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## Highlights

- For server consolidation across UNIX, IBM i, and Linux workloads
  - For mid to large database serving
  - For mid to large transaction processing such as ERP and CRM applications
  - For a complete business system combining all aspects of a company's IT infrastructure
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# IBM Power 770 server

*Modular and scalable systems for business flexibility and IT efficiency*

Everyone knows what “performance” meant for IT in the past. Built on the foundation of POWER7® processor technology, Power Systems™ servers and blades continue to excel and extend industry leadership in traditional benchmarks of performance.

But the IT landscape is evolving rapidly. And, as processes become more interrelated and complex, IT is being called upon to solve challenging new problems—and implement new projects, both with higher service levels and in a more cost effective manner. IBM has the systems, software and expertise to help clients implement projects that make their IT an enabler of innovation and a catalyst for business change.

Today's IT performance means delivering services faster, with higher quality and with superior economics. The emerging measures of IT performance are around agility and the ability to help the business capitalize on new opportunities. IT is measured on providing an infrastructure that can handle rapid growth and manage business risk while meeting higher required service levels. And of course it is expected that new services will be delivered with tighter budget constraints—with IT expected to do more with less and find the lowest cost solutions possible.

Designed for virtualized consolidation of business-critical workloads, the IBM Power® 770 delivers on performance, availability, efficiency and virtualization in a way that is unique in the industry. PowerVM™ virtualization enables continuous, dynamic resource adjustments across all partitions and operating environments, independent of physical



placement, to optimize performance while minimizing energy usage. Supported environments include AIX®, IBM i, Linux for Power applications, all on the same system.

IBM Power clients continuously report savings from reduced hardware, software, energy, floor space and administrative overhead. Additional benefits include faster provisioning, increased application performance and an operational availability that can only come from IBM. All of this is delivered on the latest technology from a vendor you can trust. No wonder more and more companies are switching to IBM Power Systems™.

For database serving, the Power 770 provides a system designed for demanding, critical, back-end workloads. Demonstrating outstanding performance across multiple database solutions and multiple operating systems, the Power 770 shows its true heart and soul when entrusted with a company's most treasured IT asset, the database.

For transaction processing workloads, the IBM Power 770 server delivers outstanding performance, mainframe-inspired reliability, modular nondisruptive growth and innovative virtualization technologies. These features are integrated to enable the simplified management of growth, complexity and risk.

For complete business system needs, the Power 770 provides a unique combination of performance across multiple workloads and availability features to keep your business running. In addition, PowerVM virtualization helps to maximize your efficiency and nondisruptive growth options are designed to keep your costs in line with your business. With all this coming together in one integrated energy-saving package, the Power 770 makes a great business solution.



Power 770 modular building blocks

Now available in configurations up to 64 POWER7® processor cores, this new version of the popular modular design delivers more capacity with more efficiency than ever before. The result is more performance per system, more performance per footprint, and best of all, more performance per watt. This innovative design approach also enables near-linear scaling and nondisruptive growth while maximizing your investment. POWER7 technology, PowerVM virtualization and the Power 770—is the ideal combination for your IT environment.

Feature	Benefits
<b>Industry-leading POWER7 performance</b>	<ul style="list-style-type: none"> <li>• Better customer satisfaction due to improved response time to your customers</li> <li>• Infrastructure cost savings from a reduction in the number of servers and software costs</li> <li>• Improved efficiency in operations from consolidating multiple workloads on fewer systems</li> </ul>
<b>Exceptional PowerVM virtualization capability</b>	<ul style="list-style-type: none"> <li>• Improves system efficiency, which lowers operational expense</li> <li>• Provides flexibility in responding to changing business requirements</li> <li>• Enables energy savings and maintains application availability</li> <li>• Provides ability to handle unexpected workload peaks by sharing resources</li> <li>• Enables consolidation of multiple AIX, IBM i and Linux workloads</li> </ul>
<b>Mainframe-inspired availability features</b>	<ul style="list-style-type: none"> <li>• Better customer satisfaction due to improved application availability</li> <li>• Get more work done with less disruption to your business</li> <li>• Faster repair when required due to sophisticated system diagnostics</li> </ul>
<b>Nondisruptive growth options</b>	<ul style="list-style-type: none"> <li>• Enables your system to change with your business without forcing everything to stop</li> <li>• Aligns expense with usage without sacrificing performance or future growth options</li> </ul>
<b>Frugal EnergyScale™ technology</b>	<ul style="list-style-type: none"> <li>• Helps lower energy costs without sacrificing performance or business flexibility</li> <li>• Allows business to continue operations when energy is limited</li> </ul>
<b>Innovative Active Memory™ Expansion</b>	<ul style="list-style-type: none"> <li>• Enables more work to be performed with existing resources</li> <li>• Partition level control enables flexibility and optimization for workload</li> </ul>
<b>Broad business application support</b>	<ul style="list-style-type: none"> <li>• Allows clients the flexibility to select the right application to meet their needs</li> <li>• Helps keep you in the mainstream and off the bleeding edge</li> </ul>

## Industry-leading POWER7 performance

The POWER7 processor serves up several new and unique innovations to continue the long history of leadership performance that now serves as the standard for the industry. POWER6®, recognized as the world's fastest chip, must now make room for something even faster. The amazing fact is that the POWER7-based 770 system accomplishes this no small feat in 25 percent of the space, using over 70 percent less energy and produces more performance per core with less clock speed than comparable POWER6-based systems.<sup>1</sup> What this means is that applications can run faster and be more responsive, which can result in competitive advantages or higher customer satisfaction. In addition, a single system can now run more applications, which can drive utilization even higher and result

in infrastructure cost savings. The improved performance with POWER7 also enables clients to get more processing power with fewer processors, resulting in lower per-core software licensing costs.

POWER7 processors also feature Intelligent Threads technology, which enables workload optimization by dynamically switching between threading modes. Each application can be run in the most suitable threading mode; either single thread per core, simultaneous multithread (SMT) with two threads per core, or SMT with four threads per core. As a result, applications can run at their peak performance and systems can increase their workload capacity.

Also new with POWER7 is the ability of the processor to run at a higher frequency if environmental conditions permit, resulting in increased performance; or alternatively run at a lower frequency if user settings permit, resulting in greater energy efficiency. Operating in concert with IBM Systems Director Active Energy Manager™, this feature enables customization by partition for maximum performance, maximum energy savings or a mixture of both.

## **Exceptional PowerVM virtualization capability**

PowerVM is the family of technologies, capabilities and offerings that deliver industry-leading virtualization on IBM POWER processor-based systems. On the Power 770, PowerVM includes base components provided with IBM Power Systems firmware, which includes logical partitioning (LPAR) technologies. PowerVM allows any individual LPAR to access the maximum amount of memory and CPU cores that are available on the server. In addition, optional components in PowerVM Editions are designed to provide advanced virtualization technologies resulting in efficiencies in resource utilization and cost savings. These are managed through use of a hardware management console (HMC) or through IBM Systems Director software with the VMControl virtualization management plug-in.

PowerVM Standard Edition includes Micro-Partitioning™ and Virtual I/O Server (VIOS) capabilities, which are designed to allow businesses to increase system utilization, while helping to ensure applications continue to get the resources they need. VIOS allows for the sharing of disk and optical devices as well as communications and Fibre Channel adapters to help drive down complexity and systems/administrative expenses. Also included is support for Multiple Shared Processor Pools, which allows for automatic nondisruptive balancing of processing power between partitions assigned to the shared pools, and Shared Dedicated Capacity, which helps optimize use of processor cycles.

PowerVM Enterprise Edition includes all the features of Standard Edition plus Live Partition Mobility<sup>2</sup> (LPM) and PowerVM Active Memory Sharing.<sup>3</sup> LPM allows a partition to be relocated from one server to another with virtually no impact to the applications running inside the partition. LPM is designed to enable servers to work together to help optimize system utilization and energy savings, improve application availability, balance critical workloads across multiple systems and respond to ever-changing business demands. PowerVM Active Memory Sharing is an advanced memory virtualization technology that intelligently flows memory from one partition to another for increased utilization and flexibility of memory usage. With this memory virtualization enhancement IBM i, AIX, and Linux partitions can share a pool of memory and have PowerVM automatically allocate the memory based on the workload demands of each partition.

## **Active Memory Expansion**

Active Memory Expansion is a new POWER7 technology, which allows the effective memory capacity of the system to be much larger than the true physical memory. Innovative compression/decompression of memory content can allow memory expansion up to 100 percent. This can allow a partition to do significantly more work with the same physical amount of memory or a server to run more partitions and do more work for the same physical amount of memory.

## **Mainframe-inspired availability features**

Leading the world-class RAS capabilities provided for the Power 770 is Active Memory Mirroring for Hypervisor, which is designed to prevent a system outage in the event of an uncorrectable error in memory being used by the system hypervisor. Also available are a sophisticated service processor with a redundant service processor and clock for systems larger than one building block, hot-plug, hot-swappable, redundant components; Chipkill memory with additional DRAM sparing; First Failure Data Capture mechanisms; and dynamic

deallocation of system components. These capabilities help to increase system availability and allow more work to be processed with less operational disruption. For enhanced server availability, the Power 770 can be clustered with IBM PowerHA™ SystemMirror for disaster recovery (DR) or DB2® pureScale™ for continuous database availability.

Processor Instruction Retry and Alternate Processor Recovery are designed to enhance application availability and improve the quality of the service provided. Both technologies come standard on the Power 770 and provide for the continuous monitoring of processor status with the capability to restart a processor if certain errors are detected. If required, workloads can be redirected to alternate processors, all without disruption to application execution.

With proper planning and configuration, Hot-node Repair is designed to enable repair and replacement of components by deactivating a node with reduced impact to the system operation. When the repair is complete, the module can be brought back online and the new resources made immediately available for assignment to new or existing application environments. This capability can also be used to add additional memory without bringing the system down. Now enabled for all nodes within the system this unique capability helps define what it means to be an IBM Power enterprise system.

### **Nondisruptive growth options**

IBM's modular design allows clients to start with what they need and grow by adding additional building blocks, all with minimal disruption to the base system. This is accomplished via a new innovative feature for the Power 770 referred to as Hot-node Add, just one part of the overall availability story with IBM Power enterprise systems.

As enhanced growth options, several types of Capacity on Demand (CoD) are optionally available. Clients can install processors or memory and activate them on a 30-day trial

(Trial CoD), a day-to-day basis (On/Off CoD) or permanently (Capacity Upgrade on Demand (CUoD)). Additionally, Utility CoD allows clients to install processors and have them automatically activated as needed on a minute-to-minute basis. Clients may start small and grow with systems designed for continuous application availability.

### **Frugal EnergyScale technology**

As the price of energy increases and capacity limits become more common, optimization of available power has become increasingly vital. Consolidating onto IBM Power Systems using PowerVM virtualization technologies provides you the best way to maximize your service to clients while minimizing your energy consumption. The Power 770 offers over four times the capacity of standard POWER6 570 systems while consuming only 14 percent more energy.<sup>5</sup> Consolidating older systems, especially those from other vendors, provide an even more dramatic reduction in energy usage.

IBM's PowerVM Editions can help simplify and optimize your IT infrastructure by reducing energy and infrastructure costs. IBM Systems Director Active Energy Manager software exploits POWER7 EnergyScale technology by monitoring power/thermal utilization and actively adjusting system operations through energy management features for improved system utilization and energy efficiency. The entire hardware and software environment is designed to work in concert to provide you total operational control of your energy policy.

### **Broad business application support**

The Power 770 is designed to give clients the flexibility to run the AIX, IBM i and Linux operating systems concurrently. The AIX operating system, IBM's industrial-strength UNIX environment, has delivered exceptional reliability, availability, and security for business-critical applications. AIX and Power Systems have received numerous awards for delivering the best availability of any server platform outside the mainframe.

AIX is designed to be compliant under the Common Criteria of CAPP/EAL4+ and has a history of receiving that certification for AIX including certification for the Virtual I/O Server, and Workload Partitions virtualized environments. The most recent version of AIX includes substantial security, availability, manageability and virtualization features that are designed to deliver even more capability to provide a secure, efficient platform for our clients most demanding workloads.

IBM i is the integrated operating system for Power Systems that is built for efficiently deploying business processing applications. IBM i integrates a trusted combination of relational database, security, Web services, networking and management capabilities. It is a highly scalable operating system, delivering the capability to run multiple applications on a single instance of the operating environment. IBM i offers a virus-resistant

architecture with a proven reputation for exceptional business resiliency. Running applications based on this platform has helped companies over many years to focus on innovation and delivering new value to their business, not just on managing their data center operations.

The Red Hat and Novell/SUSE Linux for Power operating systems may be ordered from IBM and select Linux distributors and include many open source applications, tools and utilities. IBM is firmly committed to Linux and has enabled many of the unique Power Architecture® technologies into the Linux kernel. The Power 770 platform offers the flexibility and performance to consolidate x86 servers running a mix of web, application and database workloads, helping clients to better manage growth without adding complexity.

#### IBM Power 770 at a glance

Configuration Options	Per building block	System maximum
Processors	Two 3.3 GHz POWER7 processor modules with eight cores each or Two 3.7 GHz POWER7 processor modules with six cores each	Eight 3.3 GHz POWER7 processor modules with eight cores each or Eight 3.7 GHz POWER7 processor modules with six cores each
Sockets	Two	Eight
Level 2 (L2) cache	256 KB L2 cache per core	256 KB L2 cache per core
Level 3 (L3) cache	4 MB L3 cache per core (eDRAM)	4 MB L3 cache per core (eDRAM)
Enterprise Memory	Up to 1 TB of 1066 MHz DDR3 Active Memory Expansion	Up to 4 TB of 1066 MHz DDR3 Active Memory Expansion
Integrated SAS bays for Solid State Drives (SSD) or Hard Disk Drives (HDD)	Up to six SFF SAS drive bays	Up to 24 SFF SAS drive bays
Integrated media bays	One slimline for SATA DVD-RAM	Four slimline for SATA DVD-RAMs
Integrated PCI adapter slots	Six PCIe Gen2 slots	24 PCIe Gen2 slots
Integrated multifunction card	One per enclosure: • Dual 10 Gb + Dual 1 Gb	Up to four per system: • Dual 10 Gb + Dual 1 Gb
Integrated SAS controllers	Two SAS DASD/SSD controllers One SATA media controller	Eight SAS DASD/SSD controllers Four SATA media controllers
Other integrated ports	Three USB; two HMC; two SPCN	Nine USB; four HMC; four SPCN
GX slots (12X)	Two	Eight

## IBM Power 770 at a glance

### Expansion features (optional – operating system dependencies)

I/O expansion	Up to 4 PCIe 12X I/O drawers Up to 8 PCI-X DDR 12X I/O drawers	Up to 16 PCIe 12X I/O drawers Up to 32 PCI-X DDR 12X I/O drawers
High-bandwidth PCI adapters	6 Gigabit SAS 8 Gigabit Fibre Channel 10 Gigabit Ethernet 10 Gigabit Fibre Channel over Ethernet 40 Gigabit QDR	
Other PCI adapters supported	SAS, Fibre Channel, Ethernet, SCSI, WAN/Async, USB, Crypto, iSCSI	

### PowerVM virtualization technologies

POWER Hypervisor™	LPAR, Dynamic LPAR; Virtual LAN (Memory to memory interpartition communication)
PowerVM Standard Edition (optional)	Micropartitioning with up to 10 micropartitions per processor; Multiple Shared Processor Pools; Virtual I/O Server; Shared Dedicated Capacity
PowerVM Enterprise Edition (optional)	PowerVM Standard Edition plus Live Partition Mobility (LPM) <sup>2</sup> and Active Memory Sharing (AMS) <sup>3</sup>

RAS features	Processor Instruction Retry Alternate Processor Recovery Selective dynamic firmware updates Chipkill memory Memory DRAM sparing ECC L2 cache, L3 cache Redundant service processors with automatic failover <sup>3</sup> Redundant system clocks with dynamic failover <sup>3</sup> Hot-swappable disk bays Hot-plug/blind-swap PCI slots Hot-add I/O drawers Hot-plug power supplies and cooling fans Dynamic Processor deallocation Dynamic deallocation of logical partitions and PCI bus slots Extended error handling on PCI slots Redundant power supplies and cooling fans Active Memory Mirroring (optional)
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<b>Capacity on Demand features</b> (optional)	Processor and/or Memory CUoD On/Off Processor and/or Memory CoD Trial Processor and/or Memory CoD Utility CoD
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Operating systems	AIX, IBM i and Linux for Power <sup>6</sup>
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High availability	IBM PowerHA family
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Power requirements	Operating voltage: 200 V ac to 240 V ac Power consumption: 1,600 watts maximum per enclosure
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<b>System dimensions</b>	Power 770 rack drawer building block: 6.9 in. H (4U) × 19.0 in. W × 34.0 in. D (174 mm × 483 mm × 863 mm) Weight 155 lbs (70.3 kg) <sup>7</sup>
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<b>Warranty</b> (limited)	Nine hours per day, Monday through Friday (excluding holidays), next business day for one year at no additional cost; onsite for selected components; CRU (customer replaceable unit) for all other units (varies by country). Warranty service upgrades and maintenance are available.
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## For more information

To learn more about the IBM Power 770 server, please contact your IBM representative or IBM Business Partner, or visit the following Web sites:

- [ibm.com/systems/power/](http://ibm.com/systems/power/)
- [ibm.com/servers/aix](http://ibm.com/servers/aix)
- [ibm.com/systems/i/advantages/index.html](http://ibm.com/systems/i/advantages/index.html)
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All performance information was determined in a controlled environment. Actual results may vary. Performance information is provided “as is” and no warranties or guarantees are expressed or implied by IBM. Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of a system they are considering buying.

When referring to storage capacity, total TB equals total GB divided by 1,000; accessible capacity may be less

<sup>1</sup> Comparison between a single-node 16-core POWER7 770 system and a four-node 16-core POWER6 570 system

<sup>2</sup> Live Partition Mobility not supported on IBM i 6.1

<sup>3</sup> Active Memory Sharing requires AIX 5.3-12 SP5, IBM i 6.1 or later, SUSE Linux Enterprise Server 10 SP4 for Power or later, or Red Hat Enterprise Linux 6.1 or later.

<sup>4</sup> Requires two or more enclosures (nodes)

<sup>5</sup> Comparison between a four-node 64-core POWER7 770 system and a four-node 16-core POWER6 570 system

<sup>6</sup> See Facts and Features for specific supported operating system levels

<sup>7</sup> Weight will vary when disks, adapters and peripherals are installed



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