

CLABBY ANALYTICS

HEWLETT-PACKARD'S
FORCED MIGRATION
TO ITANIUM

AN INDEPENDENT CLABBY ANALYTICS
WHITE PAPER

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INTRODUCTION

Information Systems (IS) buyers are at a very interesting “inflection point” with regard to systems platforms:

- Linux/Intel servers are eroding Sun's UltraSPARC/Solaris (Unix) base;
- Intel's Itanium (64-bit EPIC architecture) is poised to commoditize the 64-bit computing marketplace;
- Advanced Micro Devices (AMD) has just released its 64-bit Intel-based architecture (Opteron);
- Digital/Compaq/HP's Alpha microprocessor family will reach its end-of-life in 2004;
- Hewlett-Packard (HP) is preparing to discontinue making PA-RISC-based platforms and asking users to consider moving to Itanium-based platforms; and,
- IBM has announced its fifth generation of its Power 64-bit microprocessor architecture.

*What all of this means is that the 64-bit platforms market is consolidating — and, in our opinion, it's consolidating around **Intel-based** and **IBM's Power-based** microprocessor architectures. Alpha users are being encouraged to move to Intel's Itanium architecture. Over time, PA-RISC will be discontinued and users will be asked to migrate to Itanium. And, we project that a decline in Sun UltraSPARC sales volume will eventually force Sun to discontinue UltraSPARC and force its users to migrate to a new 64-bit platform base. In the end, this leaves two competing approaches to 64-bit computing: IBM's RISC-based Power and Intel's EPIC-based architectures.*

The Repercussions for HP Users

As this consolidation takes place, users of HP-UX/PA-RISC-based platforms, HP NonStopKernel on MIPS-based platforms, and HP Tru64 on AlphaServer platforms will find their hardware platforms discontinued. HP customers who wish to obtain competitive levels of performance over time will be *forced* to move to a new 64-bit architecture. Their options are:

- 1) move to Intel *Itanium*;
- 2) move to AMD *Opteron*;
- 3) move to Sun's *UltraSPARC*; or
- 4) move to IBM's *Power* platform.

Decision Dynamics

What factors should HP customers consider when migrating from PA-RISC to Intel Itanium architecture? We suggest the following:

- Understand the differences between CISC, RISC, and EPIC architectures. As HP moves to discontinue its RISC architectures (Alpha, PA-RISC) the company is hoping to steer its users to Intel's Itanium-class processors. These processors use a new approach for processing applications (called "EPIC" — explicitly parallel instruction computing). At a minimum, HP customers must understand the difference between where they're coming from (RISC) and where they're going (if they choose EPIC) before making the decision to adopt or not adopt Itanium.
- Understand the reliability, availability, and scalability (RAS) characteristics of the platform that you are considering buying. Many RAS characteristics are dictated by the operating environment (HPUX, Microsoft Windows, IBM's AIX, Linux, etc.) and associated management, security, and clustering software — so IS buyers will need to look closely at operating environment features and functions in order to determine whether the new platform-of-choice meets enterprise RAS requirements.
- Consider the ease of porting *custom* applications from a PA-RISC environment to another RISC environment or to an Intel EPIC environment. And,
- Consider whether the *packaged* applications that your organization currently uses are available on your new platform (and examine the depth of support you'll be able to get on your new systems architecture).

What This White Paper Is About

This white paper examines some of the issues and options that *HP-UX/PA-RISC* users have with regard to migrating their *custom* as well as *packaged* RISC applications to Itanium EPIC architecture. It also identifies some concerns that we have regarding migration to Itanium (maturity of the architecture and compiler; availability of package applications); and issues we have with HP's readiness to effect a PA-RISC to Itanium migration. It concludes that, due to various technology, maturity/readiness, and professional services migration issues, *moving to HP Itanium-class platforms may not represent the best migration path for the HP-UX/PA-RISC customer base.*

CHOOSING YOUR SYSTEM – MICROPROCESSOR/PLATFORM DIFFERENCES

The starting point when migrating from PA-RISC to Itanium should be to look at the processing environment that your organization currently is running (RISC), and then look at the target environment that HP would like you to move to (EPIC). This section describes the differences between these two architectures. (Note: we also include a discussion of CISC architecture because some HP customers may also be considering moving from a CISC (Pentium, Xeon) environment to Itanium architecture).

Three Approaches To Processing

With regard to microprocessor architectures, there are three dominant approaches used by computers to execute instructions:

1. *CISC* — The “complex instruction set computing” approach is typified by Intel’s Pentium class processors. The fundamental design concept around CISC has been that hardware is always faster than software — so CISC programmers made use of a rich instruction set (over 200) to tell underlying hardware how to rapidly process information. Also, note that simple compilers can be used to build CISC applications.
2. *RISC* — The “reduced instruction set computing” approach is typified by IBM’s POWER-based platforms (although Sun’s UltraSPARC and HP’s PA-RISC are also RISC architectures). RISC processing was introduced to reduce the number of instructions an underlying microprocessor would have to handle. By using few instructions, microprocessors could be designed to run faster (by executing fewer, simpler instructions); and, fewer transistors were needed (requiring smaller die sizes and making RISC microprocessors less expensive to design and build).

To further increase processor speed and performance, RISC design enables instructions to be parallelized (broken up and processed simultaneously instead of sequentially) and to be pipelined (as one step of completing an instruction is finished, another is being executed). It even allows processing to occur out-of-order to exploit maximum performance at the microprocessor level.

Finally, the role of the compiler is to present instructions to the underlying hardware — RISC processors take on the responsibility to identify and exploit parallelism.

- *EPIC* — explicitly parallel instruction computing is exemplified by Intel’s Itanium class processors. Like RISC, the way that EPIC architecture works is aimed at parallelizing processing to obtain maximum performance. But the way that EPIC architecture works is to make the compiler decide how instructions are to be executed (and in what order) — rather than focusing on having the hardware perform this task.

The primary difference in RISC and EPIC architecture is where the logic exists for deciding how to execute parallelized tasks. In RISC, the compiler presents instructions to the processor and the processor figures out how to best parallelize the processing of those instructions. In EPIC, the compiler takes on the parallelization assignment — and uses the processor for execution.

Why is this important? Because HP customers who are considering a move to Itanium/EPIC architecture need to understand that HP is asking them to process applications in a completely new manner — one that poses certain migration issues when porting applications (and one that relies heavily on compiler technology to successfully effect software migration).

Also Consider RAS

Itanium platforms are relatively new to market (the first Itanium was released in May, 2001). Meanwhile, RISC technology has been available since the late 1980s.

Over the years RISC vendors have had the opportunity to build reliability, availability, scalability, and management capabilities into their respective platforms. RISC vendors can articulate meantime-between-failure (MTBF) performance; system up-time characteristics; and have proven scalable implementations of their respective platforms. Itanium vendors have not had the same amount of time to build/test RAS characteristics on their Itanium systems implementations. Further, ISVs have not had as much time to develop/test their RAS software for Itanium environments.

It is therefore necessary to ask your prospective Itanium platform supplier to provide RAS information on any EPIC-based sever in order to ensure that the platform that you choose can match the platform from which you migrate.

Finally, Consider Platform/Architecture Maturity

Although HP would love to see its base migrate to Itanium — moving to Itanium is not the only option that HP PA-RISC and AlphaServer platform users have. From our perspective, moving to Itanium could actually prove to be a bit riskier than moving to UltraSPARC or POWER RISC-based servers. Here's why:

- **Maturity** — Itanium has yet to prove itself. Although the official agreement between HP and Intel to jointly develop Itanium dates back to late 1993, it took Intel eight years to release the first generation Itanium processor — and most IS buyers waited until Itanium 2 was released (in July, 2002) before taking Itanium seriously.

What this means is that Intel's first real "production" Itanium platform (Itanium 2) has been on the market for less than one year. Accordingly, at this juncture, Itanium 2 has very little marketshare and has yet to establish a track record in the enterprise. Meanwhile, IBM's PowerPC and Sun's UltraSPARC RISC implementation are proven designs with thousands upon thousands of servers installed (and these factors may make POWER- and UltraSPARC-based servers "safer" choices).

HP users may find that, as long as they have to go through a platform migration, they might be better off moving to a more "established/proven/stable" architecture.

MIGRATION PLANNING – APPLICATION CONSIDERATIONS

After learning about the microprocessor characteristics of RISC and EPIC platforms, and after considering platform RAS characteristics and platform/architecture maturity, the next logical step in migration planning involves examining what it takes to port applications to a new platform and potentially a new architecture.

From our perspective, the choice of CISC, RISC, or EPIC architecture should ultimately be made first on the ability of applications to exploit underlying processor performance in the most optimal fashion; and second on the availability of ISV applications for the chosen platform.

Having said this, we do have some concerns with migrating existing PA-RISC custom applications to EPIC environments; and we have some concerns about the availability of ISV applications on Itanium.

Observation: Potential Issues When Porting Custom Applications

With regard to migrating custom applications from PA-RISC platforms running HP's HP-UX operating environment to HP-UX Itanium-based platforms, we expect HP customers to face the following issues:

Binary Compatibility — For HP customers who wish to move their custom code from PA-RISC to Itanium, HP offers “binary compatibility” when moving applications from PA-RISC-based platforms to Intel Itanium platforms (and this migration does not necessarily require a recompile). What this means is that applications that currently run on HP's PA-RISC architecture can run natively on Intel's Itanium platform. This binary compatibility is made possible because Itanium includes a PA-RISC execution environment that allows direct object code translation for “well-behaved” applications (applications that don't make “undocumented” application program interface (API) calls).

Our issue with this “binary compatibility” claim has to do with performance ramifications. The fact that well-behaved applications can run on Itanium is good — provided that those applications are able to exploit the EPIC architecture to gain increased performance (because gaining performance would be the point for moving from an existing PA-RISC platform to Itanium — otherwise, why move)? We have seen no guidance from HP on the performance ramifications of moving binary compatible code from PA-RISC to Itanium — and we don't believe that uncompiled code will realize any performance gains.

Performance hits — HP-UX applications that are not directly ported to Itanium architecture can be run in emulation mode using HP's Aries emulator. According to HP, the Aries emulator will: a) cause integer applications to slow down by a factor of 2-4; and, b) cause floating-point applications to slow down by a factor of 3-6 (*source: "Compatibility Mode on HP-UX/IPF: A Developer Perspective" (July 16, 2002) — formerly at <http://devresource.hp.com/STK/Aries.html>*). (Note that this page is no longer available on HP's site...).

From our perspective HP needs to publish new data about the performance ramifications of running applications in emulation mode on Itanium. But we also observe that, from our experience, IS buyers usually resist running applications on emulators (witness Digital Equipment's FX-32 environment that allowed applications written for Windows/Intel to be run on Windows/Alpha). Despite the fact that emulators sometimes offer equivalent or better performance than on a native processor, IS managers have traditionally shown a reluctance to adopting emulation as a valid migration approach.

Revision synchronization — HP customers who want to run HP-UX on Itanium will have to run a different version of HP-UX on Itanium and a different version of HP-UX on PA-RISC until about the end of 2004 when HP will have a converged version of HP-UX that will run on both platforms.

This situation has the potential to create support problems for HP Itanium buyers who need to manage two functionally different revisions of HP-UX.

Observation: Obtaining ISV Applications

The big challenges that ISVs will face will be recompiling their applications to exploit EPIC's parallel execution streams and merge them into these "packed" instructions — and then “quality assuring” that those applications can run in an optimized fashion. Today, Intel claims that over 300 ISV applications have been ported to Itanium. But this 300 is the total of all Itanium applications available across all operating systems (HP-UX, Windows, Linux). And it's a tiny fraction of the estimated 10,000+ applications currently available on the PA-RISC version of HP-UX; and the estimated 16,000 on IBM's POWER platform; and the estimated 12,000 on Sun's UltraSPARC.

ISVs tend to port when they see clear market demand for a new platform (like they did for Windows and Unix-based platforms in the late 1980s and early 1990s) — and so far that demand has not materialized on Itanium. They also tend to port when the toolsets and compilers are sufficiently mature to allow easy porting across platform environments. It should be clear from the limited acceptance of Itanium to date that Intel (and HP) still have a long, long way to go until the Itanium ecosystem can begin to rival that on any IBM or Sun RISC platform.

Intel claims to have about 300 packaged applications ported to Itanium 2. This contrasts with tens-of-thousands of packaged applications that already run on POWER and UltraSPARC platforms. What this infers is that HP users who want migrate from Alpha-, MIPS-, or PA-RISC-based servers may have to wait a while until their ISVs port and tune packaged applications for the new Itanium EPIC architecture. Choosing Itanium could lead to long wait periods for various enterprise packaged applications to become available on EPIC architecture.

ONE PARTICULAR BUSINESS ISSUE WITH HP

In addition to potential porting-related technology issues, we think that HP customers should pay close attention to HP Itanium and HP-UX development roadmaps. In this regard we observe that:

Slippage — In May of 2002 when the HP-Compaq merger closed, HP published a 3-year product roadmap for HP-UX. HP's UNIX roadmap showed that HP-UX 11i v2 (which was recently announced) as being the first *converged* HP-UX version for *PA-RISC and IA-64*. But the new HP-UX 11i v2 version only supports *Itanium*, and *not PA-RISC*. Press reports quote an HP spokesman as stating that the convergence has been delayed to YE2004, a slip of 18 months. This slip means that HP customers must support different HP-UX OS versions for PA-RISC and Itanium at least until 2005, with different applications, tools, etc.

Currently, HP plans to create and release a version of HP-UX that can run on both PA-RISC and Itanium platforms at year-end 2004. We observe that migration gets even uglier if the customer is forced to use two different revisions of a given operating system when migrating applications and databases — as HP customers will now have to do until the end of 2004 (if not into 2005 if further slippage occurs).

PARTICULAR PROFESSIONAL SERVICES ISSUES WITH HP

Hewlett-Packard's professional services organization has long been a "pet peeve" of ours. For years we've watched HP stumble and bumble in the professional services marketplace – focusing on providing network/systems management outsourcing, basic deployment services, and break-fix maintenance (and more recently on server consolidation and business continuity), primarily for its Unix-based product lines. Meanwhile, competitors like IBM and Unisys have combined basic deployment services with high-end business consulting and reengineering services. What has bothered us most about HP's stance in professional services is that, in our opinion, the company has been leaving money on the table by not building the right mix of professional services programs to suit its customers' business integration needs.

On the brighter side, HP appears to be expanding its Windows-based services. On September 23, 2002, HP and Microsoft announced a worldwide initiative focused on expanding HP support for Microsoft's .NET Web services platform. The two companies will invest \$50 million in programs, training and other activities designed to promote .NET solutions in the marketplace. A big part of this HP/Microsoft .NET initiative is the 'field engagement' plan that calls for dedicated field teams (*180 people*) across multiple geographies to pursue and promote .NET initiatives. More specifically this plan calls for the pursuit of targeted .NET opportunities in the areas of Internet business solutions, enterprise application environments, and collaboration (so HP will not be "all over the place"). With the assumption of Compaq's professional services organization HP gained access to a services group that understands how to create low-level, packaged Windows-based services offerings that are replicable (for instance, the deployment of Microsoft *Exchange* messaging environments is - relatively rote) and profitable; while also being capable of providing high-level consulting services.

Still, as we look at HP plans to migrate its customers from PA-RISC to Itanium systems, we find ourselves wondering not only can HP put together the right mix of programs needed to entice its customers to move to Itanium-class servers — but also where is HP going to get the people and programs it needs to address its user's migration needs. Further, even if HP gets the headcount it needs to help its customers migrate to Itanium, we wonder if the company has the ability to execute a mass migration of HP-UX/PA-RISC users to Itanium-class processors.

Two Primary Concerns

In short, we've narrowed-down our HP professional services concerns to two issues: headcount and execution.

Headcount concerns — One of the ways that HP has been able to reduce its operating costs since it acquired Compaq Computer Corporation has been to slash headcount in its enterprise systems group (ESG). When HP and Compaq combined, the company had a total of 153,500 employees (42,000 of which were in ESG). Since the merger, HP cut 17,900 jobs (approximately 9,100 of which were in ESG). And HP recently announced that it would be further reducing its workforce by 3,500 people (1,200 in ESG). All in all, this represents a downsizing of about 25% in ESG.

So, given that ESG has been downsized by around 25% — and given that HP is planning to migrate its AlphaServer ,PA-RISC, and MIPS user bases to Itanium — we have to ask “where are all of the people HP will need to assist its customers in redesigning applications, restructuring

databases, and redeploying systems going to come from”? Also, Itanium EPIC is a completely new programming architecture. We’d like to see clear evidence that HP has spent the time and money to build its Itanium skill base — otherwise “*how will HP be able to meet its customers’ migration needs?*”

Failure to execute — Over the past several years we have observed that HP has failed to execute well in various professional services markets that have involved migration and business integration. For example:

- In the 1997 HP announced (with Microsoft) a new initiative called “Simplified Enterprise Computing”. This initiative called for joint development between Microsoft and HP (especially in the integration of HP *Open Mail* and Microsoft *Exchange* mail and messaging); and it called for HP to significantly expand its Windows professional services business. The purpose of this initiative was to make HP the place to turn for Windows-related professional services...

In our opinion, this initiative failed miserably. The joint development effort fizzled; and HP was never quite able to figure out how to package and deliver Windows professional services at competitive prices. (Compaq became the place to go for prepackaged, replicable Windows-related professional services).

- In May, 1999, HP announced its E-speak initiative — software and services that made use of XML (extensible markup language) to glue together all sorts of different computers and software. Although HP’s vision was forward looking at the time, HP failed to put in place the professional services training and implementation programs needed to get its partners and customers to adopt its E-speak vision. Instead, the market has gravitated to open standards in the areas of Web services and XML to build integrated business process/information systems environments. The failure of E-speak to become a market force represents another “missed revenue opportunity” for HP and its professional services organization.
- In late 2000, HP entered discussions with PriceWaterhouse Coopers — PwC — (a big five accounting/consulting firm) to purchase the consulting arm of PwC’s business. This move would have given HP the kind of consulting expertise it needed to help its customers integrate business processes with underlying information systems. This potential acquisition failed when Pricewaterhouse Coopers was acquired by HP’s rival — IBM. Now HP is a bit “flat-footed” when it comes to offering direct business process integration services (and instead of garnering the lion’s share of business process consulting revenue HP relies on its business partners to help fill this void).

In fairness, HP has recently won a few custom services engagements that involve business process integration (most notably, its recent Proctor and Gamble outsourcing win). But, overall HP remains ill-positioned to compete in the business process integration/outsourcing marketplace (especially when compared to IBM and Unisys).

It is against this backdrop that we express our concern about HP’s ability to deliver P.A-RISC to Itanium migration services. We think that due to headcount- and expertise-related issues HP may have problems helping its customers migrate to Itanium. We also think that HP is ill-prepared to deliver business process consulting services.

SUMMARY OBSERVATIONS

This white paper outlined our perspective on the technical, business, and professional services obstacles HP customers might face when attempting to migrate from PA-RISC based systems to Itanium-class processors. What we attempted to show was that migration from PA-RISC to Itanium is not a “no-brainer” — this migration warrants a close evaluation of application design and underlying microprocessor/platform choice.

With regard to moving custom application code from PA-RISC to Itanium we observed that the driving factor to make such a move should be to recognize increased performance on a new hardware platform. We think HP’s offer to provide “binary compatibility” on Itanium does not accomplish that goal; nor do we think the use of HP’s Aries emulator accomplishes that goal.

With regard to finding the packaged applications that currently run on PA-RISC available on Itanium — HP customers who migrate to Itanium may have to wait a while for their ISVs to port applications to Itanium’s EPIC architecture...

With regard to HP’s business practices, we are bothered the company’s slippage of the availability of a converged HP-UX that can run on Itanium and PA-RISC platforms. Having to run separate versions of an operating environment has the potential to create support headaches for IS managers charged with managing and administrating different platform types.

With regard to HP’s professional services organization we have long found HP consulting to be understaffed and misfocused. Over the past two years HP’s ESG has lost a quarter of its people — and given this headcount reduction, we wonder where HP will find the expertise and people it will need to effect a mass migration from PA-RISC to Itanium. Further, we observe that HP is not well prepared to lead the charge into business process integration with underlying information systems — and we see this as a major strategic error.

How do we think this PA-RISC to Itanium scenario will really play out? We think that:

- Some HP customers will *invest in porting* their applications to Itanium-class systems in order to stay with HP and to obtain performance advantages over time.
- Many HP customers will choose *not to move their custom applications* from PA-RISC to Itanium. These customers will continue to run packaged applications on PA-RISC-based servers for years to come (just as HP 3000 customers did with their MPE/iX-based servers before HP abandoned them).
- Other HP customers will say “as long as we’re being forced to move — let’s evaluate other platforms”. Now we’re back to where we started — will it be Itanium or Power?

In the end, the PA-RISC migration may have little to do with which new platform choice is made and may have more to do with whether HP can remain a given enterprise’s strategic vendor of choice. And given the technical challenges involved in migrating from PA-RISC to Itanium, certain HP business practices, and the expertise/headcount/focus issues that exist in HP’s professional services organization — this choice may be hard to make.