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ETG WHITE PAPER

Evaluating the IBM @server pSeries™ 630 Models 6C4 and 6E4

Delivering More — For Less!

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JUNE 2002

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Introduction - New Requirements

In the last decade, the inevitable progress of Moore's Law has dramatically changed the "best practices" associated with deployment of entry level UNIX® servers — those costing less than $25,000 USD. For most of the 1990s, entry servers tended to be little more than workstations well-endowed with I/O. The size and scope of applications supported were resource constrained - small by today's standards - and the potentially disruptive effects of system or application failures were therefore relatively limited in scope.

Now, servers costing under $25,000 can deliver levels of performance and capacity that equal or surpass the capabilities of some of the largest and most costly systems of the 1990s. They have the ability to simultaneously support multiple large scale applications - and handle the interactions of a worldwide user community. These capabilities, combined with increasing pressure to reduce operational costs through server consolidation in many establishments, have led to significant new design objectives for entry servers.

Users should expect today's entry level servers to provide the highest levels of RAS: hardware reliability, application availability, and increasingly self-administered serviceability that were once characteristic of only the most advanced high-end systems. The new IBM @server pSeries 630 is an entry level server that excels in satisfying those requirements.

Background — A Proven Strategy

For decades, IBM hardware product plans have followed the same pattern: innovations in technology or system design and implementation are initially introduced in high-end systems. Over time, these "leading edge" features and functions are distributed across the IBM product line.

The p630 is the latest server to benefit from that trend — adopting system design concepts from high-end IBM mainframes and sharing advanced hardware technologies with high-performance pSeries servers, clearly redefining the nature of the entry server marketplace - and combining these features with the ability to support other pSeries entry server capabilities like PDA-based remote wireless system administration.

By building on a common technology foundation with IBM @server pSeries 690 and 670 systems, the p630 is able to satisfy the demanding new entry system requirements. It promises unprecedented levels of reliability, availability and serviceability through an extraordinary range of automatic error prediction, detection, and resolution capabilities.

Combined with industry-leading system management tools, extraordinary performance, unique granularity, and a low entry price, the pSeries 630 is a formidable presence in an increasingly demanding marketplace.

Overview - System Highlights

The new 1-4 way IBM @server pSeries 630 builds on IBM's recent gains in the entry server space, and delivers the extraordinarily successful POWER4™ technology found in the newest pSeries high-end and mid-range servers in a low-priced, small footprint package. Base system components include 4 PCI slots and 4 disk/2 media bays in either a deskside or rack drawer configuration.

The results, when compared to competitors' offerings — like the recently announced Sun Fire™ V480, show significant value. The p630 has more advanced, high-end system RAS functionality, greater

expandability (more rack and stack options with superior rack density), greater internal and I/O bandwidth, higher levels of performance for both floating-point applications and secure (SSL) e-business transactions, and superior environmental characteristics. Its smaller physical size and substantially lower power and cooling requirements add cost-effectiveness and efficiency to the list of p630 advantages over competitive alternatives.

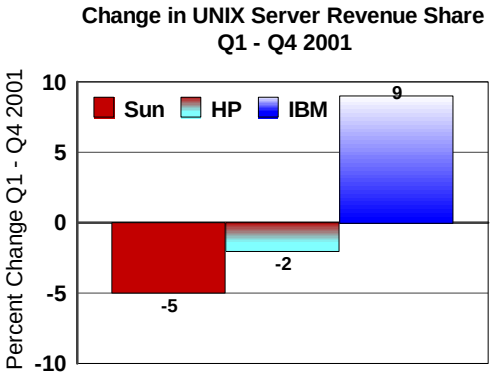
These capabilities are a direct result of the p630 implementation of the same industry leading POWER4 technology found in the p690 and p670 systems. The system is capable of supporting the same advanced RAS and system management facilities like HACMP, HAGEO, and in the near future, dynamic logical partitioning (LPAR), IBM's highly automated resource management capability that facilitates server consolidation, load balancing, and the isolation of test and production workloads on the same system.

p630 customers can benefit from the advantages of buying an entry server in terms of pricing and granularity (a one-way system prices out at under $12.5K USD,) while gaining the horsepower, expandability, and functionality of a system that substantially outperforms the competition - with excellent floating point performance as well as the ability to support the demands of the commercial user.
In introducing the p630 to its lineup, IBM effectively replaces RS/6000® Model 270 in its tower form, and the pSeries 640 Model B80 in its rack form, with the announcement of future (1Q03) NEBS Level 3 compliance for telco customers.

Evaluation: On Target
The new p630 1-4 way server sets the competitive bar substantially higher in the entry level UNIX server space. By combining the industry's foremost RISC microprocessor technology (according to MicroProcessor Report) with brilliantly downsized implementations of high-end system management and availability tools, the p630 is more than likely to accelerate growth in IBM's increasing share of the low-end UNIX server space.

The system is designed to support a combination of hardware scalability enabled by advanced technologies as well as IBM's latest generation of system management facilities and availability enhancements - producing a uniquely scalable, robust and cost effective server platform for a variety of users.

Competitive Positioning
While it's probably an exaggeration to state, as ZDNet correspondent Bill O'Brien recently did, that Sun "has the dexterity of an ocean liner and that only the momentum of its past victories is keeping it moving forward," there is a strong case to be made that Sun's historic position of prominence in the marketplace is rapidly eroding.



At the high end, Sun's chief technologist is embroiled in an aggressive, but increasingly questionable public debate concerning the decline of Sun's position in the high-margin large systems marketplace. At the low end, the success of recent IBM entry servers like the p610 and p640 have created similar concerns over Sun's share of the entry server business.

Given the uncertainties of the marketplace - as HP and Compaq undertake the internal challenges of their merger and a simultaneous PA-RISC/Alpha to Intel® technology transition, and Sun fights against an erosion of confidence and the flight of top executives - IBM's position in the

"short list" should strengthen – and the p630 could be an excellent candidate as a "first" IBM system in traditionally non-IBM enclaves.

By year end 2002, the p630 user will be able to develop or deploy 32- or 64- bit Linux® applications, Java™, or AIX® applications, all on the same server with a single point of system management!

This versatility can pay significant dividends to users by simplifying operating system transitions, and letting customers, rather than a vendor, decide how and when to migrate to a new environment.

The Total Cost of Ownership (TCO)
The p630 gives small to medium businesses the advantages of high-end system compatibility, availability, manageability, stability, and security without the costs associated with larger systems.

The newest cost evaluation models all attempt to quantify the increasingly dominant "people costs" associated with systems — IT staff, service and support staff. The most advanced models chart the "opportunity costs" of the significant differences in end user productivity caused by variations among systems in unplanned system outages.

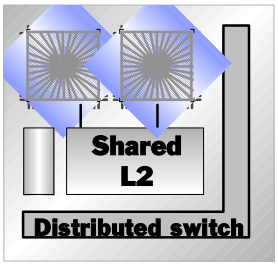
The TCO advantages of the pSeries over competitive server platforms are substantial. Downtime avoidance through higher availability, and an almost 2:1 performance advantage combined with world class system management facilities and lower facilities costs result in a very positive TCO picture when compared to less highly evolved systems.

So What's New?
The entry level p630 embeds some of the world's most advanced microprocessor technologies, built with the capacity to support levels of scalability, manageability, reliability and versatility that are effectively years ahead of competitive systems.

The p630 implementation of POWER4 technology places nearly an entire high-performance server on a chip – with one or two 1.0 Gigahertz processors, a high-bandwidth system switch, a large memory cache and an I/O interface. This level of advancement places IBM a generation or more ahead of competing technologies – a three-to-five year advantage in function, reliability and performance for IBM customers.

The Technology Difference Makers
The IBM POWER4 microprocessor is at the heart of the p630 technology advantage. The p630 offers an industry-leading consolidation platform for rapid deployment of scalable e-business applications on an entry level system!

Compared to SPARC, PA-RISC or Intel microprocessor designs, the IBM POWER4 chip offers several significant advantages to users. The IBM POWER4 is built with both copper and performance enhancing Silicon-On-Insulator (SOI) technology.



Sun Microsystem's UltraSPARC III lags well behind IBM in semiconductor technology, but the difference is more than "chip deep."

The entire IBM POWER4 server implementation concept is derived from IBM mainframe principles of design, starting with a highly integrated processor package, the "Single Chip Module," that consolidates multiple system components at the chip level — processors, memory, and I/O control!

The result? Fewer system components, reduced latency, better system level performance, and enhanced system reliability.

The interconnections between the POWER4 microprocessors and system memory and I/O are designed to achieve and sustain data transfer speed (bandwidth) that exceeds that of competitive systems.

4-way System	pSeries 630	Sun Fire V480
Internal Bandwidth	10.66 Gigabytes per Second	9.6 Gigabytes per Second
I/O Bandwidth	2.66 Gigabytes per Second	1.2 Gigabytes per Second

Performance Considerations

The greater capacity for system level internal and external data movement, combined with larger, and more tightly integrated caches and main memory, enables pSeries servers to achieve and sustain much higher levels of scalability when compared to alternative SPARC or Intel processor-based systems.

Processor	IBM 1.0 GHz POWER4	Sun 900 MHz UltraSPARC III Cu
On Chip Primary Cache (L1)	96 KB	96 KB
On Chip Secondary Cache	1.44 MB	NONE
Off Chip Cache	32 MB	32 MB

At the chip level, design factors like the tighter integration of caches with lower latency results in the 1.0 GHz IBM POWER4 outperforming the 900 MHz UltraSPARC III by 20 to 25%.

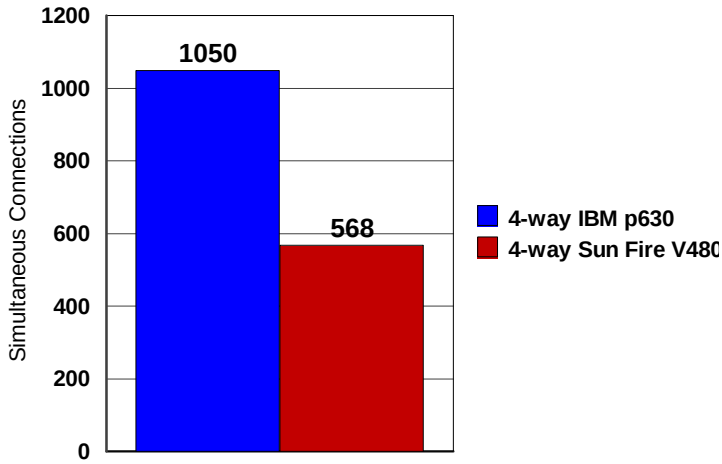
	SPEC CINT2000	SPEC CFP2000
IBM 1000 MHz POWER4	637	896
Sun 900 MHz UltraSPARC III Cu	530	714

Source: www.specbench.org/

More importantly to the commercial user, a fully configured 4-way p630 is able to outperform a similarly sized V480 by 85% in the SPECweb99_SSL benchmark, a rigorous test of a server's ability to support secure Web transactions.

In a comparable production environment, ten p630 servers could be expected to do the work of nineteen V480s! In a large commercial deployment, this advantage could dramatically impact operational costs and complexity as well as physical facilities costs.

Vendor Reported
SPECweb99_SSL Results



Future Prospects

Given IBM's past track record of living up to "SODs" (Statements of Direction), ETG has better than 95% confidence that IBM will deliver planned future capabilities for the p630 as promised. Users should expect full support for Cluster 1600 with PSSP and SP™ Switch2 attachment capability, dynamic logical partitioning (LPAR) and a remote I/O expansion drawer by year end 2002. Designed with NEBS Level 3 compliance in mind, the p630 Model 6C4 should be fully certified in early 2003.

LPAR support will enable p630 users to dynamically add or remove processors, memory and I/O from up to four active partitions without disrupting applications - providing a stable, secure, and cost effective means of consolidating development, test and production workloads on the same system.

Project eLiza™ and the p630

Project eLiza is an industry-leading IBM initiative to prevent unscheduled downtime. The conceptual design is that systems will self-detect, self-diagnose, and self-heal potential causes of unscheduled interruptions, without human intervention. Furthermore, the duration of planned interruptions will be minimized. Like the p690 and p670 systems, the p630 embeds support for some of the most advanced eLiza functions, including the ability to automatically identify and "deallocate" failing processors or other system components without interrupting production work, the ability to perform predictive maintenance so as identify and resolve potential points of failure, and the ability to capture error data on the fly resulting in the rapid resolution of problems and the potential for extended periods of uninterrupted operation. ETG expects that the mean time between hardware failure of the p630 will approach or exceed 2 years.

The IBM @server pSeries 630: A Total Solution Platform

Enhanced RAS facilities, advanced system management tools, and a growing suite of industry-leading application development and deployment tools make the new pSeries 630 a logical favorite in the race for leadership in entry server space.

While IBM has embraced support for open system standards, Sun and Microsoft remain increasingly proprietary system environments, and like HP 3000 and VAX systems, may be approaching a point of diminishing returns for users.

Potential users, IT managers, and ISVs should take a serious look at each system, the realities of conflicting vendor claims and capabilities, and the potential benefits to be realized from each. Major differences exist in the areas of system scalability and design, system manageability and availability, and in system versatility. The pSeries offers substantial advantages in all these areas.

Conclusions

The IBM @server pSeries 630 represents the merger of some of the industry's most highly evolved system management facilities, RAS features, and microprocessor technologies in an entry level server. The results? For end users, the addition of the p630 to the pSeries family defines new levels of entry server reliability, manageability, scalability, and price/performance. For ISVs, the p630 should be an increasingly attractive platform for the development of deployment of mission-critical enterprise class server applications. For IBM competitors, the p630 poses a substantial challenge and raises the bar new levels.

With the p630, IBM has made a quantum leap ahead of other vendors in delivering high-end system features, functions, and benefits to entry server customers. Compared to competitive alternatives, the p630 is a more reliable, manageable, and scalable entry level UNIX server, building on some of the industry's most advanced technology, system design and implementation concepts.