Rugged, powerful mid-range server

IBM @server pSeries 660 Model 6M1

IBM @server pSeries 660 Model 6M1 mounted in a 7014-T00 rack

Highlights

- ***World-class performance and expandability in a 2- to 8-way UNIX® server***
- ***Rack-mount packaging for configuration flflexibility, ease-of-growth and reduced floor space***
- ***Rugged NEBS Level 3 design with features such as redundancy, hot-plug design and advanced recovery techniques for exceptional availability and reliability***

Exceptional rack package

The IBM @server pSeries™ 660 Model 6M1 is an advanced symmetric multiprocessing (SMP) mid-range rack server. Combining the versatile 19-inch rack packaging of the popular IBM RS/6000® Model M80 with the design and technology of the pSeries product line, the pSeries 660 Model 6M1 brings extraordinary levels of configuration flexibility, performance, reliability and value to demanding business environments.

The Model 6M1 is a member of the IBM @server product line – advanced servers that can help lower costs, improve efficiency and speed e-business transformation.

The Model 6M1 is targeted to meet the critical requirements of e-business infrastructures including enterprise resource planning, supply chain management and business intelligence solutions. In these environments, it is an excellent application or database server with powerful processors and outstanding memory capacity. For e-business, it excels as a highly reliable and fast business-to-business Web server.

The Model 6M1 is Network Equipment Building System (NEBS) Level 3 compliant and offers special features such as redundant -48 volts DC power for telecommunication central office operations and server farm environments.

Proven technology in a mid-range server

The pSeries 660 Model 6M1 server offers the same advanced technology as the widely acclaimed pSeries 680 in an affordable rack-mountable package. The minimum configuration of two 64-bit 500 or 750 MHz copper chip microprocessors can be expanded to four (500 MHz) and to eight (750 MHz) processors in increments of two.

The 750 MHz processors utilize unique copper and silicon-on-insulator (SOI) technology. The result is high performance with less power comsumption and lower heat generation for higher levels of reliability and system availability.

The Model 6M1 has an integrated system switch connecting the processors, memory and I/O. The switch has an outstanding total aggregate system bandwidth of 23.2GB/sec.

The Model 6M1 also comes standard with 2GB memory, which can be increased to 64GB. In addition, the 750 MHz processor has 8MB of Level 2 (L2) cache to further boost performance. These features provide enough performance and memory capacity to meet the needs of many demanding e-business infrastructure applications.

Big power, small footprint

The Model 6M1 rack packaging offers exceptional configuration flexibility to meet unexpected growth needs. It includes a rack-mountable processor drawer containing the processors and memory and a separate I/O drawer.

The Model 6M1 comes standard with 14 hot-plug PCI I/O slots (with a combined bandwidth of 1GB/sec) packaged in the I/O drawer for easy rack mounting. Up to four I/O drawers may be installed for a total of 56 slots (for an aggregate I/O bandwidth of 4GB/sec).

Two optional boot bays are provided in the first I/O drawer (requires two I/O slots, leaving 12). Integrated 10/100 Mbps Ethernet, Ultra SCSI and Ultra2 SCSI controllers are included in each I/O drawer, leaving all slots available for expansion.

The Model 6M1 offers flexibility in the number of processor and I/O drawers that can be mounted in the rack, for more compute and I/O power per square foot of floor space. In its maximum configuration, a Model 6M1 server comprises one processor drawer with eight 750 MHz processors and four I/O drawers for a total of 28 EIA units (28U) of rack space (8U for the processor drawer, 5U for each I/O drawer). Depending on the number of attached I/O drawers, up to two Model 6M1 systems may be installed in an IBM 7014-T00 rack (36U) and up to three systems may be installed in a 7014-T42 rack (42U).

Disk and tape storage can also be mounted in the racks. Products such as the IBM 7133 Serial Disk System (SSA), the IBM 2104 Expandable Storage Plus (Ultra3 SCSI) and the IBM 2105 Enterprise Storage Server™ provide terabytes of highly reliable, high-performance, hot-swappable disk storage.

Feature	Benefits
Copper-based, SOI-based SMP processors	• Provide significant performance increases over the predecessor Model M80 • Improve reliability while reducing the heat produced
Capacity Upgrade on Demand	• Offers flexibility to immediately and cost-effectively add processing capacity
64-bit system architecture	• Improves physical memory use for applications requiring faster access to large amounts of data
Up to 8MB ECC L2 cache per processor	• Provides increased performance
Up to 64GB ECC Chipkill™ memory	• Allows exploitation of 64-bit addressing for large database applications • Provides growth options with much greater throughput • Significantly lowers number of memory failures that cause system outages; thus increasing system availability
Rack-drawer configuration	• Allows for efficient utilization of floor space • Provides flexible growth in processor, I/O and storage capacity
Up to 56 hot-plug PCI slots	• Dramatically improve availability and provide uninterrupted growth for new adapters • Provide increased connectivity for e-business applications
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
Hot-plug redundant power and cooling subsystems	• Allow uninterrupted operations if a power supply or cooling fan becomes disabled
Dynamic Processor Deallocation	• Automatically deallocates resources when impending processor failures are detected so applications can continue to run uninterrupted
N**EBS Level 3 compliance**	• Offers rugged packaging required for telecommunications central office operations and other harsh computing environments
SP™ Switch attachment	• Allows attachment to a high-speed SP Switch providing consolidation and operational advantages in a cluster environment
Cluster 1600	• 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
Linux® operating system	• Offers native support for 64-bit Linux applications • Enables access to thousands of Open Source applications • Provides common operating environments across IBM @server platforms
AIX® operating system	• Maintains compliance with UNIX 98 specifications and first to achieve UNIX 98 Server registration • 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

High availability, all day, every day

To help ensure that strategic applications remain available 24x7, the Model 6M1 features an integrated service processor —a computer within a computer— that constsntly monitors the system's vital signs. In the event of a malfunction, the service processor is capable of "calling home" by automatically dialing out to an IBM service center often before any problem is apparent to users or system administrators. In this fashion, the service technician may be able to correct the problem and restore system function remotely without interruption or downtime.

To maximize system availability, the Model 6M1 server has built-in fault and error correction functions. For the main memory, Chipkill memory technology—developed by IBM for the S/390® mainframe server—detects multiple bit errors and corrects most of them transparently. If the error rate exceeds the critical threshold, a maintenance action is initated automatically by the system, to be resolved at the customer's convenience. IBM studies indicate that systems with Chipkill memory are up to 100 times less likely to experience an outage due to memory failure.[1]

The Model 6M1 also uses ECC (error checking and correcting) memory technology to enhance reliability and error correction of L1 data cache and L2 cache memory as well as main memory. ECC technology can detect single and double errors and correct all single bit errors. Parity memory can only detect, but not correct, single bit errors. Thus double bit errors may be missed altogether, which can lead to a complete system shutdown. The use of these advanced memory technologies, Chipkill and ECC, on the Model 6M1 helps protect the server from memory failures that can cause costly, unscheduled downtime.

Another unique availability feature of the Model 6M1 is Dynamic Processor Deallocation. In the unlikely event that a processor indicates an impending failure, this feature—working with the AIX operating system and service processor—is designed to dynamically take the processor offline. Its workload is reassigned automatically to other processors, and replacement can be scheduled during normal service to minimize system and application downtime.

Reliability and availability features also include redundant hot-plug cooling fans and power supplies, which may be easily replaced without affecting system operations. Also included is a temperature monitoring capability that increases the fan speed in response to above-normal temperatures.

The hot-plug PCI slots make it possible to keep e-business applications running while I/O adapters are added or replaced. Individual adapters can be enabled or disabled as needed, while operations not dependent on that adapter continue to run. There is usually no need to power-down and restart the system.

High availability configurations

For near continuous operations, two Model 6M1 systems can be clustered in a single rack with High Availability Cluster Multiprocessing (HACMP) UNIX disaster recovery software from IBM. This clustering solution, HA-6M1, minimizes downtime of systems and applications for both planned and unplanned outages and provides a superior base for high availability, an essential ingredient for e-commerce.

Better management

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 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 Model 6M1 incorporates many leading self-managing system capabilities from across the IBM @server product line. Examples include the service processor, Dynamic Processor Deallocation and Chipkill memory.

Scalable growth

The Model 6M1 provides the scalability necessary to handle business growth smoothly, and extend business-critical applications to the Web. The Capacity Upgrade on Demand feature enables businesses to scale the system quickly to handle requirements for more computing resources.

Eight processors may be installed with two or four of them initially disabled. When the need for more capacity arises, an AIX command activates the additional processors in increments of two. AIX Workload Manager sees to it that system resources are allocated to accommodate the newly activated processors.

Clustering alternatives

Clustering enables multiple servers to be interconnected into a single computing resource for improved availability, scalability, manageability and performance. With the IBM @server Cluster 1600 and AIX operating system, companies can mix or match up to 128 nodes and servers (512 via special order) including up to 64 Model 6M1 systems.

Designed to save money and deliver the right amount of performance, the Cluster 1600 provides cluster management from a single point-of-control, continuous access to business-critical data and applications, and investment protection through the co-existence of old and new technology. The Cluster 1600 is especially suited for business intelligence environments with large databases and server consolidation where diverse workloads are more easily managed.

It is also an excellent choice for environments requiring horizontal growth, which involves replicating the same application across multiple servers as a business grows. The Cluster 1600 offers a highly scalable and reliable platform for hosting large and growing corporate data warehouses, or simplifying management of IT infrastructure and reducing total cost of ownership.

Investment protection

Upgrading to a Model 6M1 from a pSeries 660 Model 6H1 is simple and cost-effective, since both systems use the same flexible packaging design. The Model 6H1 processor drawer is exchanged for a Model 6M1 drawer via a serial number protected model conversion, while memory DIMMs, I/O drawers, adapters, disk drives and rack enclosures can be reused.

IBM @server pSeries 660 Model 6M1 processor and I/O drawers

pSeries 660 Model 6M1 at a glance

Minimum configuration	
Processor rack drawer (5U)	
Microprocessor:	2-way 500 MHz RS64 III SMP or 2-way 750 MHz RS64 IV SMP
Level 1 (L1) cache:	128KB data (ECC) / 128KB instruction
Level 2 (L2) cache:	4MB (ECC), 500 MHz; 8MB (ECC), 750 MHz
RAM (memory):	2GB (ECC)
System bus width:	128-bit
I/O rack drawer (5U)	
I/O slots:	14 hot-plug PCI slots
I/O bus width:	10 64-bit, 4 32-bit
I/O bus speed:	10 @ 66 MHz (3.3v) / 4 @ 33 MHz (5v)
I/O bandwidth	1GB per second – aggregate peak
Storage options:	Boot capability from externally attached disk drawers, or optionally, two internal boot disks which require two I/O slots; maximum internal disk capacity of 72.8GB
Standard features	
Integrated ports:	Keyboard, mouse, four serial, one parallel
Integrated bays:	Diskette drive, CD-ROM or DVD-RAM; one additional media bay
Integrated controllers:	Ultra2 SCSI (external), 10/100 Mbps Ethernet
System expansion	
Processor:	4-way (500 MHz) RS64 III SMP; 4-, 6- or 8-way (750 MHz) RS64 IV SMP
Level 2 (L2) cache:	4MB/processor 4-way, (500 MHz) or 8MB/processor 4-, 6- or 8-way (750 MHz)
RAM:	Up to 64GB
I/O:	Up to three 5U rack drawers additional (56 total hot-plug PCI slots and 8 total bays)
External storage:	IBM 2104 Expandable Storage Plus (Ultra3 SCSI) IBM 7133 Serial Disk System (SSA) IBM 2105 Enterprise Storage Server
Attachment:	SP System Attachment Adapter for use in a Cluster 1600 configuration
RAS features	Copper SOI microprocessors Chipkill RAM memory ECC L1 data cache, L2 cache Service processor Hot plug PCI slots, power supplies and cooling fans Dynamic Processor Deallocation Redundant power supplies and cooling fans NEBS Level 3 compliance
Operating systems	AIX 5L™ Version 5.1 or Version 4.3.3 Linux 2.4 available from one or more IBM Linux Distribution Partners
Power requirements	220 volts AC / -48 volts DC
System dimensions	
Rack drawer:	17.5” W x 32.5” D x 14.0” H (445 mm x 826 mm x 356 mm); Weight — 132 lb (59.7 kg)*
I/O drawer:	17.5” W x 32.3” D x 8.6” H (445 mm x 820 mm x 218 mm); Weight — 90 lb (41 kg)*
Warranty	Onsite 24x7 for one year (limited) at no additional cost

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

The AIX advantage

The Model 6M1 system is matched with AIX, the advanced UNIX operating system from IBM. Providing real value in reliability, availability and security, AIX is tuned for e-business application performance and is widely recognized as state-of-the-art in systems and network management.[2]

AIX delivers Java™ technology, Web performance and scalability enhancements for managing large, complex e-business installations. Web-based remote management tools control the system and monitor key resources such as network availability, file system status and processor workload. AIX incorporates Workload Manager which can help ensure that critical applications remain responsive even during periods of peak system demand. 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 enhance security, system availability and Workload Manager. In fact, the systems management and Internet/Web-application services of AIX 5L rank as industry leaders.[2]

Native Linux

The Linux operating system is available for the Model 6M1 from one or more major Linux distributors. These distributors can provide a full complement of Open Source tools and applications. Linux runs natively on the Model 6M1 and does not require the use of AIX. Full service and support for Linux is available from IBM Global Services or a Linux distributor.

Greater application choice

The IBM @server product line is about uncompromising flexibility in selecting, building and deploying the applications a business needs. Toward that end, IBM offers one of the industry's broadest range of platforms and operating systems. IBM is committed to industry-standard, cross-platform technologies—such as Java, XML, HTML, SOAP and UDDI—that are at the heart of a flexible e-business infrastructure. Support for these standards in our key middleware—including DB2® Universal Database™, WebSphere® Application Server and MQSeries®—means that companies won't be locked into a single platform as their businesses grow. As a result, they always have the flexibility to deploy applications in a cost-effective way.

The Model 6M1 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 system-compatible Application Programming Interfaces 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 compilers, utilities, editors, debuggers and other application development tools to aid in this recompilation.

Tools for managing e-business

The Model 6M1 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. 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.

Backed by IBM

The Model 6M1 is backed by worldwide service and support from IBM. Our commitment behind every system sold is to provide the highest possible customer satisfaction.

Availability support is enhanced with advanced maintenance and diagnositc capabilities built into the Model 6M1 offerings with a framework for delivery of system and performance information via the Web.

For more information

To learn more about the IBM @server pSeries Model 6M1, contact your IBM marketing representative or IBM Business Partner or visit the following IBM Web sites:

ibm.com/eserver/pseries
ibm.com/servers/aix
ibm.com/eserver/clusters
ibm.com/servers/solutions
ibm.com/ibmlink

Integrated Marketing Communications
Server Group
Route 100
Somers, NY 10589

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[1] IBM Chipkill Memory white paper available at www.pc.**ibm.com**/qtechinfo/MCGN-46AMQP.html

[2] *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.

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