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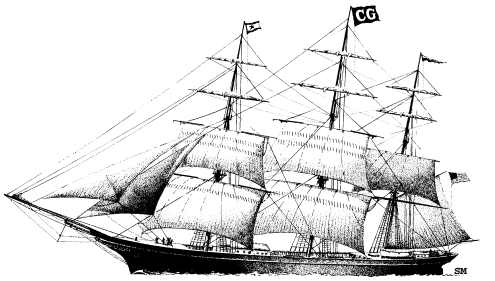

Navigating Information Technology Horizons℠

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HP Adds Blades to NonStop Architecture — Improves Performance, No Impact on Reliability

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Management Summary

There are times when we go shopping that an item is so inexpensive that we do not include warranty, maintenance, or replacement parts in the purchase equation. Items in this category could include a coffee maker, an electric can opener, or even a smoke detector. If something goes wrong, we do not call for service, we simply replace the defective item with a new one. Some appliances cost more, however, and a multi-year, in-home warranty might be considered with the purchase. Items here would include a refrigerator, a dishwasher, or a 50" high-definition TV, anything that you install in your home and use with the assumption that something will break and will need to be repaired. We know that a well-trained service technician is only a phone call away and should arrive within 24 to 48 hours with a replacement part. There are other times, however, when a part failure that causes an outage to a mission-critical component is completely unacceptable. Take the Space Shuttle, for example. If a critical component fails 600 miles in space, there is no service person around to fix it. In this case, NASA ensures that every critical component is redundant, having a backup unit in place to complete the task where a service tech is not available. There are times, however, when even planning and redundancy fail – take, for example, the most recent shuttle mission to the International Space Station where part of the cargo included a replacement vacuum pump for the on-board waste collection system – that would be a toilet to all earth-bound humans. *There are some parts that we simply cannot do without!*

Now, let's look at the data center of any mission-critical enterprise. If you lose access to a business-critical application, you may cause instant panic within the IT staff, but there might be no long-term effect beyond an extended response time for an unhappy client community. On the other hand, if the mission-critical application was a *911-response system* for a major metropolitan community, **any failure could cause a delay in the dispatch of fire or police rescue vehicles and result in the significant loss of property and life**. Here, a fault-tolerant system is not only preferred, it is mandatory. The same is true for other data centers, such as those on Wall Street. Here, each data center transaction could involve the transfer of extremely large sums of money and an outage could result in the loss of millions of dollars. **A system failure here could have serious impact on economies around the world**. In instances such as these, the IT staff must deploy a non-stop solution that they can trust, hopefully one that also satisfies the other critical success factors such as energy consumption, floor space, and response time that all go into the calculation of total cost of ownership.

In order to comply with all of the factors that go into making a resilient system that can lower the data center's TCO, HP has evolved their *Integrity NonStop* solution with the introduction of a new NonStop Blade offering, the *NB50000c*. To learn more about how the NB50000c can lower enterprise TCO while retaining essential NonStop qualities, please read on.

IN THIS ISSUE

Mission-Critical Data Center Issues

The enterprise data center faces performance and reliability challenges every day. They must rapidly respond to the demands and needs of both the enterprise and its customers. This includes meeting the service level agreements (SLAs) for throughput and response time for essential workloads, and making the risk assessment for not meeting them, as well as deploying new applications in a timely fashion to meet competitive pressures. It also requires the data center to be agile enough to respond to changing business needs without having to redesign the entire data center infrastructure.

Satisfying these requirements is difficult enough for the enterprise trying to service the *business-critical* economic needs of a worldwide Internet community. It is only magnified when the data center must deal with the *mission-critical* demands of an organization responsible for the delivery of an essential public safety service, such as police and fire, or the financial demands of a banking network. If you are responsible for the management of an ATM network with thousands of cash machines, you have a clientele that expects to have access to their own money seven days a week, 52 weeks a year. If you are responsible for the citywide dispatch of police or fire equipment, anything less than 7x24x365 availability could cost lives and property. **These environments demand fault-tolerant availability**.

In addition to meeting performance and reliability goals, the CIO must also satisfy continually shrinking budgetary requirements. The proliferation of open systems servers has lead to the widespread deployment of a network of x86 servers in a scale-out environment, with CPU utilization somewhere south of 20%. Every time the IT staff deploys a new application, the data center must install a new set of servers. ***Too many applications lead to too many servers, resulting in too much administrative overhead.*** This clearly increases administrative costs in the data center, not to mention the increased energy costs to power and cool the underutilized IT infrastructure. Too many data centers are spending the vast majority of their budgets for administration and maintenance, and not enough on innovation.

One alternative used to counter the inefficient scale-out architecture of rack-mounted x86 servers is the implementation of a scale-up[1] architecture using platforms based on the *POWER* microprocessor from IBM, the *SPARC* microprocessor from Sun, or the *Itanium* microprocessor from Intel. In fact, Hewlett-Packard (HP) has chosen to use the Intel multi-core Itanium processor as the foundation of their *Integrity* line, using the Itanium 9100 (*Montvale*) to scale-up within the server to improve processor and memory utilization and also to scale-out, to take advantage of the built-in clustering of logical processors[2]. In fact, HP is a leading member of the *Itanium Solutions Alliance*, which includes Groupe Bull, Hitachi, NEC, and Unisys, among others.

With Itanium, HP uses Integrity to deliver mainframe-class processing capabilities for high-end, mission-critical, data intensive applications, while improving reliability and reducing power consumption. The latest version of Itanium contains new features, such as *Core Level Lock-Step*, to improve data integrity and reliability of applications by eliminating undetected errors in the core. This helps to deliver greater reliability, availability, and serviceability by ensuring that calculations are consistent among all of the cores. *Demand Based Switching*, another new feature, reduces power consumption during periods of low utilization to reduce wasted energy. In addition, with new virtualization partitioning features included, Itanium becomes the ideal platform for the migration of RISC and mainframe applications, enabling consolidation into multiple O/S instances per processor.

With Integrity, HP has the ideal platform for the consolidation and virtualization of an underutilized data center infrastructure and enables the enterprise to establish a more scalable and adaptable business foundation using common components. Itanium is ideal for any heterogeneous environment, with over 12,000 database, business intelligence, ERP, and HPC applications, and operates within a multi-O/S environment capable of supporting *Windows*, *Linux*, and a variety of HP operating environments, as well as *z/OS* and *Solaris/SPARC*. Among the HP environments are *HP-UX*, *OpenVMS* and *NonStop*, enabling standard Integrity platforms to support mission-critical, fault-tolerant infrastructures.

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[1] Check http://www.clipper.com/Clipper_Server_Index.htm for the forthcoming issue of Clipper Notes entitled *Perceiving the Dark Side of the Moon – Knowing When Scale-up Computing Makes Sense*.

[2] See **The Clipper Group Navigator** dated October8, 2006, entitled *HP Upgrades Integrity to Dual-Core Itanium 2 – Worth the Wait? Most Definitely!*, which is available at http://www.clipper.com/research/TCG2006091.pdf

The HP NonStop Solution Family

In the past, any fault-tolerant data center with a 7x24 SLA could be closely associated with very high costs, for the acquisition, operations, and maintenance of a proprietary architecture. The HP *S-series NonStop* platform based on the *MIPS* RISC microprocessor is an example of that. In order to provide a new high-end solution for their S-series clients, and reduce the TCO for those customers requiring a fault-tolerant environment, HP transitioned its NonStop platform away from its older proprietary MIPS architecture, implementing a new NS-series[3] (with the *NS14000* and *NS16000*) based upon the Integrity platform using Itanium (initially, *Madison 9M*), with the *EPIC*[4] architecture, dual-core processing, and *Hyper-Threading Technology*. With the *NonStop Advanced Architecture* and new high-performance compilers targeted for EPIC, HP protected the investment made in their S-series platforms. At the same time, by using Itanium, HP opened the door for its Integrity customers to consolidate their business- and mission-critical applications into the same platform as their fault-tolerant requirements, improving resource utilization, with both Windows and Linux applications sharing the *BladeSystem* resources. In addition, *HP-UX* and *OpenVMS* applications could also share the infrastructure between NonStop and standard Integrity blades.

While the NS-series enabled the consolidation of the largest NonStop environments, the NS14000 and NS16000 were still too expensive for the small-to-medium business community and for smaller government jurisdictions. In order to meet their needs, HP *scaled–down* the NonStop platform with the introduction of the NS1000[5], based upon the Integrity rx2600 architecture.

The continuing proliferation of open servers, along with increased demands on fault-tolerant environments, continues to put increased demands on the compute capability, floor space, and energy requirements of every data center. HP has looked at these continuing issues and, acting on their prime directive to *blade everything*, adapted the Integrity NonStop architecture to a bladed environment. Seizing upon the flexibility and adaptability of the *C-class BladeSystem* chassis to **double the performance** of the NS16000 within **the same power envelope** while **tripling the performance** of the NS1000 in the **same floor space**, HP is now introducing the *NB50000c NonStop Blade Server*.

The HP NB50000c

The HP NB50000c combines the best of both worlds, providing trusted NonStop availability and data integrity in a real-time environment with the efficiency and adaptability, not to mention the energy savings, of the modular computing *BladeSystem c* architecture. The NB50000c delivers all the reliability that HP's clients have come to expect from the NonStop architecture, with *n+1* hardware fault-tolerance[6], nonstop software fault-tolerance, and linear scalability from the multi-core Itanium microprocessor to drive performance with up to 4,080 logical processors, or 8,160 processing cores[7]. With the same NonStop operating system as the NS family, the NB50000c protects the investment made in current NonStop hardware with binary compatibility for all mission-critical applications. By leveraging all of the standards already available in the c7000 chassis (see Exhibit 1, on the next page), HP can help the enterprise data center to lower the TCO of IT, providing the culmination of the journey that has seen their fault-tolerant base migrate from the purely proprietary environment of the S-series to the open bladed environment of BladeSystem c.

A typical *Integrity NS16200* platform, using the Montvale version of Itanium, with eight CPUs will occupy two 42U 19" racks. A NonStop BladeSystem configuration with eight Itanium 9100 processors, taking advantage of multiple cores, will deliver twice the performance of the NS16000, in a single 42U rack. Higher performance and higher density equates to lower IT cost for the data center.

Based upon the BL860c architecture, the NB50000c blade supports a pair of Itanium 9140M dual-core microprocessors, with two cores per microprocessor chip, running at a clock speed of 1.66GHz, with a Front Side Bus speed of 667 MHz. Each 9140M has an 18MB L3 cache and operates within a 104-Watt power envelope. Each blade supports up to 48GB of memory,

[3] See **The Clipper Group Navigator** dated June 15, 2005, entitled *HP Gives Green Light to NonStop – Adapts Integrity for Failsafe Environments*, which is available at http://www.clipper.com/research/TCG2005036.pdf.

[4] Explicitly Parallel Instruction Computing.

[5] See **The Clipper Group Navigator** dated July 3, 2006, entitled *Scale Up? Scale Out? HP Scales Down NonStop for SME*, which is available at http://www.clipper.com/research/TCG2006054.pdf.

[6] NB50000c does not support *Triple Modular Redundancy*.

[7] HP has projected the availability of quad-core Itanium processors in 2009, doubling the number of cores available.

Exhibit 1 – NB50000c's Standards to Lower TCO

- C-Class BladeSystem chassis – modified to provide the power, cooling, and I/O infrastructure required
- Multi-core Intel Itanium 9100 processors
- Standard SAS storage
- Standard Network I/O
- Binary-compatible NonStop software
- HP Systems Insight Manager (SIM) Blade plug-in – to monitor and manage the entire bladed infrastructure;
- HP NonStop Cluster Essentials – to improve management of systems within heterogeneous clusters;
- Integrity Lights-Out 2 management – to manage all servers remotely;
- Onboard administrator – to simplify common maintenance in real time.

Source: HP

sufficient to handle the most demanding database applications.

HP modified the NonStop Blade enclosure to provide the NB50000c with the power, cooling, and I/O infrastructure needed to support the modular servers, interconnect, and storage components. Each enclosure will support up to 8 processors and 384GB of main memory. HP also developed the *NonStop Multi-core Architecture* (*NSMA*) to support the first NonStop system to provide multi-core processing. NSMA runs relational database and transaction processing software, along with support for advanced SAN products from HP's *StorageWorks* family. NSMA is responsible for maximizing the workload on each core, referred to as an *Instruction Processing Unit* (IPU). The NB50000c can double the performance of a similarly-configured non-NSMA system because both IPUs can execute two different user processes independently. It also uses a novel I/O infrastructure with a standard SAS storage adapter and a standard Ethernet controller. The SAS controller supports more storage capacity at a lower cost, supports fault tolerance, and delivers improved performance, while the Ethernet controller supports IPSec, SCTP, IPv6, and facilitates improved NonStop processor utilization.

The NB50000c comes standard with HP's *System Insight Manager* to provide hardware infrastructure provisioning, monitoring, and control; *NonStop Cluster Essentials* to improve management of systems within heterogeneous clusters; the *Integrity Lights OUT 2 (iLO 2) Advanced Pack* for advanced remote server management; and the *Onboard Administrator* for local and remote administration of the BladeSystem c chassis.

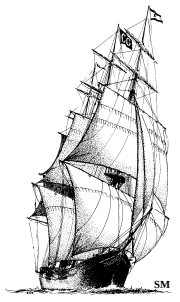
In addition to its obvious value to an existing NonStop data center, HP is also positioning the NB50000c as a mainframe replacement. With less than half the basic cost of an IBM *z9*, the NonStop Integrity BladeSystem has a 35% lower TCO than the z9 over three years. HP has collaborated with Logica, a leading IT services company, to help customers currently using an IBM mainframe, to port their applications and take advantage of NonStop to achieve better service levels for financial service applications, reduce TCO, and increase efficiency.

Conclusion

The fault tolerant data center faces the same challenges as every other enterprise data center, except with more at stake. The requirements to increase performance while lowering costs are compounded with SLAs for reliability and availability. With the Integrity NonStop BladeSystem, HP is delivering a solution that addresses these needs and manages space and energy limitations. With a roadmap for a NonStop BladeSystem Quad-Core system, HP is laying the groundwork to protect their clients investments and provide the growth that they will inevitably require.

The NSMA preserves proven, dependable, and highly available Integrity NonStop capabilities, leveraging the power of multi-core processing and the economies of standards-based, modular computing. If you have no more power available for the data center, then you need to increase performance within the same power envelope.

Migrating to the Integrity NonStop BladeSystem makes sense for any enterprise with mission-critical applications. The multi-core architecture provides high-performance scalability for any application and the NonStop technology delivers 24x7x365 reliability in a standards-based platform that will lower the TCO of the data center. If this is your environment, you should look at HP's NonStop BladeSystem as a possible infrastructure solution.



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