

All aboard!

The new Intel-based Mac is leaving the station; here's how to switch platforms

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Apple® CEO Steve Jobs raised the bar once again with the early release of the company's first Intel®-based iMac® systems on January 10, 2006 at MacWorld (www.macworldexpo.com). Apple's alliance with Intel was announced last June at the Worldwide Developers Conference and no time was wasted – we now have the first official Intel-native release of Mac® OS X and the first two Intel Mac systems (the new iMac and MacBook Pro) powered by a new Intel chip technology called Core Duo. All new Macs will be based on these high-speed processors, with all PowerPC®-based Macs being discontinued before the end of 2006 (see <http://www.apple.com>).

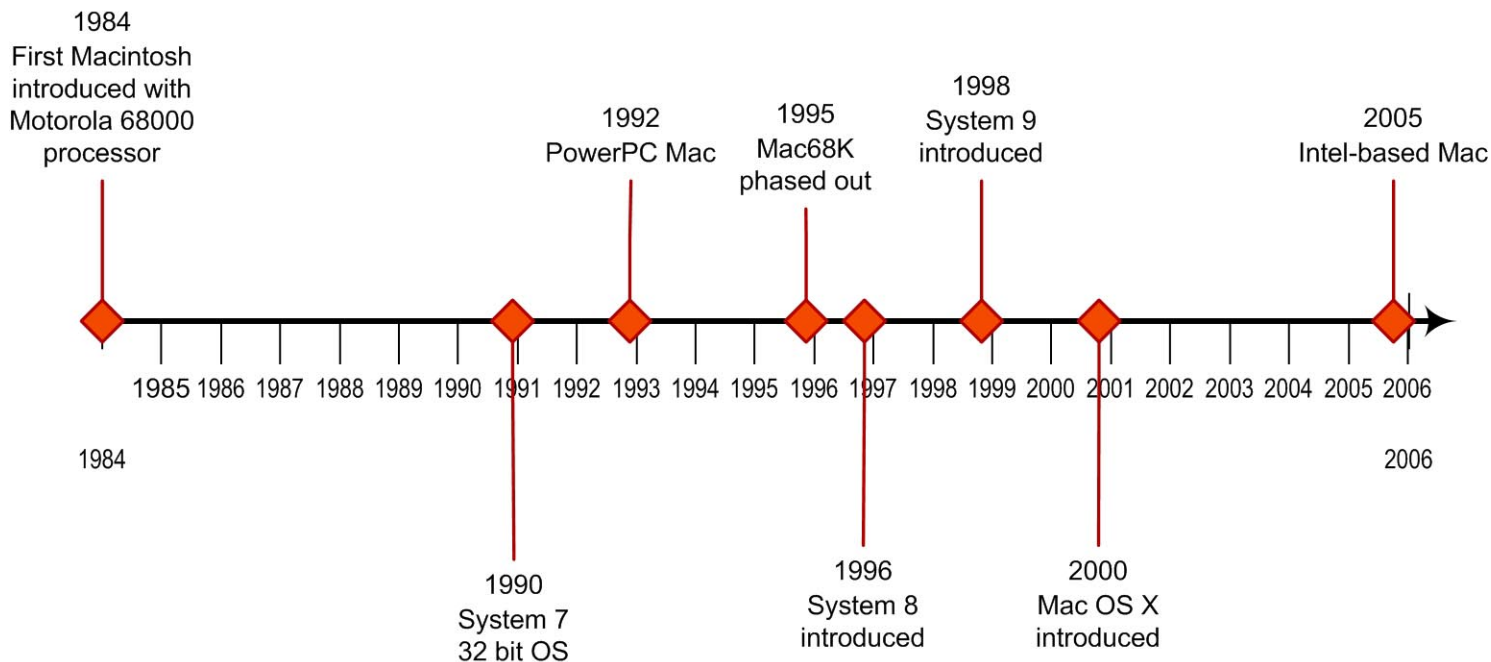
According to Apple, it switched chips because Intel's Core Duo processor is faster, better and allows for more flexible and creative computer designs in the future. The Core Duo chip provides the speed of two processors (and four times the amount of cache) but is much more energy efficient, thus making the new iMac two to three times as fast as the old one.

This is all well and good but what does Apple's new move mean for Mac users and third-party software developers? An immediate concern might be how well existing Macintosh software will perform on these new Intel systems. Will there be a decrease in speed, a loss of functionality, or will they run at all? Major programs like Microsoft Office are currently being rewritten to run on the Intel processor but it will be months before these programs are available. To help with the transition, Apple has built in an invisible translation software that allows older programs to run on the new chip, but will it work with all programs and if so, will it slow them down?

An immediate benefit to this move to Intel processors is that Mac users now have available to them a much faster computer for the same price and this is just the beginning. We can expect Apple to release in the not-too-distant future a product line of smaller, faster, lighter computers with extended battery lives. Portable computing is the fastest growing segment of the mainstream market and Apple's latest move launches it to the head of the pack. Fortunately or unfortunately, that leaves software developers scrambling to keep up – not only with Apple's technology but with the increased product demand that will inevitably follow this move.

In this article, we offer up some suggestions and strategic solutions to help you jump on board the Intel-Apple train and not get left behind on the platform.

But first, some history



- **1984:** First Macintosh introduced with 8 MHz Motorola 68000 processor, 128 KB of RAM and 400 KB floppy drive.
- **1991:** Apple introduces its first 32-bit operating system: System 7. Just about the same time, Apple, Motorola and IBM announce their collaboration on a new processor called PowerPC that is predicted to be the wave of the future. It eventually replaces the legendary Motorola 680x0 (68K) processor.
- **1993:** The first PowerPC-based Macintosh is marketed along with an emulator that allows older 68K applications to run on top of PowerPC-based Macs.
- **1996:** Apple finally phases out the last 68K-based Macintosh (Performa 5xx and 6xx). It takes software developers another 4-5 years before they feel comfortable discontinuing support for 68K applications.
- **1997:** Apple announces System 8, a mere improvement over System 7. Macintosh computers keep losing ground to competitors.

- **1999:** Apple announces System 9 which is better than System 8 but significant market shares were lost in the last few years.
- **2001:** Apple begins a long, slow transition from its Mac OS 9 operating software to Mac OS X.
- **2005:** Apple announces its transition from PowerPC to the widely popular Intel microprocessor.
- **January 10, 2006:** Apple announces its first Intel-based Macintosh with 2 GHz Intel Core Duo processor, 512 MB of RAM and 250 GB hard drive.

Despite the fact that Apple pays a great deal of attention to ensuring smooth transitions and backward-compatibility, software and hardware transitions are typically long and painful. However, Apple plans to be very proactive with the PowerPC-to-Intel transition and, unlike previous transitions which took approximately five years to accomplish, this one is scheduled to take place in under two years.

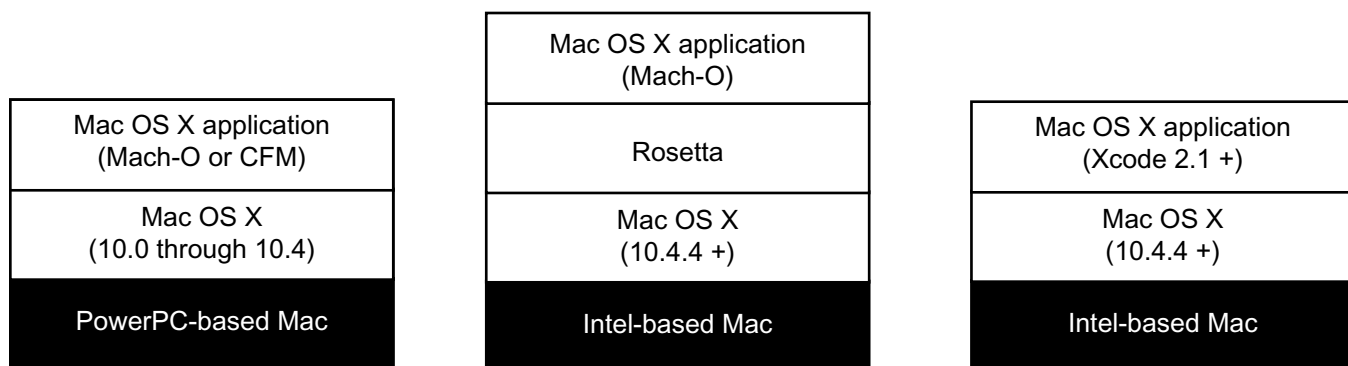
Meet Rosetta: the PowerPC Translator

The Intel version of Mac OS X (version 10.4.4 released January 2006) features a technology called Rosetta, described by Apple as a dynamic code translator. Rosetta takes program code created to run on a PowerPC processor and translates that code into its Intel equivalents, thereby enabling Intel-based Mac computers to run older Mac OS X applications without or with a few simple modifications.

INM has been actively involved with the Intel transition right from the beginning and our experts have put the new system through its paces. According to our own results, and those from the industry, Rosetta is very stable and capable of running a vast majority of – but not all – existing PowerPC applications. However, note that even if your application runs on Rosetta, it is guaranteed to run more slowly than it does on its native platform.

Last June, there was much speculation that Rosetta would refuse to run certain kinds of programs but according to Apple, that isn't true. Rosetta will try to

run anything you throw at it; however programs that are extremely processor-intensive will probably not run at acceptable speeds. In Steve Jobs' own words during his MacWorld Expo 2006 keynote address, "The performance of Photoshop in Rosetta isn't going to be powerful enough for a professional... it's fast enough for those of us who use it occasionally."



Cocoa and CarbonLib (whether Mach-O or CFM) application runs natively on Mac OS X and PowerPC.

Cocoa and CarbonLib (Mach-O only) applications run translated on Rosetta with the following exceptions:

- applications that use G5-specific features
- CFM CarbonLib applications
- other exceptions listed in the Apple Universal Binaries Programming Guidelines (2nd Edition).

Mac OS X applications compiled with XCode 2.1+ (and thus based on Mach-O) run natively on Intel-based Macs.

If compiled as universal binary, can also run natively on PowerPC.

Making the transition

Each software application is unique and must be assessed individually to determine how best to tackle the shift to Apple's new Intel-based platform. To help you in this endeavor, INM recommends the following courses of action:

Short-term (0-6 months)

Intel-based iMacs are already on the market and other popular models will follow shortly. Thus, we define short-term as 0-6 months. If you are interested in taking advantage of the new systems immediately, you must first assess your application's compatibility with Rosetta. The possible outcomes are:

1. Your application runs reasonably fast on Rosetta (which means it was running extremely fast on a PowerPC). If so, you can probably market it as compatible

with Intel-based Macs and skip to the Long-Term course of action outlined further below.

2. Your application runs on Rosetta, but slowly. Your application must then be timed and benchmarked. Then you should decide whether your market would accept it as suitable for Intel-based Macs in the short-term.

3. Your application runs on Rosetta, but misbehaves in certain areas. This scenario is likely to happen if your application uses low-level system calls such as direct manipulation of fonts or interfacing with a System Preferences panel. Or, your application was optimized to take advantage of G5-specific functionality. Regardless, your code must be reviewed and subsequent troubleshooting must occur at the source code level of your application. If workarounds are possible to make your software compatible with Intel-based Macs, go back to #2. Otherwise, skip to Medium-Term (see below).

4. Your application will not run at all on Rosetta. Skip to Medium-Term and do not pass Go. If your application is not compatible with Mac OS X (including the case in which your application runs on Mac OS X using CarbonLib), skip to Medium-Term.

Rosetta and third-party tools

If your application relies on third-party tools, they must each be compatible with Rosetta. For example, if your project relies on Macromedia® Director, you must make sure that Director itself is compatible with Rosetta before testing your entire application. Here's what we discovered in our own testing:

Qt: In itself, Qt has little to do with the PowerPC vs. Intel debate. Since the compilation of a Qt application is entirely under the software developer's control, you can expect your Qt application to run smoothly on Rosetta. The rest depends on possible low-level system calls in your own project and on other libraries that you may have included.

Macromedia Flash®: Adobe® has stated that in general, applications that are not designed to run on Intel-based Mac computers, including Macromedia Flash, may be noticeably slower than they are on PowerPC Macs and that customers may run into compatibility and other issues when using Rosetta. INM's own testing demonstrates that Flash runs slowly but fairly reliably on Rosetta.

Macromedia Director: Adobe does not have an official statement on this product's compatibility with Rosetta. However, INM's testing shows that Director also runs slowly but fairly reliably on Rosetta. This does not mean that *any* Director application will run on Rosetta – one could be totally reliable on Rosetta whereas another one could crash because it uses a feature unsupported by Rosetta.

Director Xtras: Popular Xtras such as INM V12 Database, INM Impressario, ArcaDatabase and DirectEmail are compatible with Rosetta. However, any projects that contain Xtras that rely upon third-party technologies (such as INM PDF Xtra, INM GoldenGate Database Connector and INM SecureNet Xtra) will need to be thoroughly tested. Please note that INM Moka Xtra is not compatible with Rosetta.

Medium-term (6-12 months)

Since Apple's plan is to discontinue all PowerPC-based Macs by 2006, it is likely that a significant share of your Mac market will have upgraded to Intel by July 2006. Thus, we define medium-term as 6-12 months. It would be a good strategy to release the Intel-based version of your application within that timeframe. The resulting application would be called a *universal binary*, meaning that the same file would run natively on PowerPC and Intel. [As an aside to those developing for markets that may require native Intel applications earlier, the sooner you port to Intel, the sooner you can take advantage of the new Mac OS X Universal Logo program and product directories showcasing universal applications, primarily Apple's Product Guide (<http://guide.apple.com/>).]



Making most applications compatible with Intel processors is simply a matter of recompiling and repackaging the software using updated tools – provided the tools and libraries underlying your application are also available for Intel (see below). However, not all transitions to Intel will be that painless. Here are a few scenarios:

1. If your application was built with XCode 2.0, you are on the safe side and can expect a smooth transition. To get started, compilation should be attempted with XCode 2.1 or 2.2 (Apple recommends 2.2 or higher), retrieve the list of warnings and find a suitable solution or workaround for each of them.
2. If your application was built for Mac OS 9 (with or without CarbonLib), more effort will be required to identify and replace the correct APIs and/or re-architecture certain areas of your application.
3. If your application was optimized to take advantage of G5-specific features, then a suitable solution or workaround must be found for each of them. Whether that is done by upgrading your application to take advantage of Intel-specific features or by downgrading it to run “non-optimized” all depends on a cost/benefit assessment.

Third-party tools

Most modern applications rely on third-party tools, primarily to cut development costs, risks and project time. Examples of such tools are network services, file format conversion and XML parsing. For example, you may have picked Qt as your development framework to speed up development and to take advantage of a unique Mac/Windows-compatible source code. You may have picked Adobe Director or Flash to build rich user interfaces or INM's own INM Impresario Xtra to cost-effectively publish large numbers of PDF documents. In any case, your application's transition to Intel depends upon each of these tools to be available for Intel-based Macs. Here is a list of common tools and their developers' intentions:

Qt: As mentioned above, since Qt is delivered with full source code that you can compile the way you want, a Qt application is fully under your control. Trolltech has committed to thoroughly testing Qt on Intel and will release an update, if necessary, in the near future. Currently, they do not foresee particular problems in producing universal binaries using Qt. For more information, go to:
<http://www.trolltech.com/products/qt3/platforms/osx.html>

Macromedia Flash: Adobe plans to support both Intel and PowerPC microprocessors in their next versions of its creative applications for Mac OS, which will include Macromedia Flash Professional and Flash Basic. It is safe to assume that Flash playback will be available in the next few months.
<http://www.adobe.com/products/pdfs/intelmacsupport.pdf>

Macromedia Director: All depends on Adobe's willingness to update the Director playback engine to Intel-based Mac OS X. Adobe has not yet taken an official position on Director, but has publicly stated, in a general way, a commitment to support the new Intel-based Mac computers. It is a safe bet that Director playback will be available in the next few months, most likely after the Flash version is released. However, Director Xtras must also be made Intel-compatible and again, this is up to the companies developing them.

Director Xtras: Once Director is made Intel-compatible, Xtras like INM V12 Database and INM Impresario, Tabuleiro's Arca Database Xtra and Mpeg Advance Xtra, Electronic Ink's PrintOMatic Xtra and Directxtras' DirectFTP Xtra, DirectImage Xtra and DirectCommunication Xtra will quickly follow suit. However, due to low-level intricacies and interdependence with other vendors, INM will have to wait to see which other third parties commit to an Intel transition before making other INM Xtras Intel-compatible. Many developers do intend to update their Mac OS X-compatible Xtras to support the new platform but are still waiting for an official word from Adobe regarding this issue. How quickly these products will be ported depends upon who owns the code and how much they rely on third party software tools.

Real Basic: This program will be made Intel-compatible. See <http://www.realsoftware.com/news/pr/2006/cocoa/> for more details.

Long-term

Albert Einstein said, "In the middle of difficulty lies opportunity." Apple's adoption of Intel processors will profoundly impact the software industry. Not only in terms of market share (Apple's total market valuation now exceeds that of Dell: \$72.13 billion versus \$71.97 billion as of January 12, 2006) but in a world where all popular operating systems will soon be running on Intel or Intel-compatible processors, hardware will become nothing more than a mass-produced commodity. And, where once operating systems were the differentiating factor, they are now becoming a commodity thanks to the evolution of open-source operating systems and the ability to embed an operating system into a customized installer. In the not-so-distant future, end-users will hardly know whether their application runs on a Windows, Mac OS or Linux-based device. It will all become standardized.

User

Application or publication
Operating System
Computer, peripherals
CPU
Electrical components
Electricity

With time, value moves up the chain. In the early 90s, CD-ROMs were bundled for free with CD readers, as the « real value » was perceived to be in the hardware. Today, it is right the opposite.

In the early 80s, IBM had perceived the value of a computer to be the hardware and let a small company named Microsoft exploit the Operating System business. We all know the outcome of this story.

Today, as the CPU competition reduces and the operating system becomes itself a commodity, clearly « value » in the IT business moves up to publications and applications level.

So, that leaves the software. Your applications. Decisions will be made on the content/application level – and the user interface level – not on the hardware, OS and storage capabilities. What can this system DO for me? Therein lies Einstein's opportunity. Based on this trend, your new developments should clearly take Intel into consideration. However, don't leave your present customers in the lurch. Deal with the backward-compatibility issues regarding PowerPC. Depending on what your market dictates and based on the needs of your customers, it will be a fine line to walk over the next three to five years until the older PowerPC technology can be considered marginal. You must deal with backward-compatibility issues.

Conclusion

To date, Apple seems to be doing a great job preparing the software world for this transition, thanks in part to Rosetta. However, the devil is always hiding in the details and since every application has its own specifics, it's worth taking the time to properly think through and thoroughly evaluate before attempting the transition. Should you choose to hop onboard the Intel train (whether it be to convert your own application or support others), be prepared, keep on top of things (including the competition!) and seek advice from those who have already gotten their feet wet testing the new Intel-based Mac systems or from those who offer the service. All aboard!

Vahe Kassardjian is president and co-founder of Integration New Media, Inc. Vahe has extensive knowledge in the new media field and has led teams of software developers in the development, support and consultation on interactive multimedia projects and custom software applications for the past 15 years. He holds a MSc. in Computer Science, in Complexity Theory, and is often called upon to speak at Macromedia User Groups, Seybold Seminars and local interest groups.

Laurent Brigaut has been the Director of Operations at Integration New Media (INM) for 5 years. Laurent has an engineering degree in Computer Science from the Université de Technologie de Compiègne in France as well as twelve years experience in software R&D. Laurent is an expert in object based methods and technologies.

Kristen Banham has been the Marketing Manager of Montreal-based Integration New Media, Inc. for the past four years. Kristen has a background in high-tech marketing and holds a degree in Marketing and International Business and has also studied Graphic Design.

For more information:

Apple's website

<http://www.Apple.com>

FAQ: Adobe Support for Intel-based Mac Computers

<http://www.adobe.com/products/pdfs/intelmacsupport.pdf>

Steve Jobs Keynote from MacWorld

QuickTime® web cast:

<http://macworld.apple.com.edgesuite.net/mw/index.html>

Live Web post:

<http://www.engadget.com/2006/01/10/steve-jobs-keynote-live-from-macworld-2006>

iMac review by Walt Mossberg and Katherine Boehret
<http://ptech.wsj.com/archive/solution-20060118.html>

Jason Snell, Chip Story: The Intel Mac FAQ, 2006 edition
<http://www.macworld.com>

Next Steps

Apple Developer Connection: Transition Resource Center
<http://developer.apple.com/transition/index.html>

INM's Intel-based Mac Initial Test Package
<http://www.INM.com/services/intel-mac.htm>

Glossary

68K: The Motorola 680x0 family of CISC microprocessor CPU chips were 32-bit from the start and were the primary competition for the Intel x86 family of chips.

CarbonLib: CarbonLib is a Macintosh Extension required by Mac OS 9 to run programs compatible with Mac OS X. It is a free download from Apple's site. In the late 90's, Apple encouraged developers to write CarbonLib-compatible code to facilitate the transition from Mac OS 9 to Mac OS X.

Intel-based Macintosh (MacIntel): MacIntel is a colloquial term for the Intel-based Macintosh computers, planned for release in 2006 and beyond, that will be based on Intel processors instead of the IBM PowerPC processors.

Mac OS X86: a nickname for Intel-based Mac OS X. For about 20 years, "x86" referred to the Intel CPU architecture. Mac OS X86 is industry-speak for a hybrid of Mac OS X and X86.

Mach-O: short for Mach object file format, is a file format for executables and object code. It is the format expected by Mac OS X.

PowerPC: a RISC microprocessor architecture created by the 1991 Apple-IBM-Motorola alliance, known as AIM. Originally intended for personal computers, PowerPC CPUs have since become popular embedded and high-performance processors as well. PowerPC was the cornerstone of AIM's PReP and Common Hardware Reference Platform initiatives in the 1990s, but the architecture found the most success in the personal computer market in Apple's Macintosh lines from 1994-2005.

Rosetta: Rosetta is a translation process that runs a PowerPC binary on an Intel-based Macintosh, thereby allowing applications to run as non-native binaries. Many, but not all, applications can run when translated and translated applications will never run as quickly as they run as a native binary because the translation process itself incurs a processing cost. It is also interesting to note that the translator's namesake, the famous Rosetta Stone, contained ancient scripts written in both Egyptian and Greek and thus proved key to deciphering (translating) Egyptian hieroglyphs. http://developer.apple.com/documentation/MacOSX/Conceptual/universal_binary/universal_binary_exec_a/chapter_7_section_1.html

Universal binary: Apple Computer's terminology for an executable file that runs natively on both PowerPC and Intel-based Macintosh computers. It was introduced at the 2005 WWDC as a means to ease the transition from the existing PowerPC architecture to systems based on Intel processors, which began shipping in 2006. Universal binaries include both PowerPC and Intel versions of a compiled application. The operating system detects a universal binary from its header, executing the appropriate section depending on the architecture in use. This allows the application to run at full speed on either architecture, with no appreciable performance impact.