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The Scale-Out Computing Wars Redux: Expanding the Horizon from 32 to 64 bits

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Powering the biggest names and platforms of the IT world, 64-bit solutions have been long regarded as the crème de la crème of computing technology. However, during the past twenty-four months, technological and market changes have roiled the generally placid waters of enterprise computing. The setting for this drama began with HP's acquisition of Compaq, and the company's subsequent aggressive push toward subsuming its traditional PA-RISC, Alpha, and Non-Stop platforms in favor of Intel's Itanium. But Itanium, once envisioned as an industry standard 64-bit platform that would eventually dominate datacenters, has been anything but. Missed production deadlines, muffed performance benchmarks, and lukewarm reception by the enterprise users it was supposed to charm have been among the potholes Intel and its partners have suffered on the Road to Itanium. In addition, the coming year promises powerful new generations of competing 64-bit processors from IBM (POWER5) and Sun Microsystems (UltraSPARC IV) that will likely grab the attention of users and the media for much of the year.

In addition, the 2003 IT market was shocked by innovative news from an unexpected source: AMD. Long regarded as Intel's whipping boy in the desktop and PC space, AMD's introduction of its new hybrid Opteron processor in April 2003 caused a largely unexpected seismic shift. Rather than creating a discrete, specialized 64-bit platform offering, AMD instead simply extended the addressing capabilities of the venerable x86 platform to natively support 64-bit applications. Since Opteron seamlessly runs both 32- and 64-bit software, the chip became particularly interesting as a natural migration path for 32-bit users who wished to incrementally move to 64-bit computing. This essentially contradicted vendors who considered x86 a simplistic stepping stone to "real" 64-bit enterprise computing, and complicated life for Intel when 32-bit performance issues plagued Itanium, undercutting the company's own stated x86 migration strategy. Now, Intel has announced 64-bit extensions technologies for its 32-bit Xeon workstation and server processors, positioning the new offerings as enhancements that will be especially beneficial for 32-bit customers.

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Expanding the Horizon from 32 to 64 Bits

Despite the desires of certain systems vendors to declare 32-bit computing dead, it is clear that nothing could be further from the truth among enterprise customers. One merely needs to cast a passing glance into the IT market to notice the awesome increases in price/performance manifest in the 32-bit Industry Standard x86 architecture. For a great many businesses, the power of 32-bit computing provides a viable and cost-effective solution that meets (or exceeds) their IT needs. Nevertheless, despite this arguably unprecedented price/performance curve in the 32-bit market, successful organizations find themselves increasingly coming up against the glass ceiling of a 32-bit infrastructure. To meet their growing computing needs, a 64-bit architecture is the next logical evolutionary step. There have been several vendors happy to meet this need, largely through the promotion of incompatible (with Industry Standard architecture), albeit arguably, very high-performance systems. However, for users who have developed IT infrastructures based on the x86 architecture, a massively disruptive change of platform in order to obtain the advantages of 64-bit computing is simply impractical. Therefore, for the bulk of users, a successful transformation to 64-bit computing should be based on existing architecture. This means that the existing code base must be able to operate intact while applications are extended to take advantage of the 64-bit address space. To meet this need, there are two x86 64-bit extensions: the Xeon 64-bit extensions from Intel, and the Opteron from AMD.

Intel 64-bit Extensions for Xeon

In a sense, the 64-bit extensions Intel plans for its Xeon product line later this year are defined as much by what they cannot do as what they can, and the company's announcement at IDF was as notable for what was left unspoken as for what was actually said. On the can-do side of things, Intel is positioning the new offering as a value-add to its volume solutions, viewing the extensions as a simple, affordable way for 32-bit customers to gain a bit of 64-bit headroom if and when they need it. The new Xeon extensions are decidedly not being positioned as alternatives to or replacements for the company's 64-bit Itanium platform. This is not especially surprising or disingenuous. For a good while, Intel has been clear both in its views on the limitations of 64-bit extensions, and in pointing out the benefits of dedicated 64-bit solutions. But the company's announcement also reflected the delicate balancing act it will be required to perform.

In our view, the decision to deliver 64-bit extensions for IA-32 represents a notable retreat for Intel. Previously, the company had insisted that 32-bit customers migrating to 64-bit applications would have their needs more than adequately served by Itanium's software-based 32-bit emulation abilities. In fact, Intel recently announced further enhancements to Itanium's emulation layer that increase application performance. But such an approach flies in the face of conventional end-user behavior. For most small to mid-market companies, the journey to 64-bit computing happens piecemeal, beginning with support for a few addressability-sensitive solutions, such as database applications or the rare applications dependent on floating point performance, before moving into more robust and expensive territories. For such companies, affordable 32-bit solutions that offer scalable 64-bit options make considerably more sense than jumping fully-clothed into the Itanium (or other RISC solution) pool. In other words, business users not inclined to buy Intel's vision of 64-bit migration wanted other options.

AMD's Opteron

Given this behavioral backdrop, it would seem there is a latent opportunity for the inevitable and predictable march to 64-bit computing, but one with specific terms and conditions. When AMD's hybrid 32-/64-bit x86 processor first became available last April, the simplicity and elegance of extending 32-bit addressability to 64 bits caught the market's attention and imagination. In addition, Opteron's notable performance specs (in both the 32- and 64-bit arena), coupled with its remarkably low (for a 64-bit platform) price, made the chip a fast seller and AMD a market and media darling for most of 2003, an annum Intel declared "The Year of Itanium." Realistically, Intel's announcement of Opteron-like features for Xeon can be interpreted as a serious tactical AMD win in the 64-bit extensions battle. However, it should be remembered that every war encompasses minor skirmishes and major battles, balances that shift from one side to another and multitudinous examples of short-term winners who became losers over time. It is also important to note that all architectural similarities aside, Intel's and AMD's products are discretely different technologically. Until the two can be tested side by side, all declarations of superiority should be treated as marcom blather. Intel's announcement is little more than the beginning of a latest chapter in what promises to be a sizeable epic.

The Real Battle for Marketshare: The OEM Channel

The real battle for platform superiority, however, will be fought not by Intel and AMD, but by behemoth OEM partners including HP, Dell, IBM, and Sun.

HP and Dell: Twin Sons of a Different Mother

From this standpoint, we see Intel's announcement as especially good news for HP and Dell, which though nominally engaged with AMD have been cautious in their approach to Opteron. There are two obvious reasons for such reticence. First, neither company wished to contradict its primary processor supplier's decidedly different (until now) product development strategy. Additionally, at least for HP, it would be a risky move to embrace any technology that could potentially damage its stuttering Itanium strategy. A few weeks ago, HP announced gauzy plans to deliver IA-32 solutions with 64-bit extensions later this year, which most interpreted as a decision to embrace Opteron. Intel's announcement gives the company an opportunity to remain on its Intel-über-alles flight path.

For Dell, high-end products are a counterpoint to the volume game. The company keeps Itanium on their price list to guarantee customers the headroom they need, but Dell is not the logical candidate to sell large volumes of dedicated 64-bit servers any sooner than the other OEMs. Therefore, no matter what Intel's new chip costs, Dell is unlikely to benefit from another type of processor until it sees volumes which do not exist at present. However, more importantly both Dell and HP are solidly positioned among SMBs, especially in the dominant US market, the market Intel sees as crucial to the success of its new solutions. Since SMBs continue to be the drivers of the majority of 1- and 2-processor scale-out servers that drive processor volume sales, if Intel's 64-bit extensions to Xeon do catch fire Dell stands to become an eventual beneficiary.

IBM: Never Forget Big Blue

IBM's involvement with both Opteron and the new Intel processor is the most complex of any OEM. The company has slotted its Opteron-based solutions into a high performance computing (HPC) product group separate from its Intel-based eServer xSeries product line. Indeed, Opteron's performance and

scalability make it a natural fit for HPC, but real success for the chip will depend on its adoption as a volume server platform. Regardless, IBM is hard-pressed to lose here. After all, any IBM server sale is good for IBM, and IBM will sell whichever server a customer desires, but the company is bound to encounter some delicate marketing and product positioning issues along the way. More importantly, the SMB and scale-out volume spaces so eagerly sought by these 64-bit extended chips are not IBM's traditional strong suit, though the company has been aggressive in developing solutions for these markets over the past two years. In the end, IBM's efforts around Linux may offer some interesting momentum to this area, especially since Microsoft is likely to be a driver behind much of whatever solutions HP and Dell bring to market.

Sun: A Renewed Interest in the x86 Architecture

Sun's announcement last week of plans to deliver Opteron-based volume servers constitutes the most intriguing x86 64-bit effort to date and stands the company in bold contrast to other OEM server manufacturers. Given Sun's x86 architecture products are limited to small number of Xeon-based systems and its past adversarial relationship with Intel ("32 bit computing is dead"), Sun does not have to perform the same balancing act required of other OEMs. As the only server vendor openly positioning Opteron for the volume market,. Sun has no reason to prevaricate about customer preferences, but has boldly claimed Opteron as the centerpiece of its volume strategy for both UNIX and Linux.

While Sun has never had significant market share in the Intel space, it has sold many UltraSPARC-based uniprocessor and dual processor systems, along with its now-retired Cobalt brand. Sun also has a significant presence in the financial and telecommunications markets in particular, which will continue to purchase volumes of small servers where 64-bit computing yields real benefits. While Sun will not compete in the Microsoft space, they should be able to stem the flow of low-end customers to alternate platforms by providing a palatable volume option to accounts that embrace the benefits of 64-bit computing but are deterred by the steep price delta between UltraSPARC and x86 based systems. Additionally, in Europe, Fujitsu Siemens has sold significant quantities of Solaris-based servers. Since the company already uses Opteron in high-end workstation solutions, they may choose to develop Solaris on AMD systems as well. Finally, Sun should keep an eye on the relationship AMD shares with IBM since AMD dumped their old partner, UMC, and turned to IBM to develop advanced processor technologies for chips beyond 90-nanometer mode. As a result, AMD will be able to take jointly developed technologies and use them to manufacture its own products. That said, Sun has relied on Texas Instruments for its chip development for over fifteen years, and is comfortable with the idea of joint processor development.

What Does It All Mean?

So where does all this leave us? In general, we see Intel's announcement as being essentially good for users, good for Intel, and good for the company's OEMs, with the biggest potential casualty being AMD's Opteron. In Opteron's favor, however, is the fact that AMD will own the marketplace for more than a year before competing Intel-based solutions become available, and has been the primary messenger for the benefits of 64-bit extension solutions. In addition, for the first time AMD has one of the big four server vendors, namely Sun, solidly in its court. While Intel will understandably use every opportunity and advantage to drive its own strategic messaging, the market is AMD's to

lose or give away. Most important for both companies and their partners will be the role end users play in this drama. Customer adoption has led to both AMD's success and Intel's about face. Whether the market will buy Intel's vision of 64-bit extensions as a boon to 32-bit solutions or simply deploy these processors in places Intel might prefer they avoid, customers are driving the actions of this market and its vendors. Given the current shape of things, we believe any eventual victors of the battle of 64-bit extensions will be the processor and server vendors who listen closely and carefully to their customers.