IBM @server pSeries 670

Robust pSeries 670 mid-range server

Highlights

- ***IBM POWER4+ processors provide high performance for diverse workloads***
- ***pSeries on demand capabilities help businesses adapt at the pace of e-business***
- ***Self-managing features enhance resiliency and help reduce total cost of ownership***

In the era of e-business on demand™, customers insist on impeccable service and personalized products. Businesses that rise to this challenge can reap the benefits of a global economy: vastly expanded markets, highly efficient supply chains and real-time transactions. Harnessing the power of e-business, however, requires an IT infrastructure that can offer not only speed and reliability, but also the agility to sense and respond to changes in its environment.

As a premier member of the IBM @server® pSeries® product line, the pSeries 670—a mid-range counterpart to the pSeries 690—can help lower costs, improve efficiency and speed transformation to e-business. Through leading-edge innovations such as high-performance processors and advanced clustering techniques, the pSeries 670 helps deliver outstanding power, flexibility, reliability and investment protection for both commercial and technical computing applications.

Features such as dynamic logical partitioning (LPAR) and flexible Capacity on Demand (CoD) capabilities also contribute to strong pSeries 670 performance while preserving operational versatility. In addition, innovative self-managing reliability, availability and serviceability (RAS) features help to drive down costs and complexity by lowering administrative overhead. Combining advanced IBM leadership technology for enterprise-class performance and flexible adaptation to changing market conditions, the pSeries 670 delivers uncompromising UNIX® computing for today's e-business on demand world.

Fast processors and dense packaging
Designed to provide data-center-class capacity, performance and RAS, the POWER4+™ processors in the pSeries 670 utilize "SMP-on-a-chip" design. At 1.5 GHz, this processor ranks among the fastest 64-bit chips in the world[1]. Because they also incorporate copper and silicon-on-insulator (SOI) technology, POWER4+ processors consume less power—saving energy while delivering high reliability and outstanding performance. Customers with an existing POWER4™ pSeries 670 system can upgrade to a POWER4+ configuration to boost application speed and throughput for growing workload needs.

Innovative CPU packaging also contributes to enterprise-class performance and reliability from the pSeries 670. Advanced Multichip Module (MCM) architecture, similar to the design used in IBM @server zSeries® servers, places up to eight microprocessors in a single MCM so small that it can fit in the palm of your hand. To further enhance performance, 128MB of Level 3 (L3) cache is packaged with the MCM. L3 cache helps stage information more effectively from processor memory to application programs. By decreasing the physical distance between components, MCMs enable faster movement of information—resulting in greater speed and improved reliability compared with earlier, less dense component configurations.

Additional "book" packaging for memory also enhances reliability by helping to protect components from electrostatic discharge and physical damage. With space for up to eight memory books per server, the pSeries 670 offers up to a 16-way configuration with 4GB to 256GB of total memory—providing tremendous processing power for both commercial and technical workloads.

The unique system architecture of the pSeries 670 enables it to deliver efficient, cost-effective data sharing and application throughput. Designed to support the incredible speed of the processors, the pSeries 670 design also features a peak aggregate memory-to-L3 cache bandwidth of 102.4GB/sec in a 16-way configuration. In addition, the server can deliver an aggregate I/O subsystem bandwidth of up to 14GB/sec.

Partitioning for quick response to change
IBM's logical partitioning implementation provides outstanding flexibility in matching resources to workloads, facilitating higher efficiency and lower total cost of ownership (TCO), while providing robust isolation of operating environments. The pSeries 670 system can be divided into as many as 16 independent logical servers or partitions, each with its own memory, processors, I/O and copy of the AIX 5L™ or Linux operating system. By enabling consolidation of applications using both operating systems onto a single platform, the pSeries 670 can increase system utilization, provide greater flexibility of managing the dynamics of multiple workloads in a single server, reduce complexity and deliver administration savings.

Based on business requirements and application needs, administrators can assign and manage resources using a single interface—the Hardware Management Console for pSeries. This dedicated workstation is used to define and manage the allocation of processors, memory and I/O resources to partitions. Dynamic LPAR, a function of AIX 5L

Feature	Benefits
POWER4+ processors with L3 cache	• Provide excellent system and application performance and high reliability for commercial applications in a small, efficient dual-processor chip • Offer capacity to grow to 16 processors
Copper and SOI technology	• Improves processor performance and reliability while using less power and producing less heat to help conserve energy and help lower operational costs
High memory and I/O bandwidth	• Helps remove performance bottlenecks that can occur when fast processors must wait for data to be moved through the system • Delivers increased memory bandwidth for the needs of HPC applications
Up to 256GB ECC Chipkill™ bit-steering memory	• Allows exploitation of 64-bit addressing for large database and HPC applications • Provides growth options with outstanding throughput • Significantly lowers number of memory failures that can cause system outages, thus increasing system availability • Automatically activates memory spares when multiple memory errors are encountered
Capacity Upgrade on Demand	• Offers flexibility for cost-effectively and easily adding permanent processing and memory capacity to help meet workload growth—with minimal disruption
On/Off Capacity on Demand	• Provides temporary processor use to meet unexpected workload demands
Capacity BackUp	• Offers disaster recovery solution with low entry price • Provides rapid deployment on demand in disaster situations
Book packaging	• Protects memory components against accidental disconnection and/or contamination • Facilitates easier servicing
Logical partitioning	• Permits up to 16 UNIX or Linux servers to be consolidated on a single system, easing maintenance and administration • Offers greater flexibility in using available capacity and dynamically matching resources to changing business requirements (requires AIX 5L v5.2)
Up to 80 PCI/PCI-X hot-plug/blind-swap adapter slots	• Provides growth options for significantly increased capacity • Supports many commonly used adapters for increased availability at a lower cost • Allows adapters to be added or removed without interrupting the system
Hot-swappable disk bays	• Provide greater system availability and smoother growth by allowing swapping or adding of disk drives without powering down the system
Built-in service processor	• Continuously monitors system operations and takes preventive or corrective action for quick problem resolution and high system availability • Allows diagnostics and maintenance to be performed remotely
Redundant hot-plug power and cooling subsystems	• Enhance system availability because cooling fans and power supplies can be changed without interrupting operations • Provide backup power and cooling if primary unit fails
Dynamic processor and PCI bus slot deallocation	• Automatically deallocates resources when impending failure is detected, so that applications continue to run uninterrupted
IBM @server Cluster 1600	• Provides centralized management of multiple interconnected systems • Provides ability to handle unexpected workload peaks by sharing resources • Allows for more granular growth so that user demands can be readily satisfied
Linux operating system	• Enables access to 32- and 64-bit Open Source Linux applications • Provides a common operating environment across IBM @server platforms
AIX 5L operating system	• Delivers maximum throughput for mixed workloads without complex system configuration or tuning • Provides upward binary compatibility to help preserve software investments • Extends application choices with Linux affinity

Version 5.2, even allows reallocation of system resources without rebooting the affected partition and the creation of new partitions from resources removed from one or more partitions. Unused I/O expansion PCI slots and disk bays can also be populated concurrent with system operation to create new partitions. IBM's dynamic partitioning capabilities mean that partition changes can take effect much more rapidly, enabling companies to respond faster to changing requirements.

Extensive configuration options

In addition to performance and advanced partitioning capability, the pSeries 670 offers tremendous configuration flexibility to meet most capacity and growth requirements. Processor MCMs, L3 cache and memory books are packaged into a 24-inch system frame.

This frame, which contains 42 EIA units (42U) of rack space, uses a 350-volt DC bulk power subsystem with redundant hot-plug bulk power assemblies to provide power for other pSeries 670 components. Built for extensive attachability, it also houses a media drawer with five media bays and up to three 7040-61D I/O drawers (one is required)—each with 20 PCI or PCI-X adapter slots and 16 hot-swappable Ultra3 SCSI disk bays for 36.4GB, 73.4GB or 146.8GB disk drives. With support for 64-bit adapters and backward compatibility for 32-bit cards, these slots provide investment protection and ample room for growth.

For even greater levels of disk storage capacity and performance, many customers choose the IBM 2104 Expandable Storage Plus and IBM FAStT Storage Server. These storage solutions for the pSeries 670 offer terabytes of external data storage at Ultra320 and Fibre Channel speeds respectively.

Hot-plug/blind-swap slots also allow administrators to insert and remove adapters with the I/O drawer in place, which helps prevent system interruption and improves availability. When fully configured, a pSeries 670 server offers 60 PCI/PCI-X slots and 48 disk bays for extensive attachability, as well as up to 7.0TB of online disk storage.

pSeries Clustering

Clustering—an advanced computing technique designed to promote higher performance, scalability, availability and manageability—allows multiple pSeries servers to be interconnected to form a single, unified computing resource. Clusters of pSeries servers, which may include the pSeries 670, are known as the IBM @server Cluster 1600. Using software that has been designed to simplify and streamline the management of tens or hundreds of pSeries servers or server partitions, the Cluster 1600 can help reduce the cost of data center administration, while ensuring continuous access to business-critical data and applications. Diverse workloads such as Web serving and hosting, enterprise resource planning (ERP), enterprise resource management (ERM), supply chain management (SCM), business intelligence (BI) and high performance computing (HPC) can all benefit from the increased performance, scalability, availability and manageability offered by pSeries clusters.

With the Cluster 1600, companies can manage up to 128 operating system images from a single point-of-control. A higher scalability limit of 512 is available by special order. Up to 32 pSeries 670 servers, each with up to 16 LPARs, can participate in a Cluster 1600 (maximum of 128 LPARs per cluster). Each pSeries 670 server can be interconnected to an industry standard Ethernet network or to an IBM SP™ Switch2 network using a PCI-X adapter.

Grid readiness

The pSeries 670 is designed to participate in Grid Computing—an emerging technology that creates virtual computing resources across an intranet or the Internet using industry-standard protocols. By harnessing unused computing cycles, Grid Computing allows organizations to make more efficient use of existing resources, giving them additional computing power while lowering their overall cost of computing.

Keeping businesses running

Several innovations stemming from the IBM autonomic computing initiative—a blueprint for self-managing systems—help contribute to uncompromising pSeries reliability, manageability and serviceability features. Its goal is to create an intelligent IT infrastructure that responds to unexpected capacity demands or to system failures while at the same time helping to control spiraling pressure on critical skills, software and service/support costs.

To boost availability, an integrated service processor in every pSeries 670 server monitors system health. This feature can detect error conditions within the hardware and automatically place a service call to IBM, often before the problem becomes apparent to users. Then, if repairs are necessary, the service processor can initiate dynamic reconfiguration to correct the failure. In this manner, automated monitoring helps businesses minimize costly outages and reduce administrative overhead and support costs.

First Failure Data Capture (FFDC) identifies and logs both the source and root cause of system failures to help prevent the reoccurrence of intermittent failures that diagnostics cannot reproduce. Designed to prevent outages and reduce repair time by identifying failing components in real time, FFDC also contributes to outstanding pSeries system availability.

To help prevent system shutdowns caused by main memory and L2/L3 cache errors, error checking and correcting (ECC) memory detects both single- and double-bit errors and corrects all single-bit errors dynamically—complementing Chipkill memory to improve reliability. In addition, the pSeries 670 includes redundant, spare main memory chips. Through a technique known as bit-steering, these spares can be dynamically activated to replace a failing memory chip if multiple memory bit errors exceed a threshold.

The use of IBM Chipkill technology allows detection and correction of most multi-bit memory errors on the pSeries 670. This protection from memory failures helps prevent costly system memory crashes and improve pSeries reliability. In fact, IBM studies show that systems with Chipkill memory are up to 100 times less likely to have outages because of memory failure[2].

The pSeries 670 server also features the ability to deallocate critical system resources, including the processors and PCI-X bus slots. In the unlikely event that one of these components fails or indicates an impending failure, this capability—working with AIX 5L and the service processor—can dynamically take the faulty component offline. The system automatically reassigns the workload to other processors to avoid interruption. If the system must be rebooted, previously deallocated components will not be included to avoid repetition of the error condition. Failing components can be replaced during normal service to minimize system and application downtime.

Reliability and availability features also include redundant hot-plug power supplies and cooling fans, designed for easy replacement without affecting system operations. Environmental monitoring functions—such as temperature monitoring that increases the fan speed in response to above-normal temperatures—boost reliability by helping to maintain the correct conditions for stable system operation.

For near-continuous availability, from 2 to 32 pSeries 670 servers can be clustered with High Availability Cluster Multiprocessing (HACMP) software from IBM. HACMP helps minimize downtime of systems and applications, providing a superior base for high availability—an essential ingredient in business-critical environments.

Open standards for e-business

The pSeries 670 server is matched with AIX 5L—the advanced, open, scalable UNIX operating system from IBM. Providing real value in reliability, availability and security, AIX 5L is tuned for e-business application performance and is recognized as state-of-the-art in systems and network management.

AIX 5L delivers Java™ technology, Web performance and scalability enhancements for managing systems of all sizes—from single servers to large, complex e-business installations. Web-based remote management tools give administrators centralized control of the system, enabling them to monitor key resources such as adapter and network availability, file system status and processor workload. AIX 5L also incorporates Workload Manager, which can help ensure that critical applications remain responsive even during periods of peak system demand.

The pSeries 670 exemplifies the IBM @server commitment to application flexibility through open standards. In addition to including enhanced Java scalability and performance, AIX 5L provides application programming interfaces (APIs) that allow popular Linux Open Source applications to run on AIX 5L with a simple recompilation. The AIX Toolbox for Linux Applications provides utilities, editors, debuggers and other application development tools to aid in this recompilation.

Linux support offers versatility

The Linux operating system is available for the pSeries 670 from one or more Linux distributors, offering packages that include a complement of Open Source tools and applications. Linux does not require the use of AIX 5L. Linux applications can run independently in an LPAR, which allows them to utilize I/O resources and benefit from many of the performance features of the pSeries 670[3]. IBM Global Services and Linux distributors offer service and support offerings for Linux.

pSeries 670 at a glance

Minimum configuration	
Processor:	4-way SMP (one 4-way MCM); 1.5 GHz POWER4+
L3 cache	128MB (ECC)
RAM (memory):	4GB
Disk bays:	16 hot-swappable via one 7140-61D I/O drawer
Media bays:	Five (four available)
Expansion slots:	20 PCI or PCI-X (64-bit) via one 7140-61D I/O drawer (speeds up to 133 MHz)
PCI bus width:	32- and 64-bit
I/O adapters	Two integrated Ultra3 SCSI controllers
Ports	Two serial ports for connecting Hardware Management Console for pSeries
System expansion	
SMP configuration:	8- or 16-way SMP (one or two 8-way MCMs); 1.5 GHz POWER4+
L3 cache:	128MB per MCM (256MB maximum)
RAM:	Up to 256GB (ECC, Chipkill)
PCI/PCI-X expansion slots:	Up to 60 adapters via two additional 7140-61D I/O drawers
Disk bay expansion:	Up to 32 hot-swappable disk bays via two additional 7140-61D I/O drawers; up to 7.0TB (36.4GB, 73.4GB and 146.8GB disk drives available)
Battery backup:	Up to two (optional)
Cluster features	
Cluster management:	Cluster Systems Management (CSM) v1.3 with AIX 5L v5.2 PSSP v3.5 with AIX 5L v5.1/5.2
Cluster Interconnect:	Ethernet (CSM or PSSP) SP Switch2 (PSSP only)
RAS features	Copper, SOI microprocessors Chipkill ECC, bit-steering memory ECC L2 cache, L3 cache Service processor Hot-swappable disk bays Hot-plug/blind-swap PCI/PCI-X slots Hot-plug power supplies and cooling fans Dynamic deallocation of logical partitions and PCI bus slots Redundant power supplies and cooling fans Battery backup (optional)
Operating systems	AIX 5L Versions 5.1/5.2 Selected Linux distributions*
Operating environment	
Power requirements:	200 v to 240 v; 380 v to 415 v; 480 v AC
Physical characteristics	
Dimensions:	79.7" H x 30.9" W x 58.8" D (202 cm x 79 cm x 149 cm)
Weight:	2,605 lb (1,184 kg)**
Warranty	On-site 24x7 for one year (limited) at no additional cost

* Details on supported Linux distributions may be found at **ibm.com**/servers/eserver/pseries/linux/whitepapers/linux_pseries.html

** With acoustic door. Weight will vary when disks, adapters and other peripherals are installed.

Greater application choice

The entire IBM @server product line offers uncompromising flexibility in selecting, building and deploying the applications that businesses need to succeed in today's on demand world. Toward that end, IBM offers one of the industry's broadest ranges of hardware platforms and systems software. IBM is committed to industry-standard, cross-platform technologies that form the core of a flexible computing infrastructure.

Support for these standards in key middleware—including DB2® Universal Database™, WebSphere® and MQSeries® software—means that companies need not get locked into a single platform as their business grows. By embracing open standards, organizations gain the flexibility to deploy applications in a cost-effective way.

Managing an on demand business

The IBM @server product line is backed by a comprehensive suite of offerings and resources that provide value at every stage of IT implementation. In addition to building on IBM innovations in chip technology, clustering and multiplatform design, the pSeries 670 also leverages flexible Capacity on Demand features to provide one of the most scalable and rapidly adaptable servers available today. In an on demand world, having the agility to scale up at a moment's notice can be the difference between capturing a flood of orders following a weekend advertising blitz or alienating buyers with slow system response times and poor service.

Capacity Upgrade on Demand (CUoD) for processors and memory allows businesses to anticipate growth and workload requirements by bringing reserve resources online incrementally. When extra power becomes necessary, administrators activate pre-installed processors in pairs—or memory in 4GB increments—on a permanent basis. Dynamic LPAR can make this activation seamless. By bringing capacity online as processing demands grow, companies can easily and economically scale to meet market requirements.

In environments where the applications running on the pSeries 670 are mission-critical, it is possible to install an affordable backup server with Capacity BackUp (CBU) functionality. The CBU system with four active and 12 inactive processors remains in standby mode until needed for disaster recovery. The price of the backup system is less than the production system since its resources are only activated when the production system is down.

On/Off Capacity on Demand for processors also gives pSeries 670 systems the ability to handle business spikes. This feature works like a debit card, allowing the temporary activation of pairs of reserve processors. Companies pay only for the processing power they need, when they need it—which makes the pSeries 670 a great server to support unanticipated or seasonal peak workloads.

In environments with CUoD for processors, an availability-enhancing feature known as Dynamic Processor Sparing allows inactive processors to act as dynamic spares. By transparently activating an inactive CPU when a failing processor reaches an error threshold, Dynamic Processor Sparing can help maintain performance and improve system availability. When the failing processor returns to service, the spare returns to the inactive CUoD processor pool of resources.

In addition, IBM Global Services experts can help with business and IT consulting, business transformation, total systems management services and customized e-business solutions.

Simple upgrade paths
To provide investment protection for customers who need more processing capacity than that provided by a 16-way pSeries 670, IBM offers a p670 to p690 model conversion. Through this offering, customers can convert an installed 16-way p670 to a p690 with serial number protection.

Enterprise-class security for safe data
The pSeries 670 builds on IBM innovations in encryption—as well as performance and manageability—to safeguard sensitive information. Earning the U.S. government's highest certification for commercial security (Cryptographic Coprocessor with Federal Information Coprocessing Standard (FIPS) Certification—140-Level 4), pSeries servers with AIX 5L are among the world's most well protected. This outstanding level of safety enables companies to conduct business through secure transactions while protecting customers and suppliers.

IBM provides around-the-clock support
pSeries 670 systems are backed by worldwide service and support from IBM. The end-to-end, one-year basic warranty includes AIX 5L operating system support, hardware fixes, manned phone hardware support and call tracking.

This hardware warranty provides 24x7x365 coverage. The warranty terms and conditions may be different in some countries. Please consult your local IBM marketing representative or IBM Business Partner for country-specific terms and conditions.

Flexible Financing
IBM Global Financing offers a wide range of financing options to help manage the bottom-line and meet the varying needs of e-business on demand.

Uncompromising functionality for on demand computing
IBM advances in processor technology, clustering, scalability and autonomic and on demand computing put pSeries servers among the most powerful, versatile, reliable and secure computers in the world. The pSeries 670—as a premier member of the pSeries product line—can deliver a highly available, cost-effective system tuned for e-business and a range of diverse workloads. Through its uncompromising performance and flexibility, the pSeries 670 provides truly enterprise-class UNIX and Linux computing—giving a company the tools it needs to meet the challenges of the on demand era.

For more information

To learn more about the IBM @server pSeries 670, contact your IBM marketing representative or IBM Business Partner, or visit the following Web sites:

- **ibm.com**/eserver/pseries
- **ibm.com**/servers/aix
- **ibm.com**/eserver/pseries/linux
- **ibm.com**/servers/solutions
- **ibm.com**/ibmlink

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[1] Based on SPEC CPU2000 benchmarks on a 1.7 GHz POWER4+ processor as of October 14, 2003, available at www.spec.org.

[2] IBM study by Timothy J. Dell, "A White Paper on the Benefits of Chipkill-Correct ECC for PC Server Main Memory," November 19, 1997. Available at **ibm.com**/servers/eserver/pseries/campaigns/chipkill.pdf

[3] Many of the pSeries 670 features described in this document are operating system dependent and may not be available with the Linux operating system. For more information, please visit **ibm.com**/servers/eserver/pseries/linux/whitepapers/linux_pseries.html

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