Itanium — Is it time to end the cruise?

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EXECUTIVE SUMMARY

The topic of Intel's Itanium comes up from time to time. Kusnetzky Group analysts are asked to discuss the history of this microprocessor family, recent announcements centering on support of this family of microprocessors and then offer advice on what the client should do going forward.

Kusnetzky Group analysts present information gathered from IT industry hardware and software product announcements; information Intel offers on its website and publically available white paper; information on the Internet, including vendor websites and Wikipedia.org; and private interviews of industry executives.

This paper is meant to present the content of a typical session. The advice, of course, has been generalized since each client's IT infrastructure, its expertise and its overall business requirements are different.

In the end, the choice to stay with Itanium-based systems or migrate workloads to another supplier's product depends upon an organization's relationship with the supplier of their Itanium-based systems, with Intel and their overall business requirements.

WHAT IS ITANIUM?

Itanium is the name of a family of 64-bit microprocessors offered by Intel and a few partners. These microprocessors implement the IA-64 architecture, which has been renamed "Intel Itanium Architecture" in recent years.

The target market for systems based upon this family of microprocessors has changed from an entry system designed to supplant Intel's X86 family with a new generation of technology to today's target markets. This transition didn't happen as Intel, HP and several others hoped.

The X86 family has evolved to include 64-bit microprocessors that are compatible with previous generations of 32-bit microprocessors, that include instructions to improve application security, overall application performance and that assist virtual machine software products, such as VMware ESX Server, Microsoft Hyper-V, Citrix XenServer and Red Hat Enterprise Virtualization Server (previously known as Kernel based Virtual Machine or KVM) to perform better and more efficiently.

Now, Intel and its partners are targeting high end commercial and technical computing with their Itanium systems.

ITANIUM'S INTERESTING HISTORY

The architecture originated at Hewlett-Packard (HP). HP and Intel later worked together to develop both the architecture and microprocessors that implemented that architecture.

HP and Intel's goal was to create an architecture that explicitly included parallel processing capabilities on an instruction-by-instruction basis. This would make it possible for compilers to better optimize code to take advantage of future generations of microprocessors that would have more processing units (cores)

and would have the ability to execute more application threads per processor. At this time, Intel's Tukwila microprocessor is able to manage the execution of six instructions each clock cycle.

DEVELOPMENT

HP's engineers, back in 1989, came to the conclusion that the popular reduced instruction set computer (RISC) were approaching a limit that would be difficult to overcome. They believed that getting systems to execute more than one instruction every clock cycle would be costly and very difficult.

So, these engineers developed a processing architecture that would be able to execute a number of instructions every clock tick. This, they hoped, would allow the creation of vastly faster and more extensible systems. Later, this architecture was named EPIC, or explicitly parallel instruction set.

The key innovation that EPIC offered was to use a very long instruction word (VLIW) that made it possible for more than one instruction to be specified in a single machine word. This, the engineers concluded, would make it possible for a number of instructions to execute simultaneously. This approach would simplify complier creation and make it possible to make better use of processor pipelines and processing units.

PARTNERING WITH INTEL

The cost of developing new processor architectures can be staggering and HP decided that it couldn't support the total cost. It turned to Intel in 1994 in the expectation that the high development costs could be spread across a number of system suppliers. Today's IA-64 is clearly an offshoot of HP's EPIC.

HP and IBM planned that most system suppliers would adopt microprocessors supporting this processing architecture because they would perform much faster and reduce the costs of developing very large systems.

The partners engaged in a very complex development effort that resulted in the delivery of Intel's Merced in 1998. This was later than either of the partners expected.

Kusnetzky Group analysts remember statements from both HP and Intel executives that they believed that systems based upon their much beloved IA-64 would come to rule the world. They were convinced that IA-64 would become the high performance, low cost leader in servers, workstations and high end desktop computers. They were convinced that IA-64 would eventually replace complex instruction set (CISC) systems, such as Intel's own X86 and HP's Precision architecture, and reduced instruction set computers (RISC), such as Sun's SPARC, DEC's Alpha, and IBM's Power systems.

WHO JUMPED ON THE IA-64 BANDWAGON?

Compaq, the owner of DEC's Alpha, and Silicon Graphics (now SGI) made the choice to stop development of their own 64-bit RISC architectures to jump on the IA-64 bandwagon.

Many software suppliers added IA-64 to their development plans as well. Microsoft developed Windows for this platform. Red Hat and SUSE Linux offered Linux distributions for IA-64. Several suppliers of UNIX, including HP, Sun, and Compaq announced plans to port their software to IA-64 as well. In the end, however, HP was the only UNIX supplier who stayed the course.

WHAT WAS THE CHALLENGE?

Developing the Merced microprocessor was delayed due to the complexity of implementing the instruction set. It took far more transistors, executed more slowly, created more heat and cost far more than expected.

Intel announced that Merced would be offered as “Itanium” in October 1999. It didn’t take long for IT humorists on the network to start calling the device “the Itanic” and speculated how long it would stay afloat. That name still appears in industry accounts whenever a new version of Itanium is released.

Furthermore, developing compliers for IA-64 turned out to be far more challenging that originally envisioned. This stalled the release of operating systems, development tools and applications for the microprocessor.

INITIAL OFFERINGS TARGETED THE LOW END

Surprisingly, given that Itanium was developed to get around the performance limits of then-current processor and system architecture, the initial Itanium offerings targeted the low end of the market. Typically, these systems were built based upon 4 or fewer processors. They were designed to compete with low end offerings based upon IBM’s Power Architecture, Intel’s own X86, Sun’s SPARC and HP’s own PA RISC.

Initially Microsoft’s Windows, HP’s UNIX and two Linux distributions were made available. Applications for these systems lagged behind projections.

Although HP and Intel had high hopes for these systems, they didn’t outperform other systems, had fewer applications and development tools and were more costly as well. As one might expect, the adoption rate was significantly lower than expected.

ITANIUM 2

HP and Intel realized that they needed to look closely at Merced and come up with something that addressed the issues with performance, cost, complexity and the fact that other microprocessors, including Intel’s own Xeon family and AMD’s Opteron, were rapidly adopting 64-bit features.

Intel quickly came up with an improved architecture. The first microprocessor was code named McKinley. The engineers were careful to make sure McKinley required no major changes were required to compilers, operating systems, development tools or applications.

Intel launched McKinely under the name Itanium II in 2002. Faster products were released al the way until 2010. However, these systems never performed as well, or scaled up as far as then-current IBM Power Systems. Nor did they outperform systems based upon some members of Intel’s X86 family of microprocessors. If we stop and consider the impact on the UNIX market, this is one of the factors that drove IBM Power’s share of the Unix market to grow from about 20% to approximately 50% since 2002 according to several industry research firms.

THE TUKWILA PROJECT

In 2005, Intel announced that it was working on the next generation microprocessors in the Itanium family. The code name for this project was Tukwila. The goal was to improve performance and memory capacity, as well as to reduce power consumption and heat production.

Itanium 9300 was released in 2010 as a replacement for the Itanium II family.

IS THE ITANIUM SINKING?

Itanium never achieved the dominant position that HP and Intel wanted. Other platforms continued to offer better price performance, system pricing and/or software availability.

When the Itanium shipment volumes didn’t grow as expected, software suppliers started announcing that they were not going to continue to support Itanium with future offerings.

Microsoft announced that Windows Server 2003 and Windows 2008 would be the last to support Itanium. Many Linux distributions, including Red Hat, SUSE,

Oracle Debian and Ubuntu announced that Itanium would not be supported in future versions of their products.

Oracle went on to announce that it would discontinue support for Itanium in its Oracle and MySQL database products, middleware and applications after the current versions. It is clear that this announcement was perceived as a significant blow to Itanium's future, given the high percentage of HP-UX systems running Oracle database and middleware.

HP was quick to announce that it would continue to support Itanium with its OpenVMS, Non-Stop and HP-UX operating systems. It also announced that it would continue to develop and deliver systems based upon Itanium.

Other hardware suppliers, including SGI, NEC, Fujitsu, Hitachi and Group Bull continue to support their software and Itanium-based systems. It appears that of these suppliers have announced new Itanium-based systems since Oracle's announcement and the subsequent industry concern over the health of Itanium. It is not at all clear that these suppliers will continue to invest in systems based upon this microprocessor family. We're just have to wait to see what moves these suppliers will make over the coming months.

IF ITANIUM IS SINKING, WHAT SHOULD WE DO?

The key questions Kusnetzky Group clients have asked all center on whether they should continue to invest in Itanium or should abandon that investment and move in other directions. Our answer has always been, to consider the organizations business requirements, plans for future growth and comfort with their hardware and software suppliers' plans.

WHAT TO DO IF THE ORGANIZATION IS HAPPY WITH THEIR SUPPLIERS AND THEIR PLANS

If the organization's suppliers appear to be in a position to continue to offer the products and services needed to address the organization's business requirements. The choice is clear. Continue to work with those suppliers as long as their products and services continue to address the organization's needs.

If, on the other hand, the organization does not have a clear understanding of their chosen suppliers' planned support, it would be wise to ask each of them to lay out their plans. This includes, of course, finding out what suppliers of hardware, operating systems, application frameworks, database software and the like are planning. Some suppliers, such as IBM, have affirmed their support for Itanium/HP-UX with a large portfolio of middleware, database software and professional services. Other suppliers, such as Oracle/Sun have indicated that they are not planning to continue their investment in Intel's Itainum.

WHAT TO DO IF THE ORGANIZATION IS UNHAPPY WITH THEIR SUPPLIERS' FUTURE INVESTMENT PLANS FOR THE ITANIUM PLATFORM?

Here are a few rules of thumb that would be helpful when considering what to do next. The Kusnetzky Group would recommend taking the time to carefully evaluate alternatives rather than leaping from one sort of problem to another.

It is important to review potential suppliers based upon a number of factors including the following:

- **Technology roadmap** — Does that supplier have a reasonable plan for the future? Have they lived up to their promises in the past?
- **Technology investments** — Has the supplier demonstrated its commitment to the proposed hardware and software platforms? How long has the supplier demonstrated commitment to its platforms?

- **Support for Itanium-based solutions** — Is that supplier in the position to help the organization keep current application systems up and running? Is the supplier suggesting that today's investment be abandoned immediately?
- **Migration/coexistence programs** — Does the supplier have well established, successful programs for migration from today's technology? Does the supplier have teams of highly trained experts that can help in any recommended transition? Does the supplier have tools that will make any recommended transition easy and error-proof?

IBM, Oracle/Sun and others have all announced programs designed to help organizations make a transition away from Itanium and Itanium-based software. It is important to consider are they offering a migration from one questionable platform to another or would a migration to that supplier's platform allow the organization to focus on its business rather than fears of platform obsolesce.

The Kusnetzky Group's recommendation is to proceed carefully rather than leaping from one problematic situation directly into another. Look for a company with a long-term, believable road map. Look for a company that has earmarked engineering investments to enhance systems, system software, application frameworks, database software and support a complete ecosystem of other suppliers. IBM's Power offers an example of a safe long-term bet. Oracle's SPARC platforms, another example, don't present an equally strong image.