Apple and the PowerPC

Bill Brown of Apple Computer is one of the negotiators of the Apple/IBM alliance and the program manager for the Enterprise Networking Initiative, one of the alliance's five components. Other components include the cornerstone PowerPC technology; the PowerOpen Architecture, which enables Macintosh applications to run on AIX; Taligent, a joint venture developing an object-oriented operating system; and Kaleida, a joint venture focused on multimedia standards.

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How did the PowerPC alliance get underway, and how did Apple become involved?

Brown: Apple was interested in bringing the power of RISC technology to the desktop. Despite a longstanding relationship with Motorola, we thought it prudent to shop around and evaluate various RISC architectures, which we did. About two-and-a-half years ago, John Sculley started talking to RISC platform vendors—to Sun® about SPARC®, to Digital about the Alpha chip, and to IBM about its POWER Architecture.

Initially, IBM wasn't sure about an alliance. Sculley went away and kept trying to figure out what to do, because it seemed apparent that the POWER Architecture was the right way for Apple to go. We were very pleased when IBM came back and said that they wanted to do this alliance.

That initial discussion about Apple using the POWER Architecture really started the whole deal. After meetings with a number of people, it turned out there were more and more areas of mutual interest between the two companies, and eventually the deal expanded into the five areas that now make up the alliance.

How were you involved in putting the alliance together?

Brown: I was one of the team that negotiated the overall agreement with IBM. Upper management selected a group of people from IBM, Motorola, and Apple, locked us up in IBM's management development facility in Armonk, New York, and said, "You aren't leaving until this agreement is done." For the next two weeks the team worked almost around the clock on the agreement—and the rest is history.

I think many people have been surprised at the success of the alliance. Obviously, the PowerPC is getting a lot of great press, and it's really the cornerstone not only of the initial agreement but also of what will eventually emerge. But we're also seeing a lot of other successes. The networking initiative that I'm involved with has created a lot of products that help integrate the two worlds of computing—Apple and IBM—and that's really our goal.

What have Apple and IBM been working on in the areas of networking and interoperability?

Brown: In the past year or two we have developed a lot of customer-demanded capabilities to integrate the Macintosh into the IBM environment. For example, we have an IBM 5250 terminal emulator for the Macintosh that enables it to interact with the AS/400®. We moved our data access language into the AS/400 environment. And IBM is working on a CICS™ client for the Macintosh to "talk" to the CICS transaction processing environment. In general, we've been filling in areas that were clearly defined by customer requests.

In the coming year, we're going to focus on new opportunities such as wireless communications. Both companies are doing a lot of work in this area, so it makes sense to work cooperatively and really push the edge of the envelope for that technology.

We're also looking at high-speed networking. Right now, Macs and IBM equipment communicate over Ethernet™ or Token-Ring networks (see Figure 1). IBM has done a lot of work in the area

of ATM and other types of high-speed networking. That's an area of great interest to Apple because it's particularly well suited for moving multimedia content between machines.

It sounds like we're going to see increased integration of Apple's products in the Big Blue computing world.

Brown: We have good integration now, and we're continuing to make it even better. With the basics done, we have the luxury of looking into some more innovative applications.

What benefits do you see in the Apple/IBM alliance for the industry as a whole?

Brown: The PowerPC chip provides a breakthrough level of sheer horsepower. We'll see very high-end RISC performance at a very low price point. These machines will deliver unprecedented price/performance to the personal computer marketplace, with a clear family planned ahead—both up in terms of performance and down in terms of price and power consumption.

Apple, IBM, and Motorola aren't keeping this technology to themselves. Anyone can license the chip. It's gathering a lot of support from operating system vendors, including Bull, Thomson-CSF™, and, of course, Apple and IBM with System 7, Taligent, OS/2®, and AIX. Everyone is excited about it because it provides a tremendous opportunity to change the balance of the industry—or perhaps I should say, to balance the industry. The PowerPC is expected to challenge Intel's stronghold on the microprocessor market.

Intel® Corporation recently released a new CISC microprocessor called Pentium®. Information gathered by Motorola shows that even the first-generation PowerPC 601 microprocessor has performance comparable to Pentium integer calculations and exceeding Pentium in floating-point calculations. Floating-point calculations are needed for sophisticated graphics, communications, and video applications. Not only does PowerPC outperform Pentium, but it does so in a smaller and cooler package. Pretty impressive when you consider that these comparisons were made with a prototype 601 chip, the lowest rung on the PowerPC ladder.

What benefits do you see from the PowerPC in the area of open systems?

Brown: The PowerPC chip was designed from the outset to run multiple operating systems.

IBM and Apple Interoperability

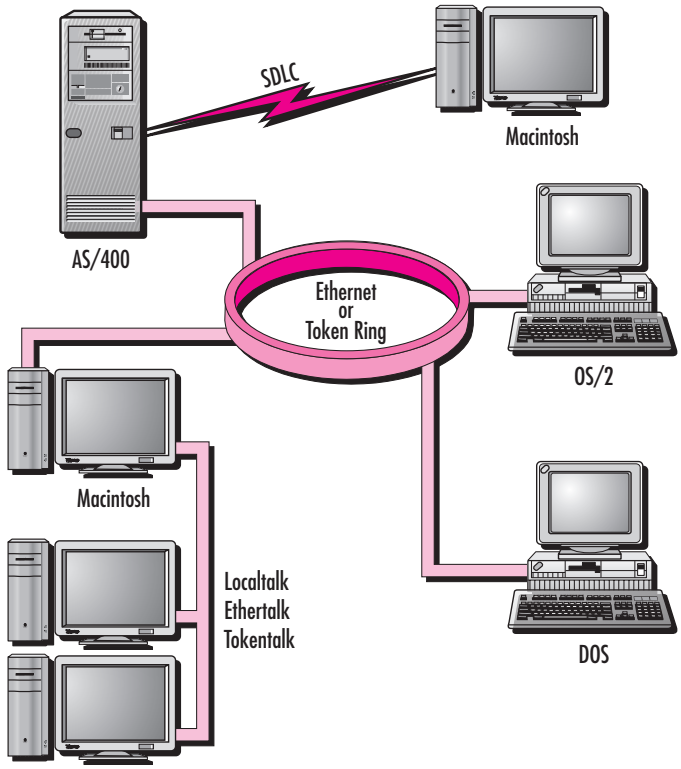

Figure 1. IBM and Apple interoperability

There are two ways in which a chip can handle byte ordering. Motorola processors and IBM's internal processors have always done it one way and Intel processors have always done it the other way. Well, the PowerPC chip can switch its byte ordering. Capabilities like that enable it to run different operating systems very effectively.

With the PowerPC, they can run the Macintosh operating system and all the normal Macintosh applications, in addition to other key operating systems. So people with Macintosh computers today have a strong growth path for moving their existing applications to the PowerPC platform. This really delivers what users are looking for: open systems capability.

Does Apple have any plans for UNIX® on the PowerPC?

Brown: Because of the PowerOpen commitment between Apple and IBM, the future of UNIX on the Macintosh is really AIX. The PowerOpen Architecture blends the AIX fundamentals with

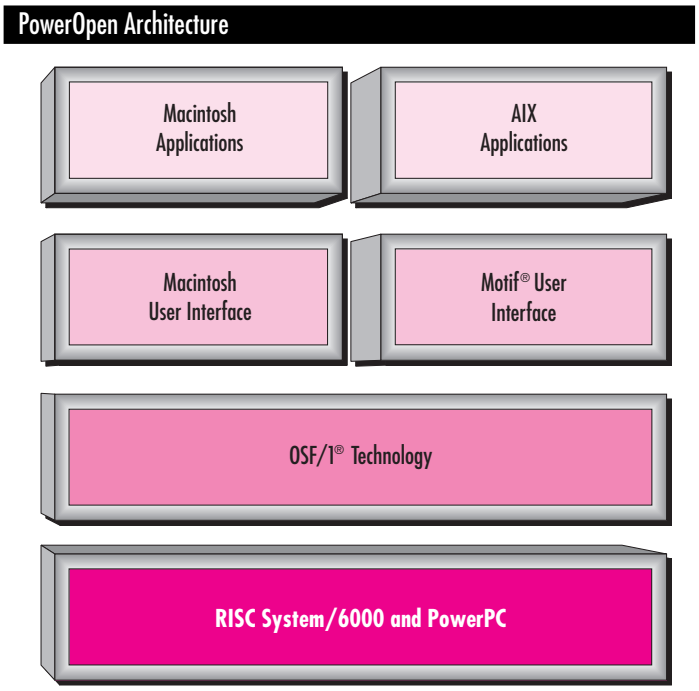

Figure 2. PowerOpen Architecture

the capability to deliver the Macintosh user interface (see Figure 2).

When does Apple expect to ship the first PowerPC-based Macs, and what can users look for in these new machines?

Brown: The first PowerPC Macs are targeted for the first half of 1994. Interestingly, that announcement will come within months of the tenth anniversary of the Macintosh, which was originally launched in January 1984. Clearly, the PowerPC will give Mac® users the best of both worlds. It is expected that PowerPC users will see performance gains of up to two- to four-times faster with their existing applications. New applications, including rewrites of existing applications, are expected to be up to 10 times faster on the PowerPC platform. And most of the major software vendors, including Microsoft®, Aldus®, and WordPerfect®, have committed to rewrite many of their most popular applications for the PowerPC platform.

The performance boost will make an incredible difference in what a user can do. Computationally intensive programs such as animation and multimedia will get the biggest boost, since those tend to consume a tremendous amount of horsepower. For rotating 3-D objects or playing video and music at the same time, a PowerPC will make a tremendous difference.

What other new developments will we see as a result of this added horsepower?

Brown: I think the new level of performance will spur developers to start thinking about enhancing the user interface. The Mac is easy to use, for a computer, but it's still difficult for some people—just as setting the clock on a VCR is difficult for some people. All that added performance can contribute a lot to speech or handwriting recognition, both of which would substantially improve people's ability to interact with computers.

What are Apple's future plans for the PowerPC Architecture?

Brown: We were drawn to IBM's POWER Architecture because of its scalability. The same fundamental architecture that's in a desktop machine could also be the heart of a multiprocessor server platform or the heart of a handheld device. None of the other technologies scale as nicely as POWER does—in horsepower, price point, and power consumption.

The 601 chip, the first PowerPC chip available, is just the tip of the iceberg. There's a sequence of increasingly powerful chips coming from the alliance. So we will continue to see an increase in the amount of power available to Macintosh users.

We'll also see lower costs and lower power limitations. Power consumption is a critical problem in smaller devices. For example, Intel's Pentium chip is very, very warm. Since it has a high heat output, it is not ideal for small notebook-style computers. This is not the case, however, with the PowerPC chips, such as the 603 chip that will follow the 601 chip. The 603 chip will be very functional in smaller configurations, such as the Apple PowerBooks®. Overall, it would be fair to say that you can expect to see the PowerPC spread across most of Apple's product line.