

System z10™ vs. HP Integrity, No Contest

About this Executive Summary

This Executive Summary abridges our in-depth, 78-page White Paper of the same title above, also published in June 2009. Since Q4 2008, Hewlett-Packard (HP) ramped up its attacks upon IBM's (System z10™) mainframe, pushing out press releases, critical Web page claims, and hostile comparisons, etc. These claimed that HP Integrity servers, using Intel® Itanium® processors, were cheaper enterprise platforms that had won many customers away from IBM mainframes:

- *Was this the same HP that cast adrift tens of thousands of its loyal server customers when it killed off four longstanding HP business-enterprise server/Microprocessor Unit (MPU) architecture families this decade?*
- *Were HP talking about the same IBM System z10™ mainframe that went from market strength to market strength, more than doubling its high-end server market share to 37% from 2000-2008?*
- *Is that the same Intel® Itanium® MPU powering these HP Integrity enterprise servers recently described by a leading IT commentator with the words: "This continues to be one of the great fiascos of the last 50 years."*

HP was successful over recent years in other markets, holding share leadership in PCs and notebooks, printers and imaging, and Industry Standard Servers (ISS); three major, high-volume, standard products-focused, and price-driven IT segments. But far less so in enterprise systems!

So what is afoot here? Why such HP noise about Integrity servers? Why such HP disrespect for, and denigration of, IBM's resurgent, burgeoning System z10™ mainframe?

Mainframe/enterprise system analyst Software Strategies untangles this battle, assesses HP's claims, and shows why IBM's System z10™ mainframes have won market share, added new customer sites, grabbed new workloads, and multiplied installed capacity many-fold; all to HP's considerable detriment.

1. Aggressive HP Attacks IBM Mainframes, Promotes Integrity Servers

1.01 New IBM Mainframe Attacks From HP: From Q4 2008, Hewlett-Packard cranked up new, somewhat desperate, **HP Integrity**-platform-based attacks on IBM's highly-successful System z10™ mainframes. HP Integrity servers are all powered by "**lagging-edge**" Intel® Itanium® Microprocessor Units, the source of many of their woes.

...mainframe attacks followed the disreputable pattern of earlier HP assaults.

1.02 Same Old HP Anti-mainframe Rubbish: These HP mainframe attacks followed the disreputable pattern of earlier HP assaults. Using **outmoded mainframe myths, dubious comparisons, partial data, unsupported assertions**, and skating over deep platform differences, HP's attacks used **Fear, Uncertainty, and Doubt (FUD)** not hard fact, and **marketing hype** not proper analysis. Unusually, a riled IBM publicly refuted every HP claim strongly/specifically.

1.03 IBM Bags 5,000 HP, Sun, & EMC Customers: IBM then revealed that it had won/migrated 5,000+ customers onto IBM Systems/Storage platforms, from HP, Sun, and EMC systems combined, since 2004; striking proof of IBM enterprise platforms strength, and far outweighing HP's win claims.

Notes:

*The < symbol is used in this Executive Summary to concisely denote "up to".
The ~ symbol is used to denote "about" or "approximately".*

Section headings in this Executive Summary follow those of the main White Paper.



HP Integrity vs. IBM System z10™ Mainframe

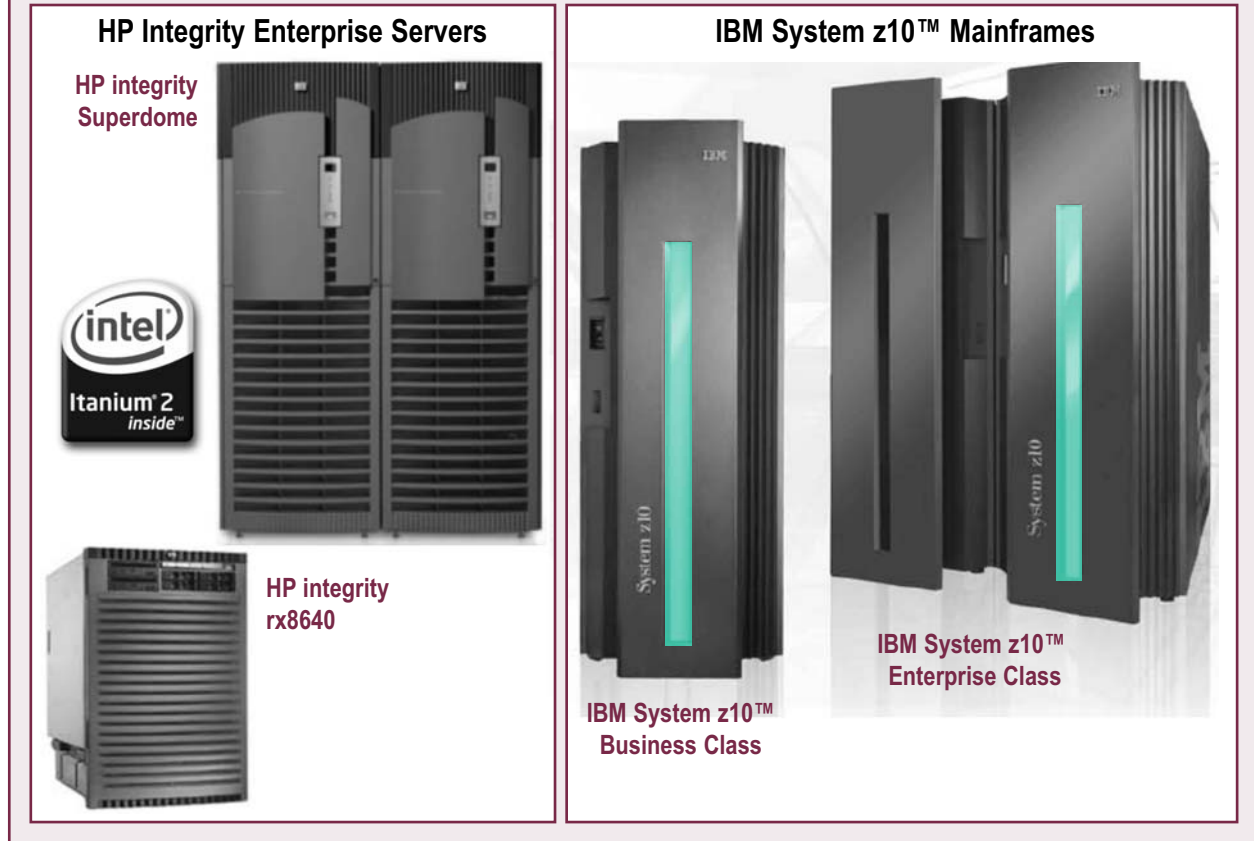


Figure 1: HP Integrity vs. IBM System z10™ Mainframe

1.04 \$10B 2000-09 IBM Research and Development (R&D) Spend Extends System z Lead: Intense, fast-paced, deep IBM innovation/development (at ~\$10B cost) dramatically advanced 64-bit System z mainframe hardware/software via five on-time new generations this decade, far outrunning competing HP/UNIX vendors' advances. Today's System z10™ Enterprise Class (z10™ EC) mainframes stand three+ generations, and 5- to 6-years ahead of HP Integrity (and similar UNIX) systems on most attributes, our study found.

1.05 Why HP-IBM War of Words Went Wild: What sparked these strong, renewed hostilities between these two IT titans? Why does HP now pitch Integrity against IBM System z mainframes, and not against its direct UNIX competitors (IBM, Sun, and Fujitsu)? The four main reasons are:

- **IBM Pummeled HP UNIX Share:** IBM's Power Systems™ RISC-UNIX servers smashed HP Integrity (& Sun) shares, grabbing 37.2% of 2008 UNIX server revenue, far ahead of trailing third-placed HP on 26.5%. IBM gained 11.2% UNIX share points, whilst HP lost 5.7%, over the last five years!

- **System z™ Doubles Share This Decade:** \$10B of IBM innovation powered resurgent System z™ mainframe success, more than doubling its >\$250K enterprise server revenue share from 17% (2000) to 37% (2008) (Gartner). Installed capacity also soared dramatically by ~8-fold, to top 14,300,000 Millions of Instructions Per Second (MIPS) (1997 to end-2008).

...System z™ more than doubling its >\$250K enterprise server revenue share from 17% (2000) to 37% (2008)...

- **IBM Dominates Enterprise Servers:** IBM's two winning system lines combined gave IBM a dominant, 50%+ enterprise server revenue share (2008), even topping 57.5% in Q3 2008, rising whilst HP's share declined.
- **HP Faces IBM, New Competition, in Fading Niche:** IBM's dreadnaught duo, soon the stronger Oracle/Sun combo, plus network giant Cisco Systems' server market entry, all deeply threaten HP Integrity's fading server share, as its easy HP legacy Reduced Instruction Set Computer (RISC) box replacement sales end.

Hobbled by repeated Itanium® delays/issues, HP Integrity was roundly beaten by IBM's dreadnaught duo this decade, with its outlook now yet darker. Early HP/Intel dreams of Itanium® victory in workstations, in High Performance Computing (HPC), and in standard servers/x86 replacement, all turned to dust as x64 MPUs soared. Today, HP Integrity's last niche is in mainframe/RISC attack, head on against IBM. Little hope ahead, we found!

...Q2 2009 BCS revenue collapsed 29%, with HP Integrity down 18%...

1.06 HP Business-Critical Systems (BCS) Fade, Condition Critical: With only 2.99% of 2008 Financial Year (FY) HP revenue, BCS (*enterprise systems*) ranked a distant sixth amongst HP segments, down over 40% from 5.25% in 2003. Latest Q2 2009 BCS revenue collapsed 29%, with HP Integrity down 18%, both Year-to-Year (YTY). So this fading enterprise systems business is far from central or critical to the firm today, an uncomfortable reality for its customers, given point 1.09 below.

1.07 HP Commodity Products, Consumer Focus: HP leads in standard volume products for consumers, including PCs, laptops, printers, imaging and ink, plus in industry-standard servers for business. These (*and Services*) now dominate HP's revenues and mindshare. By contrast, IBM's huge 2000-2008 self-funded capital investments/acquisitions (\$60B) and R&D (\$50B) were all focused solely on business/enterprise customer needs and high-margin lines.

1.08 IBM R&D Far Outranks HPs: Enterprise systems need continuous innovation/development for fast-evolving user needs and continued technology advances. The last six years IBM R&D spend totaled \$36.6B – 6.24% of revenue and held level. Now under half IBM's rate, HP's same period R&D spend was \$21.4B – 3.87% of revenue, down 40% to 2.99% in 2008, the lion's share for volume/consumer lines. In US patents, IBM was again # 1 with 3,148, more than double 10th-placed HP's 1,470.

This betrayed thousands of HP server customers, by inflicting mass destruction on their platform-linked investments.

1.09 HP Dropped 4 Legacy Platforms, Cut Costs: New Itanium®-based, 2003-on HP Integrity (& 2005-on HP Integrity NonStop) lines let HP phase-out its four legacy platforms/RISC MPUs since then. These were the **HP e3000** (PA RISC-MPE/XL), **HP AlphaServer**

(Alpha RISC-Tru64 UNIX & OpenVMS), **HP 9000** (PA-RISC-HP-UX), and **HP NonStop S** (MIPS RISC-NonStop Operating System (OS)), all now past End Of Sale (EOS). HP then dropped chip-building and MPU design, and sharply reduced BCS enterprise server and operating software teams/costs. This betrayed thousands of HP server customers, by inflicting mass destruction on their platform-linked investments.

1.10 Many Betrayed Users Jumped HP Ship: Integrity replacements suffered many Itanium® MPU snafus and delays (*see Section 2 below*), performed uncompetitively, and offered little tuned software for years, so their adoption ran far below HP hopes. **HP e3000** (MPE/IX OS), and **HP AlphaServer** (Tru64 UNIX) users faced worst migrations when HP killed those OS, forcing disruptive cross-MPU/cross-OS/cross-system line moves. Even the less dire **HP 9000** and **NonStop S** migrations to the two Integrity lines were still difficult. Many unhappy HP BCS customers chose to jump ship, most to IBM, rather than follow disruptive, complex and costly HP-advised migration paths onto often uncompetitive Integrity systems.

2. Intel & HP's EPIC Bid for Enterprise MPU Lead – The Itanium® Story

2.01 Itanium®-HP/Intel's MPU Glory Bid: From 1994, HP and Intel teamed to create a new, full-64-bit MPU family using HP's Explicitly Parallel Instruction Computing (EPIC) model, later named Itanium®. With **unbridled marketing hype**, the duo bragged that their wonder-chips would replace existing Complex Instruction Set Computer (CISC) and RISC MPUs to conquer every IT segment. With this deep-pocketed, dynamic duo driving development, **how could Itanium® fail?**

2.02 All Aboard the Good Ship Itanic: Awed by this miracle, other top system vendors (*IBM, Dell, Unisys, Fujitsu, NEC, and SGI*), leading OS producers, analysts, media, and researchers, all piled aboard the HP/Intel-steered Itanium® ship. Convinced by the dynamic duo's dominance-theme rhetoric, all expected a smooth, successful voyage to a nirvana and safe harbor. **But wags tagged the ship 'Itanic', and dubbed their voyage Titanic!**

...Itanium® soon became an IT industry legend for the dynamic duo's way-overblown promises, for fantastic IDC market forecasts, for unfilled market dominance hopes...

2.03 EPIC Itanic Voyage Dream Founders: Alas, instead Itanium® soon became an IT industry legend for the dynamic duo's way-overblown promises, for fantastic

IDC market forecasts, for unfilled market dominance hopes, for repeated years-long MPU generation delays on, and for, consistent performance/functionality under-delivery vs. competing MPUs.

2.04 6 Itanium Generations Each Years Late, Far Short:

Six Itanium® MPU generations shipped from 2001 to date, each arriving <3 years late and with performances/capabilities lagging main (*IBM POWER RISC*) and price/performance (*x64*) competing MPUs. The latest three – Madison, Montecito, and Montvale – powered all HP Integrity (*from 2003*) and Integrity NonStop (*from 2005*) servers, and are the main cause of HP's enterprise server shares decline per 1.05 above.

Software scarcity slashed Itanium® uptake for its first 4 to 5 years.

2.05 Software Dearth, Slowness Stalled Itanium®

Advance: Software scarcity slashed Itanium® uptake for its first 4 to 5 years. The wealth of IA-32 software ran on Itanium® (*under initial IA-32 hardware, and later software emulation, support*), but with performance far worse than on x64. Applications needed rewrites, optimization, and recompilation to perform well on the wonder-chip. With tiny early-year chip/server sales, it was years before Itanium® ports made business sense for ISVs. Only by ~2007 could Itanium® servers boast a substantial Independent Software Vendor (*ISV*) software portfolio, whose size is still controversial today.

2.06 Antique Front-Side Bus Interconnect Throttled MPU:

Performance of the first six Itanium® generations was bottlenecked by their low-bandwidth Itanium® Bus interconnect. From 2001, top server MPU competitors (*e.g. IBM POWER, later AMD Opteron*) used far higher-bandwidth MPU interconnect designs. Only on the next-generation Tukwila MC (*see below*) will Intel finally add its QuickPath Interconnect (*QPI*) Links, belatedly removing this killer Itanium® constraint.

...delayed 6 months more until late Q1 2010 to "improve scalability", another blow to Itanium® futures/HP.

2.07 Next Tukwila MC Delayed Again: The next and seventh-generation Itanium®, Tukwila MC, was first due end-2006. It has just (*May 2009*) been delayed 6 months more until late Q1 2010 to "improve scalability", another blow to Itanium® futures/HP. The huge 2,050M transistor part is the first Itanium® quad-core MPU, and retains Intel® MT dual threading, for 8 threads/MPU.

- **Modest Hike in Frequency:** Top parts are to run <2.0GHz. in a hot 170W Thermal Design Power (*TDP*) footprint: lower-end MPUs from 1.2GHz. within 130W TDP. Prior top Itanium® chips ran at 1.66GHz., but competing IBM MPUs have topped 5.0GHz. since 2007!
- **Aged 65 n.m. Process:** Whilst competing server MPUs are all built on newer 45 n.m High-K Metal Gate processes, Tukwila MC again lags a process generation behind, using Intel's aged (*but at least well proven*) 65 n.m. fabrication process.
- **Adds Intel QPI Interconnect:** At last, Intel® QPI Links interconnect (*4-full+2-half wide ports*) with much higher <96GBps links bandwidth, are used. Dual on-die integrated memory controllers hike memory bandwidth to <34GBps and up three-fold; both major improvements.
- **Two-fold Montvale Performance:** Intel claims low-end parts will have "2X the performance" of top-end Montvale 1.66GHz. parts in an only 25% higher power footprint.

...far-outclassed by IBM's upcoming POWER7, the next System "z11" MPU, and by Intel's own Xeon® Nehalem-EX...

Had it appeared when first due three years ago, today's Tukwila MC would have been competitive. Now, when it debuts at end Q1 2010, **our assessments found it will be far-outclassed** by IBM's upcoming POWER7, the next System "z11" MPU, and by Intel's own Xeon® Nehalem-EX now due out a quarter ahead.

2.08 Itanium® Findings Summary: Embarrassing two technology titans, Itanium® far under-ran their stratospheric 1994 world domination aims/claims. HP enterprise systems suffered market share losses and reputation damage, and Intel lost high-end MPU credibility as a result. Our other Itanium® findings today were:

- **An HP Proprietary MPU:** HP sold 95% of all 2008 Itanium® servers. The chip is thus now an HP-proprietary part, near-exclusively custom-made for HP by Intel, mainly sold to replace HP legacy RISC systems in a migration soon to end. Far from the "industry-standard MPU" HP/Intel long-claimed!
- **A Very Low-volume MPU:** Itanium® MPU volumes are tiny, at (*we estimate*) just ~275,000 units (*2008*), and ~825,000 units to date (*2001-2008*) shipped over 6 chip generations. This is magnitudes below the many 10Ms of Intel/AMD x64 MPUs that power <8M Industry Standard Servers (*ISS*) servers, and scores of M PC/workstations, sold yearly. **No Intel-economics for Itanium®!**

- **Top System Vendors Abandon Ship:** Important tier 1 Original Equipment Manufacturers (OEMs) IBM and Dell (2005), and Unisys (2009), all abandoned Itanium®, writing off investments in terminal disillusion. A dwindling few second- or third-tier OEMs combined sold just 5% of Itanium® systems in 2008, but most focused more on their other platforms.
- **Duo's Big-buck Losses:** Intel's \$5B total Itanium® spend and \$1.35B revenues mean a \$3.65B loss to end-2008 (*our estimates*), with HP's Itanium®-related costs/losses also doubtless into \$Bs, both surely irrecoverable sunk investment losses. Both long-avoided disclosing true figures, but we understand that current-year revenue profitability, Intel from 2008, and HP one or two years earlier, have been achieved (*excluding sunk losses*).
- **Itanium® Future Bleak – Outclassed Again:** Next-generation competing IBM (*POWER7 and System “z11”*), Oracle/Sun/Fujitsu (*SPARC64 VIIIfx*), and next Intel Xeon® (*Nehalem-EX*)-based high-end server MPUs will each strongly trump the performance of the next-generation Itanium® Tukwila MC – as mentioned, just delayed by another six months to Q1 2010.
- **Itanium® End Of Life (EOL) News by Early-2013:** An IBM executive has publicly forecast Itanium® EOL announcement/HP transition before 2013, based on the MPU's unsustainable economics. We rate this as highly-likely, near-certain if Poulson (*eighth generation*) again fails to best competitor performance, or is again too long-delayed.

Overall, not a pretty MPU track-record, nor future outlook picture.

3. The HP Integrity Server Family in Review

3.01 HP Integrity Family Introduced: Powered by Intel® Itanium® MPUs, Integrity became HP's mainstream enterprise server line from June 2003, on a slow transition from its long-standing main **HP 9000 (HP PA-RISC MPU-based)** UNIX, and other HP legacy, platforms.

HP Integrity servers were near-indistinguishable from HP 9000 PA-RISC-MPU-powered equivalents...

3.02 Like HP 9000 Equivalents, Plus 3 OS: HP Integrity servers were near-indistinguishable from HP 9000 PA-RISC-MPU-powered equivalents (*MPU & software differences apart*), as HP wisely engineered common server hardware and HP chipsets for both. This eased

customer PA-RISC to Itanium® MPU transitions, and cut HP's development costs. **HP-UX**, ported to Itanium®, became the main Integrity OS, but **Linux, Windows for Itanium-based Systems**, and **OpenVMS**, were also added on these new servers. HP 9000s remained popular until their December-2008 EOS.

3.03 HP Dominant Itanium® OEM: Persisting with the wonder-chip, HP today now completely dominates Itanium® MPU-powered system sales with its (*two different*) HP Integrity lines. **Gartner reported HP shipped 95% of all Itanium® server sales in 2008**, NEC 3%, and Fujitsu, SGI, and Hitachi under 1% each.

3.04 HP Integrity Servers: The Q2 2009's current (*third full*) HP Integrity generation, all powered by Intel® Itanium® 9100 Series (*Montvale*) MPUs, family line-up consists of:

- **High-end Servers:** HP Integrity Superdome systems top the line, supporting <64 sockets, <128 cores, <256 threads, using HP's sx2000 chipset, using <16 cell-board construction. One is pictured in Figure 1 on page 2.
- **Mid-range Servers:** Mid-range HP Integrity servers are the **rx7640** and the **rx8640** (*also shown in Figure 1*) rack servers (*10U and 17U*), offering <8 and <16 sockets/<16 and <32 cores respectively, using the HP sx2000 chipset and <4 cell-boards.
- **Low-end Servers:** Most rack-mounted, the **rx2660**, **rx3600**, and **rx6600** models (*2U, 4U, and 7U*), support <2 sockets/<4 cores DP, <2 socket/<4 cores MP, and <4 sockets/<8 cores respectively, use the HP zx2 server chipset, and HP main-board construction.
- **Blade Servers:** Also now offered are **HP Integrity bl860c** (<2 socket) and **bl870c** (<4 socket) Itanium®-MPU-powered blade servers fitting into a HP BladeSystem “c”-class chassis.

3.05 Competition IBM+: HP Superdome competes with IBM Power Systems™ 570/595 POWER6/6+ RISC-UNIX systems, and with IBM System z10™ EC mainframes (*also with Sun, Fujitsu, HP Integrity NonStop, and big scale-up x64 systems*). Mid-range HP Integrity **rx7640** and **rx8640** compete with IBM Power Systems™ 560 POWER6+-systems, IBM System z10™ BC mainframes (*also with Sun, Fujitsu, HP ProLiant, and mid-range x64 systems*).

3.06 HP Chipsets Powered: HP built two generations (*to date*) of low-end (**zx1 & zx2**) and mid-high-end (**sx1000 & sx2000**) scalable chipsets that enabled all Integrity, and HP 9000, servers (& *now-dead workstations*). New chipsets are needed for the next Tukwila MC MPU's new QPI Links interconnect, new socket, etc. HP must build its own, new, mid-high-end chipset, but will likely adopt the Intel-standard Boxboro MC I/O chipset for <8-socket HP Integrity servers, now expected out ~Q2 2010.

3.07 Integrity OS Choice: These HP servers support four OS/operating environment families:

- **HP-UX:** Ported to Itanium® for HP Integrity, far the most widely-used and most important OS. HP-UX today is a robust enterprise UNIX, supporting Intel® Itanium® MPU and Integrity hardware-specific features. But developments lagged competitors' pace over this decade.
- **Linux:** Provides the main modern OS alternative, with Red Hat and Novell SUSE enterprise distributions, but with reportedly lower performance than longer-tuned HP-UX.
- **OpenVMS:** Commendably, HP ported (*and still supports*) Open VMS on HP Integrity, providing a migration path for HP AlphaServer OpenVMS users.
- **Windows Server 2008 for Itanium-based Systems:** Microsoft still offers this specialized, three-niche-roles-only, high-end Windows OS.

However, most enterprises needing new Windows or Linux platforms today select x64-MPU-based hardware for its better price/performance, for more mainstream OS versions, and for their much wider applications choice.

3.08 Consistently Outperformed by IBM: Most HP 9000/HP Integrity servers, at most times from 2001 to Q2 2009, delivered performance far below the leaders on most UNIX workload tests, because of Itanium® delays/shortcomings per Section 2 above. IBM's POWER4 to POWER6+ MPU-based RISC-UNIX servers – this period's absolute UNIX market performance leaders – consistently outperformed the HP systems, which also lagged some other MPU-based systems (*e.g. UltraSPARC, SPARC64, x64*), gravely handicapping HP in a performance-dominated UNIX market.

- **Current HP Integrity (Montvale) Generation Weak:** The current HP Integrity generation were especially weak performers since their late-2007 debut, far outgunned by:

IBM POWER6/6+-MPU-based Power Systems™
hold 70+ absolute performance benchmarks...

- **IBM POWER6/6+-MPU-based Power Systems™:** These systems hold 70+ absolute performance benchmarks for many UNIX workloads over many system sizes, most posting 2-3X higher per core performance than HP Integrity, see below:
- **Performance per processor/core:** Today's most important server/MPU performance metric, because software stack costs (*mostly core-based*) are usually 2-4X hardware costs, and thus have huge Total Cost of Ownership (TCO) impact. Superfast <5GHz. POWER6/6+ MPUs have dominated this metric since 2007, but System z10™ MPUs were also strong.

...these claims are exaggerated (by 65-70%), the ISA double/triple counting for each OS versions/releases of each real application.

3.09 ISV Software Support Much-exaggerated: Lack of ISV software on/optimized for Itanium® drastically gated server sales for their first five years. Today, the Itanium Solution Alliance (ISA)/HP claim that 13,000-14,000 Itanium® applications are available. But these claims are exaggerated (*by 65-70%*), the ISA double/triple counting for each OS versions/releases of each real application. ~8,000 applications for all OS, and ~3,000 for HP-UX, are our realistic Itanium® numbers. These are far lower than on IBM, Sun UNIX, and on x64, platforms each with >15,000 applications. Integrity buyers beware!

3.10 Decent System-level Management: HP provides integrated server management tools tagged “**HP Integrity Essentials**”, for HP 9000/HP Integrity hardware and the latter's 4 OS. Management facilities offered vary by OS, HP-UX offering most. The unified **HP System Insight Manager (HP SIM)** core offering is liked, and also supports HP ProLiant x64 systems. This decent real and virtual server-level management software also integrates HP Business Process Optimization (BPO), IBM Tivoli, CA, etc., enterprise management.

3.11 HP Software, Some Integrity Value-add: With \$3.039B 2008 FY software revenue (2.56%), HP is a mid-range ISV, far behind global leaders Microsoft, IBM, Oracle, and SAP, etc., who relies on major ISVs to provide middleware/tools (*like databases, application servers, Service-Oriented Architecture (SOA), Enterprise Resource Planning (ERP), etc.*) for its Integrity customers. HP's main BPO software line grew from its enterprise management tools plus acquisitions, complementing its system-level tools above. However, IBM offers far broader, stronger IBM software stacks, each optimized for IBM System z and IBM Power Systems™ enterprise platforms.

HP Integrity revenue fell sharply by 18% YTY for the latest Q2 2009 quarter!

3.12 Next-generation HP Integrity Delayed Until Q2 2010: The next Tukwila MC Itanium® MPU (*with new socket and Boxboro MC chipset*), just hit a further six-month delay until Q1 2010, delaying HP's next Integrity generation to ~Q2 2010, a further severe blow to the dynamic HP-Intel duo. We assess that their advance will be far from enough to make them competitive with their 2010 enterprise server opposition – see Sections 5 & 6 below. Enterprises considering HP Integrity purchases in 2009 should now reconsider their options/alternatives. HP Integrity revenue fell sharply by 18% YTY for the latest Q2 2009 quarter!

3.13 Discount “Mainframe-like” Claims: HP, abetted by Intel, play the disreputable old UNIX game. It simultaneously assaults IBM mainframes as outmoded legacy, whilst frantically copying their “gold standard enterprise platform” features, functions, Qualities of Service (QoS), and TCO, etc., the duo rightly recognizing System z as a principal (*and winning*) competitor. In reality, HP Integrity high-end systems offer only weak subsets of mainframe capabilities, lagging 3+ generations and 5-7 years behind today’s System z10®.

3.14 HP Integrity Conclusions: Our other platform conclusions are summarized below:

- **Broad Server Family:** HP’s Integrity offers a wide capacity/power/price points span, from a 1-core blade server to a 64-MPU/128-core Integrity Superdome enterprise server, with four OS families supported.
- **Familiar, Simple Hardware Designs:** The line uses simple design/construction similar to its HP 9000 siblings, with reasonable robustness appropriate to roles, and with blade servers the main recent innovation.
- **MPU Constraints Limit System Architecture:** Using “lowest-common-denominator” Intel® Itanium® MPUs precluded HP from advanced MPU-system-firmware-software packaging/optimization like that IBM used to such strong advantage on both its enterprise server lines.
- **x64 Decimates Low-end/Blade Prospects:** Integrity low-end/blade servers were severely undermined by the wide success of Intel/AMD x64 MPU servers. Only for HP-UX and OpenVMS work, and/or Itanium® development roles, are low-end Integrity servers now chosen.
- **High-end Now Integrity Battleground:** The line must thus now fight mainly in the mid-range/high-end, but here entrenched IBM Power Systems™ and System z10™ mainframes dominate, and Sun/Fujitsu compete head-on.
- **Integrity Dominates BCS \$, Falling:** After a tough 6-year haul, Integrity now dominates BCS revenue at \$2,795M for the last FY 2008 (79% of BCS). In Q2 2009 FY, BCS revenue fell 29% and Integrity fell 18% (*both YTY*), but Integrity first topped 90% (*our estimate*) of BCS.
- **Itanium® Snafus Injured HP:** HP lost enterprise server share, took reputation hits, and incurred large costs, from the many Itanium® delays, course changes, under-performance, and software shortages per Section 2 above.

- **ProLiant 8-Socket Limit Nonsense:** Only HP’s limit, of holding ProLiant x64 servers to <8-sockets, keeps HP Integrity/Itanium® alive. Other top enterprise system vendors long showed that limit to be technical nonsense, with their successful, x64 scale-up Symmetric Multiprocessing (SMP) systems of <32 sockets.

- **Next Xeon® EX Game-changer:** The next Intel® Xeon® Nehalem-EX-MPU-based generation of such x64 systems (*from IBM, NEC, and Unisys*) will ship from Q1 2010, and promise huge performance advances that will make them fearsome Integrity large-system competitors.

- **Tougher Times Ahead:** HP faces much tougher Integrity times over the next 2- to 3-years, as legacy HP box replacement ends, with the recession, and for the reasons above. Tukwila MC-powered versions will enjoy an order backlog burst, and a performance hike in 2010, but face even-tougher new competition from a formidably renewed IBM dreadnaught duo, plus x64, Oracle/Sun, and Cisco, alternatives. Further HP share falls seem certain.

- **Cut Deadly Itanic Embrace:** HP could still escape its Itanic woes by replacing Integrity with new HP scale-up x64-MPU (*Nehalem-EX*)-based systems, including >8 sockets, and by porting HP-UX onto that platform, as it will have to do when Intel cancels Itanium®. Detailed transition plans are needed, but huge advantages would accrue to HP and Intel!

- **Investments High Customer Risk:** From the factors above, enterprises making further Itanium®-based HP Integrity investments are clearly taking high strategic risks by extending this uncompetitive, HP-proprietary platform of uncertain future.

...more than doubling their high-end enterprise server market revenue share from 17% to 37% 2000-2008...

4. IBM System z10™ Mainframe Again Leads Enterprise Computing

4.01 Huge System z Success This Decade: The 2000 decade saw dramatic turnarounds in fortune, industry repute, revenue share, and technology leadership of IBM System z™ mainframes, **more than doubling their high-end enterprise server market revenue share from 17% to 37% 2000-2008 (>\$250K servers-Gartner).**

...delivered five new System z™ generations since 2000, at a blistering pace...

4.02 IBM's ~\$10B Investment, Transformation: IBM's ~\$10B R&D investment delivered five new System z™ generations since 2000, at a blistering pace of technology, software, and economic advance that no competing platform matched. Continued innovation in advanced MPUs, system packaging/architecture, virtualization, Reliability, Availability, and Serviceability (RAS) and security technologies, soaring capacity/performance, extending best service qualities, specialty processor engines, unique new software, and radical price drops, all powered IBM System z™ ahead.

4.03 New Workloads & Roles Drove Growth: Burgeoning new-to-mainframe workloads – Linux applications, infrastructure and consolidation, Java Enterprise Edition™ (JEE™)-based SOA and Web 2.0 applications, ERP/Customer Relationship Management (CRM) applications, enterprise data-serving, and Business Intelligence/Enterprise Performance Management (BI/EPM) – fuelled this growth. New enterprise hub roles of distributed server consolidation, enterprise security and IT service management, and Disaster Recovery/Business Continuity (DR/BC) also burgeoned.

...with global installed capacity soaring ~8-fold from 1997 to top 14,300,000 MIPS at end-2008...

4.04 New Capacity, New Customers, and New Markets Successes: Most existing Western IT markets customers sharply expanded their mainframes, with global installed capacity soaring ~8-fold from 1997 to top 14,300,000 MIPS at end-2008. Around 500 new customers also adopted System z™ this decade, with many such all-new footprints in Brazil, Russia, India, and China, and similar emerging high-growth markets.

4.05 2008's System z10™ – Stellar Performance Gains: System z10™ Enterprise Class (z10™ EC) high-end <64-way SMP mainframes, powered by the impressive **IBM z10™ quad-core, ultra-high-frequency (4.4GHz.)**, high chip bandwidth (240GB/s) MPU, arrived in February 2008, with the largest mainframe MPU performance jump in 45 years. With 1.7X the system capacity, 2.0X the processor performance, 3X the memory support, and 2.2X the I/O capacity (*all vs. the z9 EC*), the z10™ EC added outstanding performance on processor-intensive commercial tasks, complementing traditional fortes in transaction, I/O, and data-intensive workloads, with 35% improved price/performance, in a 5-model line-up priced from \$1M up.

4.06 System z10™ Business Class (z10 BC): In October 2008, IBM debuted the entry-mid-range **System z10™ BC**, sharply-priced (\$92,000 US up) to offer near-all z10™ EC goodness in smaller sizes, with 130 capacity setting on one model. With <4 3.5GHz. z10 tri-active-core MPUs, the z10 BC ran the new and old workloads/roles above with the same high QoS. The z10 BC rated ~40% faster, had 50%+ more capacity, and could support ~4X maximum memory, than its z9 BC predecessor.

4.07 Thriving System z ISV Software Ecosystem: System z's ISV ecosystem strongly expanded up to today's healthy, 1,400+ ISV-firm community, collectively now offering **5,000+ ISV System z software applications/tools**, with 1,000 new offerings added in 2008 alone. These, with IBM's own now-extensive, leadership-class System z middleware/tools software portfolio, now offer System z customers a rich choice of modern software.

4.08 Strong System z10™ Feature Set: System z10™ mainframes were thus a tour de force, offering major capacity, performance, software, and economics advances in most dimensions, unquestionably retaining their crown as most sophisticated and powerful IT platform for medium-large mixed enterprise business workloads. Special highlights included:

- **Exceptional z10 MPU Compute Performance:** Leveraging shared DNA, component units, and processes, from its blisteringly-fast, close sibling, but very different, IBM POWER6 MPU.

Fastest CISC MPU Ever, with clock frequency up to a staggering <4.4GHz.

- **Fastest CISC MPU Ever:** With clock frequency up to a staggering <4.4GHz., the z10 MPU was the fastest **Complex Instruction Set Computer** MPU yet built.
- **"Extreme-CISC" Instruction Set Architecture (ISA):** The z10 MPU uses a rich, extended 894-instruction z/Architecture ISA (*50+ new, 668 instructions implemented all in hardware*), runs the functions below, preserves compatibility, and dramatically hikes performance.
- **More On-chip Processing:** With this huge ISA, the z10 MPU runs top z virtualization, the most extensive chip RAS, advanced cryptographic, data compression, and new Decimal Floating Point, operations on-die at magnitudes higher performance than other MPUs can run these tasks in slow software.

The System z10 MPU sports a massive 240GB/s total chip bandwidth...

- **Massive MPU Bandwidth:** The System z10 MPU sports a massive 240GB/s total chip bandwidth, a major system performance driver, 22.6X that of the top Itanium® 9100 Series MPU.
- **High Single-system Scalability/Capacity:** From ~26 MIPS up to 64-CP SMP, >30,000 MIPS single-system.
- **Enhanced, World-class IBM z Middleware, Tools Software:** Foundation System z software subsystems, including DB2 for z/OS®, CICS, IMS, WebSphere MQ, z/OS®, and z/VM, and extensive related new IBM tooling, advanced at unprecedented rates in recent years.
- **Far Lowest TCO for Large, Mixed Commercial Workloads:** Sharply cuts transaction costs, slashes energy use, and eliminates data center sprawl/complexity, for lowest TCO on such workload mixes.
- **z10 Family a \$3.5B IBM Investment:** IBM used <12,000 staff for <5 years, directly investing ~\$3.5B to create the current System z10™ generation, 43% spent on hardware and 57% on direct software, underlining its huge platform commitment.

4.09 Five OS Offered: IBM offers five OS families on System z, four IBM developed/supported, the fifth Linux in two enterprise flavors.

- **z/OS®:** IBM's rock-solid, industrial-strength, secure, **flagship production OS for System z**, rapidly advanced over 10 substantial and innovation-packed releases this decade, with V1.11 due September 2009.
- **Linux on System z:** Both Red Hat Enterprise Linux V5 and Novell SUSE Linux Enterprise Server V10.1 distributions strongly supported by vendors and by IGS. System z Integrated Facility for Linux (*IFL*) specialty engines slash z Linux costs.
- **z/VM:** Famous IBM z/VM "extreme hypervisor" OS runs 100s to 1000s of Linux virtual servers on one System z, also runs other System z OS such as z/OS (*for development, test, etc.*).
- **TPT & z/TPF:** Lean, efficient OS maximizes System z hardware usage for fast, secure, very-high-volume Transaction Processing for banks, airlines, hotel chains, etc.
- **z/VSE:** Robust, cost-effective, four decades VSE-heritage OS platform, supports needs of today's VSE customer in most industries across a range of capacities, exploiting select z hardware features.

Sine Nomine Associates is also developing an **OpenSolaris for System z distribution** running under z/VM that can exploit IFLs. Mantissa Corporation has also previewed z/VOS that it claims will run Windows over z/VM!

System z10™/z11™ heavily exploits heterogeneous processors and hybrid processing...

4.10 Extensive Hybrid Processing Support: System z10™/z11™ heavily exploits heterogeneous processors and hybrid processing, blending multiple processing resources for better performance, I/O throughput, and economics, under one programming model on this unified host. Aspects of this include:

- **More On-die Hardware Support:** The rich System z10™/z11™ ISA has extensive, on-die support for virtualization, extensive RAS, advanced cryptographic, data compression, and Decimal Floating Point (*money-math*) hardware operations, far faster than usual software implementations.
- **General-purpose Central Processors (CPs):** Powerful general-purpose System z™ CP cores, run all workloads. (*<64 CP on z10™ EC*).
- **On-board Specialty Engines:** 4 specialty engines for economical target workloads processing. Hugely successful, with 93% Compound Annual Growth Rate unit sales growth yearly thru 2003-2008. These are:
 - **IFL:** Integrated Facility for Linux specialty processor for all z Linux workloads. All-IFL System z10™ mainframes for exclusively-Linux workloads can be ordered.
 - **ICF:** Integrated Coupling Facility specialty processor for z/OS® Parallel Sysplex® cluster coupling workloads. Ditto all-ICF systems.
 - **System z Application Assist Processor (zAAP):** Specialty processor for Java & eXtensible Markup Language (*XML*) workloads, e.g. SOA.
 - **System z Integrated Information Processor (zIIP):** Specialty processor for select DB2 data-serving, data warehousing, BI, and ERP workloads.
- **On-board Dedicated Processors:** System z™ also exploits on-board dedicated-function processors:
 - **System Assist Processors (SAPs):** Standard z cores dedicated to I/O, etc. processing, <11 SAPs standard per z10 system.
 - **Spare Processor Units (PUs):** Standard z cores (*2/system*) reserved as spares for any other PU cores failing in service.

- **CryptoExpress 2 Cards:** Tightly-coupled, integrated cryptographic co-processing, and/or Secure Sockets Layer accelerator, PCI cards, <16 cards/System z10™ with huge crypto performance.
- **Channel Processors:** z I/O channels embed dedicated (*IBM Power*) MPUs, <336 on top systems.
- **InfiniBand I/O Interconnect Processors:** z10 uses high-performance 6GBps InfiniBand links to connect Central Electronic Complexes to I/O subsystem/channels, each link also embedding powerful, dedicated link I/O processors.
- **Hardware Management Console (HMC) Processors:** System z HMCs are dedicated-function, on-board notebook-computer-based, console systems used to manage mainframe hardware.
- **Off-board, Loosely-coupled Co-processing:** System z™ now also supports several external, loosely-coupled, workload-specific, IBM high-performance co-processing systems. To date, these have included:
 - **IBM WebSphere DataPower:** SOA XML parsing, security, and messaging acceleration, co-processing appliances. Now 5 models.
 - **IBM PowerXCell™ 8i MPU-based QS22 Server Blade:** Delivers high-Giga Floating Point Operations Per Second (*GFLOPS*) imaging, gaming, and graphics-intense co-processing that complements and extends System z commercial applications into those areas.
 - **x64 Data Warehousing Blade:** IBM plans (*Q4 2009*) to add data warehousing-application-specific x64 MPU-powered co-processing server blades to optimize System z10™ data warehouse workloads performance and economics.

These extensive hybrid processing resources help explain the huge workload throughput System z10™ EC systems handle. We cover them at length because they are a crucial, but little-understood, mainframe strength. Further such hybrid processing advances are expected with the next “z11”.

4.11 Extensive Capacity on Demand (CoD) Options: System z10™ offers the fullest range of **Permanent, On/Off (temporary), Capacity Backup (for disasters), and Planned Event (short <3 day events)** CoD options, for processor capacity (*all engine types*), memory, and in some cases, I/O. These provide dynamic capacity so users can cost-effectively meet varying workload peaks, patterns, and events without over-provisioning, enabling

better QoS at lower cost. More flexible, Just-in-Time (*JIT*) On/Off CoD, Capacity Backup (*CBU*), or Capacity for Planned Events (*CPE*), options can now be Customer-Initiated Upgrades. **z/OS® MVS Capacity Provisioning** also provides automated control of temporary capacity.

Foundation mainframe subsystems all advanced at unprecedented rates...

4.12 Superior Middleware, Tools Software: Foundation mainframe subsystems, including DB2 for z/OS®, CICS, WebSphere MQ, IMS, z/OS® and z/VM, all advanced at unprecedented rates, and were complemented by many new IBM tools, since 2000. In addition, four major leadership IBM System z™ software domains, each the culmination of years/\$B investment/innovation, advanced sharply in 2008-2009. These are:

- **Market-leading IBM Smart SOA™ Software on System z™:** IBM's market-dominating, advanced Smart SOA™ software stack, strongest on the mainframe, is already being used by >1,500 System z™ customers, to transform core business processes, and reusing host-based software/data assets in their applications.
- **Excellent IBM System z AD Tooling Today:** IBM Rational now delivers a complete, world-class Application Development/Enterprise Modernization tool portfolio, spanning all types of mainframe development, including SOA, with all-Eclipse-based Integrated Development Environments greatly superior to those on other hardware platforms.
- **Enterprise Information on Demand (IOD) from System z:** Fruit of 25 ISV buys and \$15B invested, IBM's innovative, breakthrough new InfoSphere IOD software for System z™ lets firms deliver trusted, reliable, accurate, consistent, current information quickly, to all applications, processes, and people cross-enterprise. Includes the powerful Cognos 8 BI/EPM suite as its center-piece.
- **Enterprise Service Management from System z10™:** IBM Dynamic Infrastructure™ uses IT Service Management (*ITSM*) to automate main IT processes using industry best-practices enterprise wide. Service Management Center for System z delivers this from System z10™, directly linking IT service performance to business Key Performance Indicators, cutting IT operations costs sharply by using extensive new Tivoli System z ITSM software.

4.13 Unrivalled Other System z10™ Capabilities

Advance: Beyond the strengths above, System z10™ also differentiates itself from all other platforms by its strong leadership, and further advances, in:

...most advanced, dynamic, finest-grained, flexible and secure, virtualization capabilities of any IT platform...

- **“Gold-standard”, Industry-best Virtualization:** Far the most advanced, dynamic, finest-grained, flexible and secure, virtualization capabilities of any IT platform (*far ahead of other UNIX vendors*). Covers all system resources of CPU, memory, I/O, plus unique virtual networking “inside-the-box”. Can consolidate <1,500 x86/x64 Linux servers under z/VM on one z10™ EC.
- **Industry-best Resource Utilization:** Ultra-efficient and dynamic, policy-driven, self-optimizing workload management, within and across partitions, (*with gold-standard virtualization above*) enables a **System z10™ to run smoothly at <100% utilization** rates whilst delivering QoS goals, far ahead of best large UNIX system’s 40-45% average.
- **Most Extensive RAS, Near-zero Downtime:** Highest reliability and availability amongst standard commercial systems. The most extensive RAS features are deeply optimized/integrated across System z10™ MPU, modules, system, firmware, OS, and middleware software stack, layers. These give single-system hardware Mean Time Between Failure of 50-60 years, and service availability of >99.995%, far beyond RISC or Intel-MPU-based systems.
- **Much the Highest Security Levels:** Again deeply built-in throughout its stack, scores of unique, advanced security features make System z10™ the most highly-trusted, most secure, best crypto-performing, and most rock-solid unbreakable, commercial IT platform.

...System z10™ machines deliver a huge 288GB/s of I/O bandwidth, far beyond any UNIX server.

- **Huge I/O Capacity and Capability:** Unique System z10™ channel I/O architecture with <1,024 I/O channels (<336 MPUs), dedicated SAP I/O processors (<11), and <48 ultra-high performance (6GB/s) InfiniBand-based I/O links, enable System z10™ machines to deliver a huge 288GB/s of I/O bandwidth, far beyond any UNIX server.

- **Most Scalable, Refined, Full-system Cluster:** IBM z/OS® Parallel Sysplex® is the world’s most scalable, refined, and mature full-system commercial computing cluster. Linking <32-systems, with <2,048 CPUs, can provide ~1B MIPS capacity easily managed as a single system with ~99.9995+% availability.
- **Top-end DR/BC Capabilities:** IBM’s Geographically Dispersed Parallel Sysplex® (GDPS®) service solution extends a z/OS® Parallel Sysplex to a 2- or 3-site dispersed mainframe cluster, offering the market’s strongest range of DR/BC options, with advanced IBM Storage systems and software.
- **Highest Automation, Lowest Staffing:** Intense IBM R&D cut mainframe support staffing/5,000 MIPS by a dramatic 7- to 10-fold in the last decade. System z10™ now needs **just 1/3 to 1/5 of the staffing** required by an equivalent capacity/QoS distributed systems configuration.
- **Far Fewer MPU Core Licenses = Big Savings:** Hugely powerful (~920 MIPS) MPUs and <100% utilization mean a System z10™ needs far fewer CPUs than HP platforms for the same result, by 3- to 5-fold (*HP Integrity*) and up to 20- to 30-fold (*older x86/x64*). With middleware software charged per core, using a z10™ enables huge core license reductions and cost savings
- **Greenest Dynamic Infrastructure Hub:** Beyond all the virtues above, System z10™ also has the smallest data center footprint, the lowest power and the lowest cooling costs (*per enterprise workload*). One detailed comparison showed **83% less floor-space**, and **93% lower power cost**, were needed with a z10 BC solution vs. an x64 solution of equivalent capacity.

5. Enterprise Server MPU/System Architecture Battle Red-hot 2009-2011

5.01 MPU/System Architecture Sets Platform Success:

MPU/system architectures determine many crucial enterprise server capabilities, and thus their market success. The prior, wide, CISC/RISC MPUs/system architectures **diversity has now vanished**, as many oldsters died, see Figure 2 on page 12.

5.02 Three MPU Leaders Dominate Enterprise IT:

Three highly-successful leaders now dominate 2009’s server MPU/system architectures in enterprise markets. We also found each will extend their dominance with their **planned strong successors due in 2010**, assessed below. This trio, shown as “Vibrant Leaders” in Figure 2 (*on the left-hand side*), are the:

System z10™ is the enterprise server market-share-leading mainframe...

- **IBM System z10™ CISC MPU-z/Architecture:** High-end commercial workloads SMP enterprise server market-share-leading mainframe MPU/system architecture.
- **IBM POWER6/6+ RISC MPU-IBM Power Systems™ Architecture:** RISC market share-leading MPU/system architecture, dominant in high-end scale-up UNIX-workloads systems.

...Power Systems dominant in high-end scale-up UNIX...

- **Intel 64/AMD64 CISC MPUs-x64 System Architecture:** These power most high-volume ISS rack/blade servers, workstations, and HPC clusters, with ~50% of server market revenues ~8M servers sold in 2008. Intel® Xeon® x64 MPUs also power several increasingly powerful scale-up x64 SMP servers.

5.03 Sun UltraSPARC RK High-end MPU and Servers Die:

In mid-June 2009, trusted reports disclosed that Sun had cancelled its long-promised, but long-delayed, high-end **UltraSPARC RK (Rock) MPU** and its next-generation Supernova enterprise servers. This finally killed off Sun's own-built, high-end UltraSPARC MPU and enterprise servers line plans, just weeks before the Oracle/Sun deal closure. Now Fujitsu SPARC64 MPUs/Enterprise M8000 and M9000 servers must carry forward both Oracle/Sun's, and Fujitsu's, high-end UNIX server sales alone. Fujitsu's powerful SPARC64 VIIIfx (*Venus*) 8-core, 128 GFLOPS, 35 watt MPU (*or some variant*), will doubtless be Rock's replacement, but IBM POWER7 is rated at 256 GFLOPs, twice Venus's claimed floating point performance.

5.04 HP Integrity NonStop – “Fading Foe”:

HP also offers Itanium® MPU-powered, proprietary **HP Integrity NonStop** fault-tolerant systems, as replacements for predecessor **NonStop S (MIPS-RISC, ex-Tandem & Compaq)** systems' declining user base. **These are also “Fading Foes”**, with total NonStop revenues crashing from a Tandem-peak \$2,285M (1995-actual) to a <\$900M rate (2008 – our estimate), with still-sharper fall

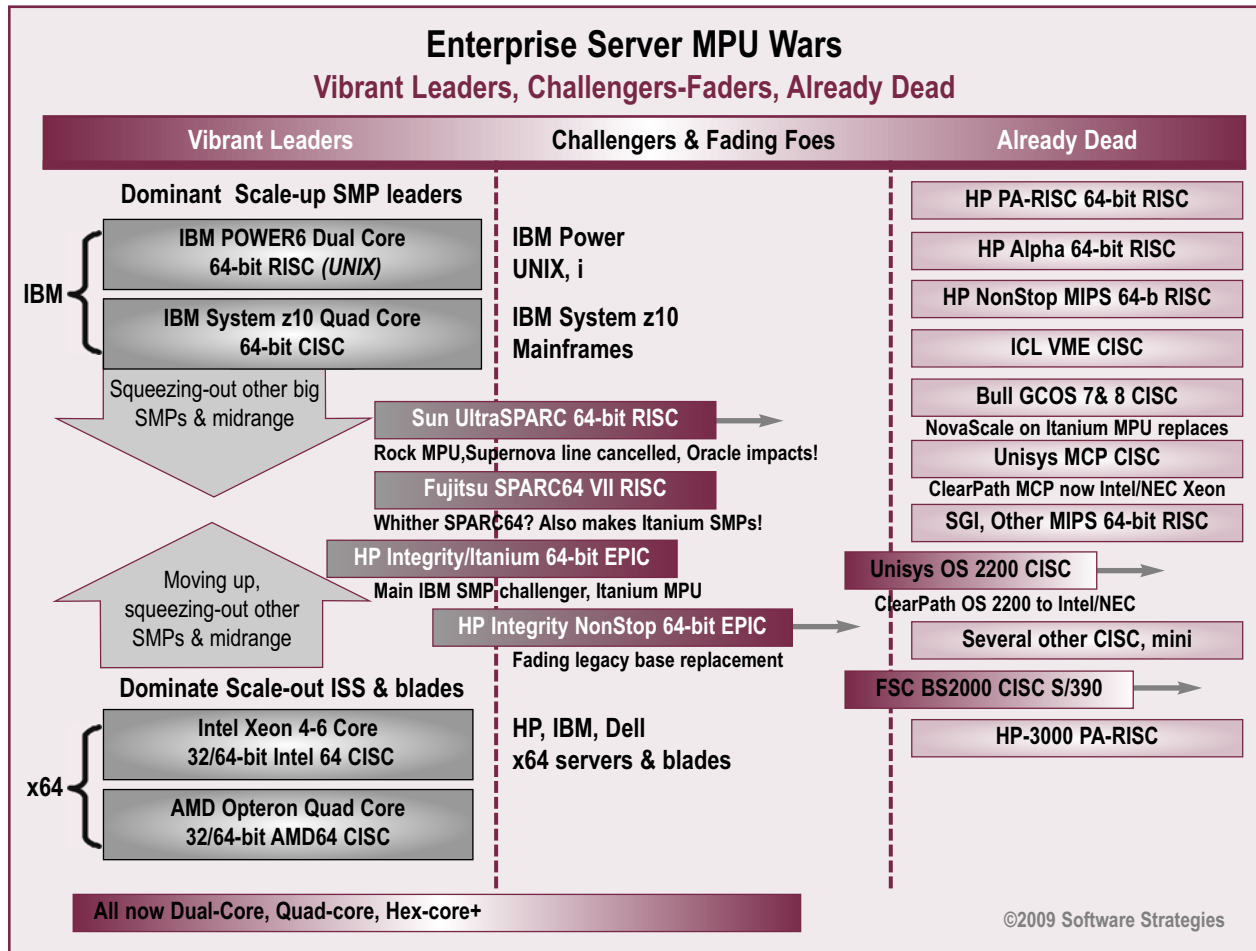


Figure 2: Enterprise Server MPU Architecture Wars – Vibrant Leaders, Challengers-Faders, Already Dead

rates expected from 2009 on. This strategically dead-end niche enterprise platform is thus slowly fading, and new investment is not advised! (*So not considered more here.*)

5.05 Competitor's Current/Next-generation MPUs/Systems:

We assessed today's Intel® Itanium® 9100 Series (*Montvale*), and next-generation Tukwila MC, MPUs (*in 2.01-2.08*), and the HP Integrity servers they power (*in 3.01-3.13*) above. How do these compare to their enterprise market-leading trio of MPU/system architecture competitors in 5.02 above, not only in their currently shipping forms, but also in their next-generation MPUs/system all due out in 2010? The latter are:

- **IBM System “z11” CISC MPU-z/Architecture:** Next-generation mainframe MPU/systems due out ~Q3 2010.
- **IBM POWER7 MPU-IBM Power Systems™ Architecture:** Blockbuster next-generation IBM RISC MPU/new systems, now certain to blow away all competitors and due out ~end-Q1 2010!
- **Intel® Xeon® EX CISC MPU-Intel 64 System Architecture:** Impressive <8-core Intel® Xeon® EX (*Nehalem-EX*) MPU, now due Q1 2010. This MPU is said to soon power ~15 new 8-way+ systems from eight Intel OEMs (*IBM, Fujitsu, Unisys, NEC, Hitachi, Cisco, Dell, +1 more – could it be HP?*)

5.06 IBM POWER6+-based Systems Remain Ahead: Our assessment showed performance of newer current POWER6+ MPU-based IBM Power Systems™ are far ahead of current HP Integrity systems, and should even remain just ahead of the new Tukwila MC-powered HP systems (*when these emerge ~Q2 2010*) on most workload benchmarks, measured per core. But see 5.08 below.

5.07 System z10™ MPU/System Success Explained:

IBM System z10™ MPU's huge performance/capability jumps (*heavily exploiting POWER6-sibling innovation*) drove System z10™ EC mainframes to new high-points in performance, advanced RAS, and QoS capabilities. This explains their strong market successes/gains, and the substantial all-round superiority they hold today over current HP Integrity Superdome systems, which they will retain to Q2 2010 at least, but also see 5.09 below.

...new POWER7 RISC MPU-based IBM Power Systems™ will absolutely blow away new Tukwila MC-based HP Integrity systems by a wide country mile...

5.08 POWER7 Will Blow New Itanium® Away ~Q1 2010:

Our research found that IBM's storming new POWER7 RISC MPU-based IBM Power Systems™ will absolutely blow away new Tukwila MC-based HP Integrity systems by a wide country mile, when they ship from ~ end-Q1 2010. These new HP Integrity systems can only be deeply uncompetitive with these new IBM screamers, both IBM chips and systems now far advanced on track in final development.

These new mainframes will further extend System z's already strong leadership...

5.09 New System “z11” Mainframe, Late 2010 Also Strides Ahead:

We found the next-generation IBM System z “z11” MPU likely to be a 45 n.m. shrink with a clock frequency increase to ~5GHz., adding Simultaneous Multithreading (SMT) dual-threading, and other chip gains for a 20-25% MPU performance hike, in scaled-up ~<76 customer CP System “z11” mainframes with ~<43,000 MIPS Large Systems Performance Reference (*LSPR*) capacity. These new mainframes, expected ~late-Q3 2010, will further extend System z's already strong leadership over next-generation HP Integrity Superdome systems for the following 2 years, at least, we found.

5.10 Intel Xeon®-EX Enterprise Servers Will Out-price and Outperform:

High-end x64 enterprise servers, using powerful Intel® <8 core Xeon® EX MPUs (*Nehalem-EX*) will be formidable competition to current and next-Tukwila MC generation HP Integrity, certain to beat the HP offerings on price/performance, and likely also to do so on absolute performance too. But will HP itself vend such Nehalem-EX systems?

With high-end Sun UltraSPARC RK MPU/new Supernova servers just cancelled, Fujitsu ties will tighten.

5.11 Oracle/Sun Impact on HP Strong:

Oracle's Sun Microsystems bid is now sure to complete. With **high-end Sun UltraSPARC RK MPU/new Supernova servers just cancelled**, Fujitsu ties will tighten. This move must disturb the Solaris/SPARC user base. Fujitsu's SPARC64 MPU/Enterprise M8000 and M9000 Servers now become (*the sole*) flagship offering for both Oracle/Sun and Fujitsu high-end sales. Oracle already said it will optimize/integrate Sun hardware to work well with Oracle software. **HP suffers the triple whammy** of stronger Oracle/Sun competition, finding its main ISV partner now a close system competitor, and from soon losing Oracle's hardware OEM business.

5.12 Next Integrity Too Little, Too Late: New HP Integrity systems using next Intel® Itanium® Tukwila MC MPUs will finally bring a much-needed, but years belated, performance boost over far-lagging current Intel® Itanium® 9100 Series-powered Integrity systems. However, as the points above attest, the new HP Integrity systems will be outclassed by new IBM POWER7-based UNIX systems (*end-Q1 2010*) and new System “z11” mainframes (*late Q3 2010*), and by scale-up x64 Nehalem-EX-based enterprise servers. Expect epic quantities of FUD from HP and Intel when the new HP systems finally ship, and treat all such with great caution. The next Itanium® Poulson-MPU-based generation now offers the HP-Intel duo their final chance to deliver fully-competitive Itanium® MPUs, but this looks likely to arrive too late.

6. HP Integrity Superdome Versus IBM System z10™ EC Compared

6.01 High-end Enterprise Servers: As the HP-IBM fight is fiercest in this segment, we restricted our full Paper’s detailed comparisons to each vendor’s high-end enterprise servers. Current offerings are the **HP Integrity Superdome** (*Intel® Itanium® 9100 Series-Montvale-powered*) from the challenger, and IBM’s winning **System z10™ EC** mainframe market leader. Our summary ratings in Figure 3 also include UNIX leader **IBM’s Power Systems™ 595** RISC high-end systems, formidable competition for UNIX workloads, to further clarify the relative strengths of these three enterprise platforms.

6.02 Compared Across Fourteen Differentiating Factors: When strategically evaluating/comparing enterprise server platforms, our research long showed that fourteen major, differentiating factors must be most carefully considered. These start with **MPU Capability/Performance**, continue with **System Packaging/Architecture/Bandwidth/Performance**, include ten other main differentiating factors, and finish with **TCO**, and **Investment Protection**, aspects. (See *Figure 3 for these factors and for our platform ratings*). We excluded several other factors where the competing system’s capabilities ran closer.

6.03 Current & Next Generations Covered: We rated the strength of both current, and of the next generation, for the three enterprise server platforms above, specifically:

- Current **HP Integrity Superdome** (*Montvale-based*), and **Q2 2010-due Tukwila MC-based-Superdome**.
- Current **IBM System z10™** (*z10 MPU-based*), and **Q3-2010-due System “z11” EC mainframe** (*“z11”-MP-based*).
- Current **IBM Power Systems™ 595** (*POWER6-based*), and **Q1 2010-due POWER7-based 595**.

based on all known public information, plus our well-informed surmises for unannounced next generations.

6.04 In-depth Assessments: These HP Superdome and IBM System z™ mainframe assessments were carefully drawn up from **over 50 pages of the main White Paper’s in-depth analysis and data**, covering these fourteen factors, over current and next generations of these high-end system lines.

6.05 2009-2012 Comparison Validity: Enterprise server platform investment decisions mandate such in-depth review, and current/next-generation combined assessments (*the latter avoiding leapfrogging effects*). This rigorous approach make our comparison ratings valid over the extended time-period mid-2009 to 2012 (*likely lifetimes of current and next-generations of these enterprise systems*), subject to some post-announcements amendment.

...the System z10™ EC/“z11” in a class of its own, widely ahead of HP Integrity Superdome on most factors.

6.06 Relative Ratings: To compare these complex, large-scale systems, we used relative strength ratings within this market segment, **with a top score of 10**, assigning up to 5 to current generation, and 5 points to next-generation systems, in each combined assessment. This approach clearly shows the areas of widest differences (*and of close similarities*) between these powerful enterprise server platforms.

6.07 System z in a Class of its Own: All our findings are summarized and visualized in the “at-a-glance” graphical presentation of Figure 3 (*on page 14*). The results speak for themselves, with the System z10™ EC/“z11” in a class of its own, widely ahead of HP Integrity Superdome (*Montvale & Tukwila MC-based*) on most factors. The rather more similar IBM Power Systems™ 595 (*POWER6 & POWER7*) RISC-UNIX servers also firmly beat the HP platform on all factors, and thus place much closer to System z across our ratings.

HP Integrity mainframe attacks have little chance of success...

6.08 Last Words: The System z10™ EC mainframe is widely recognized as the most sophisticated, advanced enterprise platform, whose capabilities all contenders long strived to copy. System z’s own advances have been so strong/fast since 2000, it is no surprise that it scored most top ratings amongst these three enterprise server lines. HP Integrity mainframe attacks have little chance of success, rather HP Integrity user migration to System z will increase, we expect.

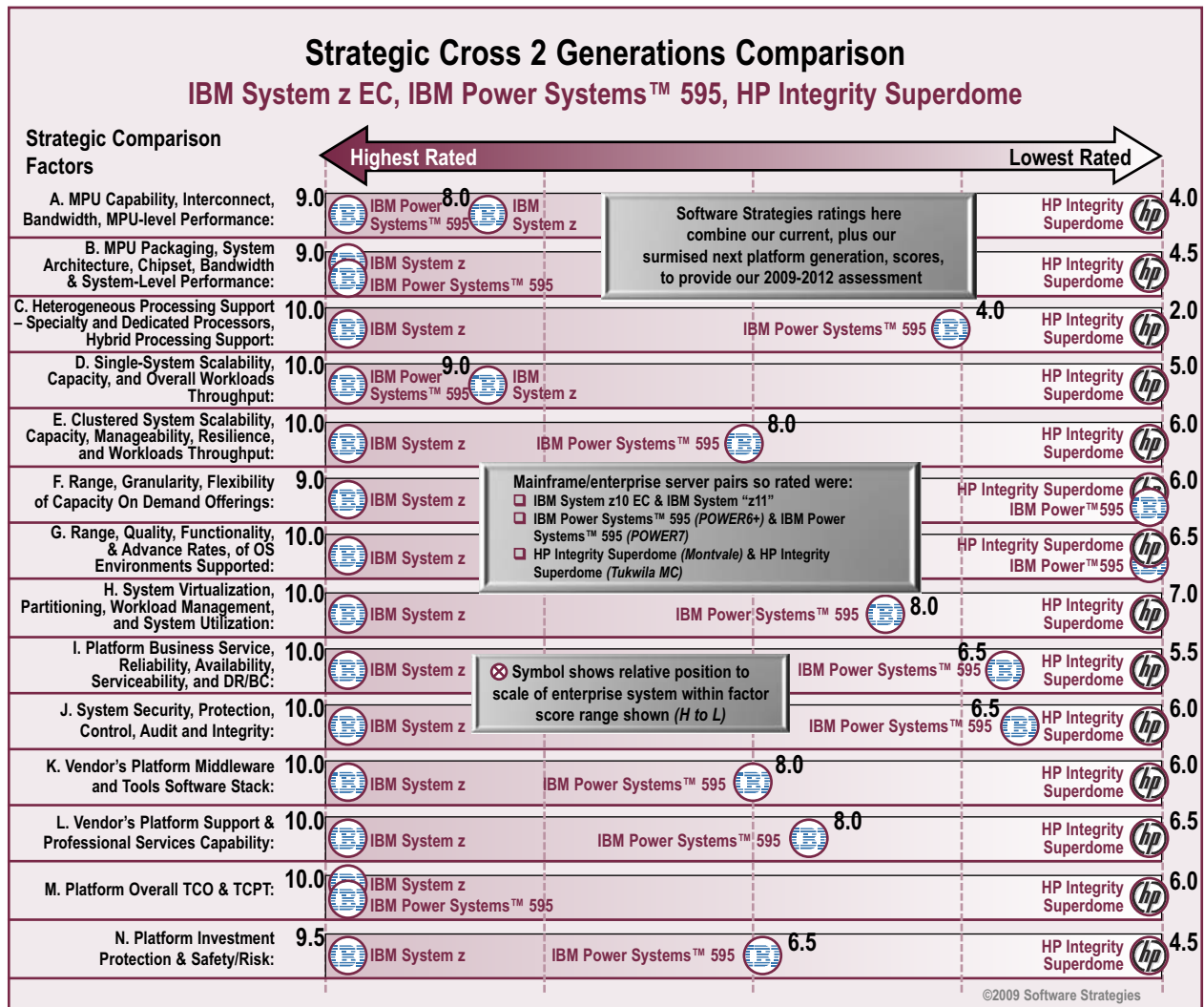


Figure 3: Strategic Cross 2 Generation Comparison – IBM System z EC, IBM Power Systems™ 595, HP Integrity Superdome

Sources and Our Other Research

Three other supporting Appendices, 24 third-party sources cited, plus 10 of our own recent System z-related White Papers referenced, in our main White Paper were our main evidential sources there, and thus also for this Executive Summary's abridged findings/conclusions.

Software Strategies

Software Strategies is a specialist analyst firm focused on enterprise IT platform strategies and issues. Specialist expertise on mainframes, servers, operating systems, and on middleware software/tools, have been our common threads. Since 1997, we have worked closely with numerous industry leaders, including: IBM; Unisys; Microsoft; Intel; Misys; Fidelity National Information Systems; CA; BMC; Stratus Computers; ICL; NetIQ; and others. Many tens of thousands of Enterprise IT user readers have benefited from our authoritative reports, white papers, and from our presentations at scores of IT events, seminars, and conferences.

Author



Ian Bramley
Managing Director – Software Strategies
ian.bramley@software-strategies.net

This Executive Summary was published in June 2009, based on the main White Paper of the same title also published that month, both researched/written by Ian Bramley, Managing Director of Software Strategies. All views expressed are those of Software Strategies alone, and are based on our extensive proprietary mainframe, enterprise server and software research. Ian founded Software Strategies in 1997. He is an experienced enterprise infrastructure analyst, has published scores of popular reports and white papers, and has served as a keynote speaker at many industry events. Previously, he was Director of Enterprise Platforms at Butler Group, and Founder/Chairman of the Enterprise NT Management Forum industry group from 1998 to 2001. Before starting Software Strategies, Ian held executive positions with four international software/services vendors over a prior 25-year IT industry career.

1st Edition Published: June 2009

Design & Layout: iok design – info@iok-design.co.uk

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