IBM @server **pSeries 690**

The powerful IBM @server pSeries 690

Highlights

■ *Datacenter-class reliability and consolidation support for mission-critical applications on a single UNIX® server*

■ *Advanced self-management capabilities help provide uninterrupted operation and lower total cost of ownership*

■ *High-performance computing (HPC) option provides the power to handle demanding scientific and commercial workloads*

Setting a new standard

Take the world's most advanced UNIX server design, then add the world's fastest microprocessors and incorporate mainframe-inspired technologies.[1] The result is the IBM @server pSeries™ 690, which delivers unprecedented scaling, performance, reliability, flexibility and manageability for today's demanding e-business environment.

The pSeries 690 is an innovative 8- to 32-way symmetric multi-processor (SMP) server that rede-fines the UNIX landscape. It represents the next generation of performance leadership from IBM,

nearly doubling the power of the pSeries 680, previously the most powerful pSeries server available.[2]

In addition to unparalleled speed, the pSeries 690 has the ability to consolidate critical applications on a single, datacenter-class server. As a result, this powerful server can simplify the transformation of an e-business infrastructure even as an enterprise prepares to handle increasing growth. There are fewer servers to manage and maintain, and available capacity can be used more effectively with greater flexibility in matching resources to meet changing business demands.

The best gets better

The pSeries 690 is an integral part of the IBM @server product line— innovative servers that can help lower costs, improve efficiency and speed e-business transformation. The foundation of this server class is advanced technology from across IBM. For example, the pSeries 690 draws on decades of IBM mainframe experience to deliver industry-leading technological capabilities.

The pSeries 690 incorporates the latest advances in chip technology from IBM, the POWER4 microprocessor. In fact, these copper/Silicon-on-Insulator (SOI) chips are the fastest processors in the world.[1]

POWER4 represents the first "SMP-on-a-chip" design for high-end UNIX servers. Two processors with Level 2 (L2) cache are incorporated on each chip. In this configuration, a single POWER4 chip can deliver almost 125GB per second of data from L2 cache to the processor. Advanced multichip module (MCM) packaging, similar to that used in IBM @server zSeries™, places up to eight POWER4 processors onto a package that can fit in the palm of the hand. To further enhance performance, 128MB of Level 3 (L3) cache is attached to each module.

The rest of the system is designed to match the incredible speed of POWER4. Compared to the pSeries 680, maximum memory has more than doubled, to 256GB, and memory bandwidth has increased to over 200GB/sec. I/O bandwidth has been increased eightfold to 16GB/sec. The result is a remarkable combination of speed, power and reliability that delivers incredibly efficient and cost-effective data sharing and performance.

This balance of processor performance and bandwidth gives the pSeries 690 the flexibility to handle both compute-intensive and demanding commercial workloads. An optional high-performance computing (HPC) configuration offers a cost-effective choice for organizations running applications such as computational fluid dynamics, oceanographic modeling or petroleum reservoir simulation.

The physical design of the pSeries 690 offers tremendous flexibility. One rack holds the processors as well as up to four I/O drawers; up to four additional drawers can be added in a second rack. Each I/O drawer can contain up to 16 hot-swappable disks of 18.2GB or 36.4GB. That's a maximum of 582GB per drawer, more than 4.5TB across all eight drawers.

Each drawer contains up to 20 PCI slots, for a maximum of 160 PCI slots per system.

These slots support the latest 64-bit adapters as well as offer backward compatibility for 33MHz 32-bit cards, thus providing investment protection as well as room for growth. All PCI slots are "blind-swap"—adapters can be added or removed without moving the I/O drawer to a service position and without system interruption. The pSeries 690 has recoverable PCI buses, where parity errors do not cause a system failure.

Optional dual battery backup units are also available to further enhance system reliability should a power failure occur.

Building on IBM's mainframe heritage, the pSeries 690 delivers true logical partitioning. Each server can be divided into as many as 16 "virtual" servers, each with its own set of system resources such as processors, memory and I/O. Unlike partitioning techniques available on other UNIX servers, logical partitioning provides greater flexibility in matching resources to workloads. Based on business requirements, resources can be assigned in any amount or combination for business-critical applications.

In 2002, the pSeries 690 will be able to dynamically reconfigure partitions—while still operating—to meet changing workload demands.

In the near future, up to 16 pSeries 690 servers will be able to be clustered together and managed from a central point of control with the IBM Parallel System Support Programs (PSSP) for AIX®. First introduced on the IBM RS/6000® SP™, the world's most popular supercomputer according to the TOP500 list,[3] PSSP will manage multiple copies of the AIX operating system on pSeries 690 servers or on logical partitions easily and cost-effectively. With the addition of the high-performance SP Switch2, clustering of pSeries 690 servers will also provide extreme scalability for computationally demanding applications in high-performance computing and for multi-terabyte databases. The pSeries 690 can be added to existing clusters of RS/6000 and pSeries servers. For near continuous operations, pSeries 690 servers can be clustered with industry-leading HACMP software from IBM.[4]

Lower cost of computing

The pSeries 690 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, in essence gaining additional computing power while lowering their overall cost of computing.

Better management

Establishing and maintaining a competitive advantage depends on finding a way to manage the e-business infrastructure as well as keeping key applications available and responsive while controlling costs. That's a significant challenge when the average company is dealing with many different architectures and a shortage of key Information Technology (IT) skills.

To help organizations deal effectively with increased complexity, IBM announced Project eLiza, a blueprint for self-managing systems. Its goal is to create an intelligent, self-managing IT infrastructure that responds to unexpected capacity demands or to system failures. By using technology to minimize human intervention, businesses can react faster to changing circumstances while at the same time controlling spiraling pressure on critical skills, software and service/support costs.

The pSeries 690 incorporates many leading self-managing system capabilities from across the IBM @server product line. For example, the pSeries 690 uses patented Chipkill™ memory from IBM. Our studies show that Chipkill can reduce memory failures by as much as one 100-fold.[5] The pSeries 690 also includes an intelligent service processor that can anticipate impending problems and take corrective action, including placing a service call and positively identifying the component without operator intervention. And the server has the ability to dynamically deactivate faulty processors, L2 cache, L3 cache, logical partitions and PCI buses. It also can automatically bypass failing L3 cache and memory, thus redirecting work to other resources to avoid interruption.

New tools for managing e-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. These tools can help customers test possible solutions, obtain financing, plan and implement applications and middleware, manage capacity and availability, improve performance and obtain technical support across the entire infrastructure. The result is an easier way to handle the complexities and rapid growth of e-business.

An excellent example is Capacity Upgrade (planned for second half of 2002) that allows inactive processors and memory to be pre-installed in the server, then activated incrementally, for a fee, when needed.

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

The AIX advantage

The pSeries 690 is matched with AIX, the high-performance, open, Linux®-enabled UNIX operating system from IBM. AIX delivers Java™ technology, Web performance and scalability enhancements. It offers Web-based remote management tools to control the system and monitor key resources such as network availability, file system status and processor workload. For example, AIX incorporates Workload Manager, which can help ensure that critical applications remain responsive even during periods of peak system demand. And AIX runs across all pSeries and RS/6000 servers for greater compatibility and investment protection.

The latest release of AIX, AIX 5L™ Version 5.1, adds new functionality to further improve security, system availability and Workload Manager. In fact, the System Management and Internet/Web-application services of AIX 5L rank as industry leaders.[6]

Greater application choice

The pSeries 690 represents the IBM @server commitment to true application flexibility through open standards. In addition to including enhanced Java scalability and performance, AIX 5L provides integrated Linux-compatible Application Programming Interfaces (APIs) that allow popular Linux and Open Source applications to run on AIX with a simple recompilation. The AIX Toolbox for Linux Applications (distributed "AS IS" with AIX 5L) provides utilities, editors, debuggers and other application development tools to aid in this recompilation.

The pSeries 690 is the first high-end UNIX server capable of running Linux natively in a partition—64-bit native Linux support is anticipated to be available from a number of distributors in the near future. This opens the possibility for greatly simplifying an e-business infrastructure. Linux-based Internet applications can share the same resources and benefit from the performance and reliability advantages of the pSeries 690.

Feature	Benefits
POWER4 microprocessors	• "SMP-on-a-chip" provides improved system performance and higher reliability in a smaller, more efficient package • Expand performance levels for SMP commercial applications • Enable capacity to grow to 32 processors
Choice of processor options	• Provide flexibility to grow in performance as workloads increase with minimal disruption and incremental cost • Offer superior performance for high-performance computing challenges
Copper and SOI technology	• Improve processor performance and reliability while using less power and producing less heat, thus conserving energy for both operation and cooling
Approximately 128MB L3 cache per MCM	• Provides increased performance
High memory and I/O bandwidth	• Remove performance bottlenecks that can occur when fast processors must wait for data to be moved through the system
Up to 256GB ECC SDRAM Memory	• Allows faster performance and exploitation of 64-bit addressing for large database or high-performance computing applications • Provides growth options for significantly increased capacity
Chipkill memory	• Designed to reduce system outages, caused by memory failures • Minimizes the potential for loss of data
Logical Partitioning	• Permits multiple applications to be consolidated on a single server, reducing the number of systems to manage and maintain • Offers greater flexibility in using available capacity and matching resources to changing business requirements
64-bit system architecture	• Supports larger amounts of memory so applications can keep more information accessible in fast access memory (less need to retrieve from online storage), thus allowing applications to run faster
Up to 160 PCI hot-plug adapter slots and 4.6TB of disk storage	• Provide growth options for significantly increased capacity • Support many commonly used adapters for increased availability at a lower cost
Hot-swappable disk drive bays	• Provide greater system availability and smooth growth by allowing swapping or adding of disk drives without powering down the system
Redundant hot-plug power and cooling subsystems	• Enhance system availability as cooling fans or power supplies can be changed without interrupting operations
Built-in service processor	• Designed to continuously monitor system operations and take preventive or corrective actions for quick problem resolution and high system availability • Allows diagnostics and maintenance to be performed remotely
Dynamic processor, memory, L2/L3 cache and PCI bus deallocation	• Capable of automatically deallocating resources when impending failure is detected, thus enabling applications to run without interruption
Concurrent 32- and 64-bit application support	• Allows customers to run 32- and 64-bit applications at the same time, helping to protect existing investments while enabling a move to more advanced technology
AIX clustering	• Provides centralized management of multiple systems • Provides ability to handle unexpected workload peaks by sharing resources • Allows for more granular growth so user demands can be readily satisfied
AIX operating system	• Maintains compliance with UNIX 98 specifications • Supports full interoperability and coexistence between 32- and 64-bit applications with processes that may run concurrently and cooperatively • Provides an AIX binary-compatible environment that helps assure continuing application availability across AIX releases when binary-compatibility rules are observed

IBM @server pSeries 690 at a glance

Standard configuration

Microprocessor:	8-way SMP; 1.1 GHz POWER4 (1x8-way MCM)
RAM (memory):	8GB
Internal disk drive:	Two 18.2GB Ultra SCSI
Internal disk bays:	16 hot-swappable
Media bays:	Five
Expansion slots:	20 PCI (64-bit)
PCI bus width:	32- and 64-bit

**High-Performance Computing
standard configuration**

Microprocessor:	8-way SMP; 1.3 GHz POWER4 HPC (2x4-way MCM)

Standard features

I/O adapters:	Two integrated Ultra3 SCSI controllers
Ports:	Two serial, two ports for connecting Hardware Management Console for pSeries

Operating systems	AIX 5L Version 5.1 (unlimited user license)
	64-bit Linux distributions available through selected third parties

System expansion

SMP configurations:	16-, 24-, 32-way SMP; 1.1 GHz POWER4 or 1.3 GHz POWER4 Turbo (up to 4x8-way MCM)
RAM:	Up to 256GB
PCI expansion slots:	Up to 160 adapters and up to 96 Internal disk bays
Internal disk storage:	Up to 4.6TB (18.2GB and 36.4GB drives available)
Internal media bays:	Up to five
Optional battery backups:	Up to two

**High-Performance Computing
microprocessor expansion**

SMP configurations:	16-way SMP; 1.3 GHz POWER4 HPC (4x4-way MCM)

System dimensions	79.5"H x 30.9"W x 56.8"D (202cm x 79cm x 144cm);
	Weight 2,666 lb (1,209 kg)*

Warranty	Onsite 24x7 for one year (limited) at no additional cost

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

Summary

The pSeries 690 defines what businesses can expect from a datacenter-class UNIX server.

It is the most powerful, technologically advanced UNIX server available—at least a generation ahead of the competition in terms of performance and self-managing capabilities.

Offering unprecedented flexibility in terms of configuration and interoperability, the pSeries 690 can easily support workload consolidation and facilitating Linux and AIX applications to run side-by-side in separate partitions.

Additionally, the pSeries 690 has the power, reliability and flexibility to integrate and extend mission-critical operations—enterprise resource planning, customer relationship management and supply chain management. Thus, customers and business partners can be reached more rapidly and efficiently. It provides the raw number-crunching capabilities and near-linear scalability required for high-performance computing challenges. All of which comes from an easy-to-manage system.

The pSeries 690 sets the standard against which to measure all UNIX servers. There's simply nothing else like it.

For more information

To learn more about the IBM @**server** pSeries 690, contact your IBM marketing representative, IBM Business Partner or visit the following IBM Web sites:

- **ibm.com**/servers/eserver/pseries
- **ibm.com**/servers/aix
- **ibm.com**/servers/solutions
- **ibm.com**/servers/hpc
- **ibm.com**/servers/eserver/ introducing/eliza
- **ibm.com**/ibmlink

IBM

[1] SPECcpu 2000 benchmark submitted to SPEC
10/3/01 available at www.spec.org

[2] **ibm.com**/servers/eserver/pseries/hardware/
system_perf.html

[3] *TOP500 Super Computer List 6/01* available at
www.top500.org

[4] *Competitive Analysis of UNIX HA Functionality*,
D.H. Brown Associates, Inc., March 2000

[5] *IBM Chipkill Memory* white paper available at
ibm.com/pc/us/techlink/wtpapers/chipkill.html

[6] *2001 UNIX Function Review*, D.H. Brown
Associates, Inc., March 2001 and *IBM Flexes
UNIX Muscle with AIX 5L*, D.H. Brown Associates,
Inc., May 2001

GM13-0104-00