

Impact of the New Generation of x86 on the Server Market

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Intel and OEMs have driven performance and reliability of the Intel Xeon 7500 processor series (code-named Nehalem-EX) to a level overlapping what Gartner judges to be about 80% of the RISC/Itanium function/feature set, but at a much lower price point. The result will cause increased server technology consolidation toward a bipolar distribution: x86-based platforms and one primary market-share-leading RISC technology (IBM Power), complementing the prevailing legacy of mainframes.

Key Findings

- A bipolar technology distribution of one strong RISC (Power) and x86 will drive at least 70% to 80% of the market's total revenue, while other technologies subsist with minor single-digit revenue share; beyond this decade, a unipolar market will exist in which x86 technology becomes the standard, predominant server technology.
- Unix has receded by \$4 billion in the past three years. Migrations from Unix to Linux or Windows continue, according to Gartner client discussions.
- Users continue to optimize costs (such as through virtualization, lower hardware costs, open-source software and cloud computing) primarily on x86.
- Of the three non-x86 technologies, IBM's has had a recent track record of sustained market share growth.

Recommendations

- Calculate an approximate x86 total cost of ownership (TCO) equivalence or line item cost analysis for comparison as if these applications were to be hosted on x86 for similar performance/availability, when considering Unix upgrades.
- Make the comparison to an approximately equivalent x86 configuration when evaluating price quotes.
- Adjust your IT organization's future platform procurement in volumes or revenue to mirror or exceed the general market's x86-to-non-x86 shipment or revenue proportions.

- Plan which applications can move from Unix/RISC/Itanium to x86 servers most readily, when they should be migrated, what level of skills and migration costs are relevant, and how independent software vendors (ISVs) view their development priorities.

STRATEGIC PLANNING ASSUMPTION(S)

By the next decade, the server market will have reached consolidation to one primary technology – x86 – with RISC/Itanium technologies fighting for dwindling market share.

ANALYSIS

By the next decade, the server market will have reached consolidation to one primary technology – x86 – with RISC/Itanium technologies fighting for dwindling market share. As a corollary, through this decade, a bipolar distribution will evolve, with x86 as a strong primary deployment choice, and Power a secondary influence in a receding market for the following reasons:

- Trends show the Unix market shrinking on RISC and Itanium server platform shipments.
- Trends show IBM's Power as the only technology with steady and incremental growth since 2002 in Unix, but not against x86.
- There have been overwhelming shipment growth and volumes of x86-based servers since 2002, which is forecast to continue until 2015.
- There has been a sharp increase in capacity and performance of recent generations of x86 servers.
- There has been strong improvement in reliability, availability and serviceability (RAS) features and functions in Nehalem-EX from Intel's learning curve on Itanium and its willingness to transfer the functional capability to Nehalem.
- Client inquiry discussions about planned migrations from Unix/RISC/Itanium to x86 Linux.
- Ongoing trends to standardize, modernize, simplify and commoditize server installments to fewer technologies and operating systems.
- Expansion of the blade market as a result of modernization through fabric computing is evidenced by new systems from Cisco (Unified Computing System) and HP (BladeSystem Matrix).

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1.0 Why x86 Will Become One of the Dominant Server Technologies of This Decade

The recent announcements made by Intel in March 2010 about the latest-generation Xeon microprocessors, called the Intel 7500 processor series, or Nehalem-EX, have brought into focus a fundamental issue. As the EX generation gains significant OEM vendor design support, and resets performance, reliability and cost levels, volume-based shipments will continue to detract or diminish the market for big scale-up and more-expensive designs. Intel, in collaboration with its OEMs and operating system (OS) distributors (Red Hat, Novell, Oracle and other Linux distributors, plus Microsoft with Windows) has willingly and forcefully driven the performance and quality of x86 on Linux and Windows to levels closer to Unix/RISC.

Primary end-user research conducted in 11 countries in 2009 showed that, as economies improve, migrations to Windows- and Linux-based servers will once again become a high priority for a significant percentage of end users. While not generalizable to all quarters and years, it's worth noting that change in shipped vendor revenue for RISC/Itanium was negative 20% from 4Q08 to 4Q09, while revenue for x86 was plus 14.3%. In 2009, RISC/Itanium-based servers fell 16.3% in shipments and 25.7% in vendor revenue on a worldwide basis, while x86-based servers dropped 18.8% in shipments and 22.1% in revenue for the same period.

Related to the RISC/Itanium segment, primarily three vendors were fighting to win a profitable market share of the 2009 \$12.3 billion Unix market, down from \$16.4 billion just four years ago in 2006. In this market segment (RISC/Itanium), Itanium and SPARC are struggling to maintain share (HP was flat and Oracle (with its acquisition of Sun) was down three percentage points from 2008 to 2009), while IBM grows its share (up four percentage points from 2008 to 2009). Gartner believes that revenue share is a more relevant indicator of business performance in this market. For example, growth in shipments with relative declines in revenue raises business issues like increasing costs of sales for a given platform. Vendor revenue shares since 2002 are shown in Table 1. Unit shipments are shown in Table 2 for comparison purposes.

There is further data to substantiate our arguments about the shifting trends toward x86 servers over RISC and Itanium servers.

Gartner's current forecast shows total worldwide server hardware platform revenue of \$49.9 billion for 2015. Of that, revenue for x86 servers is projected to be \$32.1 billion, and total RISC server revenue is projected to be \$8.6 billion. In this declining market, if

Table 1. RISC/Itanium Unix Server Worldwide Vendor Revenue Shares for the Top Three Providers

Server Provider	2002	2003	2004	2005	2006	2007	2008	2009
Sun Microsystems	38.0%	34.1%	32.9%	29.4%	33.1%	32.9%	30.9%	27.0%
IBM	21.1%	24.9%	27.4%	31.0%	31.4%	33.7%	35.2%	39.6%
HP	31.9%	32.4%	30.9%	30.7%	28.1%	26.9%	27.9%	28.2%

Source: Gartner (June 2010)

Table 2. RISC/Itanium Unix Server Worldwide Shipment Shares for the Top Three Providers

Server Provider	2002	2003	2004	2005	2006	2007	2008	2009
Sun Microsystems	59.0%	58.3%	57.6%	54.7%	54.1%	53.2%	55.6%	48.6%
IBM	16.9%	19.4%	19.8%	22.1%	25.3%	25.2%	26.6%	31.6%
HP	15.1%	13.7%	12.5%	12.7%	11.6%	12.8%	12.6%	16.0%

Source: Gartner (June 2010)

IBM Power-based systems were to capture only half of that RISC revenue total, which, at their current trajectory would be overly conservative, x86- and Power-based servers would represent just under 73% of total server market revenue. On a volume basis, the market for x86 will far exceed Power, whose strength will be confined at the higher-end range on large online transaction processing (OLTP) database management system (DBMS) applications and other performance-sensitive applications.

x86-based servers have continued to grow shipment share, while RISC and Itanium combined have continued to decline. In 2002, RISC and Itanium-based servers accounted for just over 10% of worldwide server shipments, while x86-based servers were just under 90%. In 2009, RISC and Itanium-based servers represented only 3.5% of worldwide server shipments, while x86-based servers had grown to 96.5%.

RISC and Itanium-based servers have also dropped revenue share compared with x86-based servers during the same period. In 2002, the combination of RISC and Itanium-based servers represented just over 45% of worldwide server revenue:

- By 2009, this had fallen to 30.9%. In comparison, x86-based servers had grown from a worldwide server revenue share of 38.9% in 2002 to 57.4% in 2009.
- Since 2002, IBM Power-based servers have been the only RISC-based servers to show a shipment market-share increase. In addition, since 2002, IBM Power-based servers had a greater raw market share shipment increase (+19.6%) compared with all Itanium-based servers (+16.3%).

- By 2015, Itanium-based servers are unlikely to reach a share of 1% of worldwide server shipments.
- By 2015, x86-based servers will reach a worldwide shipment share of 97.4%.
- In 2009, Sun lost the most revenue and market share of the three major Unix vendors, with a loss of \$1.5 billion in revenue over the prior year and three percentage points in market share.

Besides the market trend data, there are additional arguments of a technical nature to suggest a continued trend toward x86 servers. Nehalem-EX scales four times the memory capacity of the previous-generation 7400 series to 1 TByte (in four-socket servers), which should be enough memory to accommodate most Unix applications. It also scales in cores with eight-socket designs of eight cores and 16 threads, producing the potential of 64 cores. Next-generation aggregation technology (i.e., logically increasing the available memory and cores across blade and other hard boundaries) enables x86 OEMs to scale memory and cores to near-Unix/RISC/Itanium equivalence (1 TByte logical memory configurations are now emerging). Other features, including symmetric multiprocessing (SMP) scalability across blades within a chassis, will continue to enhance x86 blade server functionality and expand their possible workload applicability.

Health monitoring, chip reliability, self-checking logic, error recovery and external high-availability logic were once the province of vendor-designed architectures from HP, IBM and Sun (now Oracle). Those features and designs are now being embedded by the very same vendors in x86, with the help of Intel introducing 20 new RAS features, and AMD with its own machine-check architecture features. Users achieve greater cost economies (perceived as TCO) from running Windows and Linux software stacks on a common server technology (x86), rather than deploying multiple platforms and multiple OSs at more complexity and higher administrative cost (e.g., patching, upgrades, compatibility and maintenance).

But even such x86 “feature-creep” (derived from Intel’s Itanium experience and learning curve) should not be misconstrued to mean no further justification for RISC (or mainframes). For x86 to evolve from its traditional role in horizontal and flat network deployments to a true scale-up host supporting large applications/databases, it must deliver the configurations from the OEMs with large capacity storage, accompanied by HBA scaling, high-bandwidth fiber channels and Ethernet or Infiniband. The proof points will occur when such large outbound capacity can be delivered at price points that don’t “break” compute node pricing economies. That is, OEMs will need to find ways to commoditize the pricing of the input/output (I/O) channels in sync with and at the pace that Intel and AMD commoditize the compute nodes.

With this perspective, will there be a need for expansive high-end server market models and technologies, or will technology improvements and price compression force an inversion and consolidation around fewer RISC/Itanium models supporting Unix?

2.0 Why RISC/Itanium Technologies Will Decline, but Will Represent a Vendor Opportunity

Only three RISC/Itanium technologies have survived in the Unix market. The Unix market has been, and will continue to be, in decline during the rest of this decade, according to our projections. The price points are high, when compared with x86 systems, while the value proposition gap between Unix and x86 systems will continue to diminish. For example, if a Unix server is priced \$100,000 higher than a counterpart in the x86 server class, while the delta in value superiority on the Unix server is valued at say a 25% premium, users must decide if the value difference of \$75,000 more on Unix is justified as risk mitigation. If the value in x86 servers is proved by market experience in scalable and reliable track records, IT organizations will increasingly migrate applications from Unix servers, raise their capacity headroom, upgrade less frequently and retain the servers longer. The effect will be stagnation. And as stagnation settles in, the three competitors will be foraging for scarcer demand and will compete with each other, while x86 takes share from all three of them. The x86 volume demand will force Unix server pricing down.

Because Unix lacks volume economic limitations, vendors will have little room for margin. Resellers will not want to sell fewer servers at low margins. Applications aimed at one or more of the Unixes will be ported to x86. As the applications go, so go the server platforms. The outstanding example is the IBM mainframe’s near-exclusive dominance in its declared market. Since applications and DBMSs are relatively portable among Unix and Linux, ISVs will be a determining factor.

IT organizations will standardize, modernize and streamline their IT infrastructures around fabric-based computing and cloud-based services to benefit from low-cost, elastic scaling on platform standard components. The mission-critical features of Unix RISC/Itanium systems will be adequate and will rival that delivered in traditional non-x86 servers. Applications with extreme performance and scalability demands will continue to keep Unix servers “alive” and in demand, but their demand will wane during 2010 to 2017, capping market spending by IT organizations. HP-Intel, IBM and Oracle-Sun are the three primary vendors with the financial investment strength and human resources to sustain a Unix/RISC/Itanium server platform strategy. However, of the three vendor Unix platforms, two are struggling to generate growth: HP Integrity and Oracle-Sun SPARC.

HP Integrity: HP has such a powerful market position in x86 servers that it hardly has the fear and incentive of combating lost Unix market share. HP will undoubtedly continue to drive sales of Unix-based Integrity platforms, since its large worldwide installed base demands it and the profits justify continued investment. To keep both systems competitive market opportunities, HP has designed in convergence. By offering blade chassis integration to accommodate both x86 and Integrity blades, lower-cost common components on the motherboard and in processor logic designs (e.g., common interfaces, such as QuickPath Interconnect [QPI]), cost and margins are optimized, while providing users investment protection, migration and choice.

However, HP has had a history of product delays (e.g., the Tukwila systems), which have resulted in lagging performance compared with IBM Power. Thus, despite the SPA prediction, we do not forecast the demise of Integrity. However, we believe that, in several years, HP and Intel must deliver application/OS convergence that eases the migration of, or provides a bridge for, HP-UX applications to x86.

HP has managed to grow its Itanium-based server business when viewed from a compound-annual standpoint from 2005 to 2009. The compound annual growth rate (CAGR) for HP’s Itanium-based servers for that period was 16.3% in shipments and 28.4% in vendor revenue, but that has not been at a significant enough rate to offset its decline in RISC servers. If



all HP RISC-based and Itanium-based servers are combined, they actually fell 9.9% in shipments and 7.6% in vendor revenue compounded annually from 2005 through 2009. HP has been shipping Itanium servers on an annual basis at a rate less than half that of IBM's RISC-based servers.

Oracle-Sun SPARC: Prior to Oracle's acquisition of Sun, Sun's RISC-based servers had been on a steady shipment decline since 2004, and a revenue decline since a relatively flat year in 2007. The compound annual shipment decline of Sun's RISC servers from 2005 through 2009 was 17.4%, while the CAGR decline in vendor revenue for those servers for the same period was 9.7%. Although one part of the SPARC technology – Chip Multithreading (CMT-based T systems) – made steady growth since inception, we believe that it, too, will likely run into competition against Intel Nehalem-EX. In addition, Oracle's road map for high-end SPARC remains uncertain until new members and new generations of the M Series are announced (other than interim speed bumps of in-place upgrades). Adding to the uncertainty is the relationship with Fujitsu, the chief designer of the SPARC64 processor technology.

On the positive side, the Solaris SPARC installed base comprises a large worldwide population. If Oracle and Sun engineers collaborate on creating high-performance, integrated systems for Oracle databases and applications, some recovery from the decline should be possible. On the other hand, the Unix/RISC market no longer drives large revenue as it did in the past, so Oracle is battling a headwind to reverse SPARC's negative momentum. In addition, Oracle has signaled its intention to continue delivering x86-based cluster solutions with Oracle Enterprise Linux, as exemplified by the Sun Oracle Database Machine. The combined positioning of M, CMT, x86-based Exadata and Solaris on blades, and x86 as future application-to-disk appliances would need to be coherent and clearly show the benefits of future SPARC generations to a broad spectrum of applications beyond Oracle's. As with HP, we do not anticipate Oracle abandoning the market in RISC technology. However, Gartner believes that Oracle will be challenged to retain the loyalty of the Sun installed base during a period of IT consolidation and aggressive competitive migration programs aimed at the Sun installed base by IBM and HP.