for each functional category. A single standard simplifies support issues and often enables a purchasing staff to negotiate volume pricing deals. Since CorelDRAW had such a large installed base among businesses, the Mac OS version immediately satisfied these users' need to standardize and share files.

Another factor that influenced the success of Corel in the Mac OS market was their acquisition of WordPerfect from Novell.

"WordPerfect has a very loyal following in the Mac OS market," says Darryl Ryce, a software analyst at AC Nielsen in Canada, "and once Corel bundled this word processor into their CorelDRAW Suite, it was an irresistible offer to these users."

Though Corel approached their first Mac OS product marketing campaign in the same way they run their Windows campaigns, over time they're getting a feel for some of the subtle differences in Mac OS market.

"One difference that I've observed is that Mac OS users seem to be more informed and less sensitive to price than their Windows-using counterparts," says Tomlin. "The other overwhelming impression that I received after

attending my first MACWORLD Expo was that the Mac OS market really has much more of a 'family feel' than the PC market. And I realized that many technically exciting things were happening first on the Mac OS platform."

An "Insanely Great" Introduction

When Sandra Catana, Corel's PR manager, attended MACWORLD Expo for the Corel-DRAW introduction, she was excited about having a strong first-time presence at the show—especially since there had been a big media buildup ahead of time.

"Our CorelDRAW for Mac product launch was such a success that our sales far exceeded even our own expectations," says Catana. "During the first four months of shipments, we grossed about U.S. $7 million in revenues."

Bottom line, moving their Windows-based CorelDRAW application over to the Mac OS platform has been a lucrative business endeavor for Corel. Development of the Mac OS version took less than a year from start to finish, and now, with a few more Mac OS projects under their belt, Corel is looking forward to a simultaneous Windows/Mac OS release for their upcoming version of CorelDRAW 8. By January 1998, they'll have three more Mac OS–compatible products on the retail shelves, including CorelDREAM 3D (a 3D modeling and rendering tool), Corel PHOTO-PAINT 8 (an Adobe Photoshop competitor), and Corel VENTURA 8 (a Quark Xpress competitor). ♣

Kris Dalebout Newby (kris@newbytech.com) is the business editor of Apple Directions *and a freelance writer based in Palo Alto, California.*

Corel Corporation

Ottawa, Canada

Corel is a leading developer of productivity, graphics, and multimedia software. Its products run on most major operating systems, including Mac OS, Windows, UNIX, and OS/2.

Contact information:
Phone: 613-728-3733 or 1-800-772-6735

Web site:
http://www.corel.ca

Internet Resources for This Issue

News

• Dataquest report on Mac OS Licensing Strategy—http://www.dataquest.com/
• Abstract of Dataquest report (for Dataquest Interactive members)—http://www.dataquest.com/register/abstracts/pcis-ww/pcis-ww-da-9702-ab-0001.html
• Gil Amelio's statement on Internet Strategy—http://product.info.apple.com/pr/press.releases/1997/q2/970312.pr.rel.keynote.html and http://product.info.apple.com/pr/press.releases/1997/q2/970312.pr.rel.4points.html
• Apple Worldwide Developers Conference—http://devworld.apple.com/mkt/WWDC/index.html
• Press release on Rhapsody porting tools—http://product.info.apple.com/pr/press.releases/1997/q2/970220.pr.rel.metrowerks.html
• WebObjects road map—http://product.info.apple.com/pr/press.releases/1997/q2/970312.pr.rel.webobjects.html
• Press release on Mac OS market share—http://www.ci.zd.com/news/macos.html
• CFM-68K Runtime Enabler 4.0 download site—ftp://ftp.apple.com/Apple.Support.Area/Apple.Software.Updates/US/Macintosh/System/CFM-68K/
• Castanet Tuner (alpha) download sites—ftp://ftp.marimba.com/pub/release/mac/tuner.hqx and http://www.marimba.com/tunein/
• Mac OS Runtime for Java download site—http://www.applejava.apple.com/text/download.html
• Internet Config download site—ftp://ftp.marimba.com/pub/release/unsupported/inetconfig1_3.sit.hqx

• Gregg Williams's "Apple's Java Strategy Moves Forward" article—http://devworld.apple.com/mkt/informed/appledirections/mar97/stratmosaic.html
• AppleShare IP discussion group—http://appleshareip.apple.com/appleshareip/index.html
• AppleShare IP (beta) download site—http://appleshareip.apple.com/appleshareip/text/download.html
• Press release on AppleShare IP—http://product.info.apple.com/pr/press.releases/1997/q2/970312.pr.rel.appleshare.html
• Macintosh Application Environment (Update 3) download site—http://www.mae.apple.com/info/update33.html
• Apple Disk Copy 6.1 download site—ftp://ftp2.info.apple.com/Apple.Support.Area/Apple.Software.Updates/US/Macintosh/Utilities/Disk_Copy_6.1.sea.hqx
• MkLinux (DR 2.1) download site—http://www.mklinux.apple.com
• Prime Time Freeware—http://www.ptf.com/
• QuickTime VR—http://qtvr.quicktime.apple.com/
• QuickTime VR 2.0 Authoring Tools Suite and book/CD-ROM—http://www.devcatalog.apple.com/www/adccat/@287295prkpdm/product.html?record@403+from@hotlink
• The IMA's DVD Initiative—http://www.ima.org/cp/dvd/index.html
• The IMA's DVD Special Interest Group—http://www.ima.org/cp/dvdsig/index.html
• DVD FAQ—http://www.videodiscovery.com/vdyweb/dvd/dvdfaq.html
• Dolby AC-3 technical paper—http://www.dolby.com/tech/ac-3mult.html
• User adoption of DVD—http://www.tacmar.com/index.html
• Technical information on UDF—http://www.osta.org/html/ostatech.html
• DVD links—

http://www.unik.no/~robert/hifi/dvd/
• Philips's DVD page—http://www.km.philips.com/dvd/
• Wired Incorporated—http://www.wiredinc.com/
• C-Cube overview of DVD—http://www.c-cube.com/ftrstry/dvd.html
• Developer World—http://devworld.apple.com/
• Press release on Apple's restructuring—http://product.info.apple.com/pr/press.releases/1997/q2/970314.pr.rel.restructure.html
• Technology FAQ on Apple's restructuring—http://product.info.apple.com/pr/press.releases/1997/q2/970314.pr.rel.faq.html
• *MacWEEK* articles on Apple's restructuring—http://www.macweek.com/mw_1111/nw_developers.html and http://www.macweek.com/mw_1111/op_crabb.html
• *Macworld's* article on Apple's restructuring—http://www.macworld.com/daily/daily.1127.html

Technology
• Apple DTS Sample Code Survey—http://reg.devworld.apple.com/samplesurvey.qry
• Macintosh Runtime for Java 1.0.1 and SDK—http://applejava.apple.com/

Business
• Corel Corporation—http://www.corel.ca