

IBM BladeCenter QS22



The IBM BladeCenter® QS22 is based on the innovative multi-core IBM PowerXCell 8i processor, a new generation processor based on the Cell Broadband Engine (Cell/B.E.) Architecture. Offering extraordinary double precision floating point processing power, the QS22 can yield application results faster and with more fidelity. This can enable organizations to get information faster to facilitate important business decisions.

Highlights

- **Third generation blade system based on an enhanced version of the Cell Broadband Engine™ Architecture**
- **High-performance blade solution for selected workloads**
- **IBM PowerXCell™ 8i processor, offering five times the double precision performance of the previous Cell/B.E. processor**
- **Significant performance acceleration of target workloads such as rendering and medical imaging**
- **Up to 32 GB of processor memory**

For many years, organizations have relied on performance gains from increasing clock speeds of “traditional” microprocessor architectures. However, in recent years this approach has been challenged by the physical limitations of semiconductors and by traditional processor architecture implementations. Issues with power consumption, heat dissipation and memory latencies have led to diminishing returns on performance. High performance computing (HPC) applications such as digital content creation, electronic design automation, image and signal processing, financial algorithms, scientific research,



BladeCenter H chassis offers high performance and high density ideal for even the most demanding applications

and seismic processing may need a fundamentally new technology and approach to the system-level architecture to achieve the desired level of performance.

Tough signal processing and HPC workloads

Part of the BladeCenter family of products, the new QS22 is a high-performance blade that extends and deepens the IBM HPC solution portfolio by providing a new level of parallelism and performance to targeted workloads. The PowerXCell 8i multi-core processor architecture helps the QS22 accelerate key algorithms such as 3D rendering, compression, and encryption and enables companies to create and run highly visual, immersive, real-time applications—this performance offers significant potential benefit to

companies in aerospace and defense, health care, life sciences, petroleum exploration, financial markets, digital media, electronics, government, education and other industries.

Breakthrough performance

The QS22 relies on two 3.2 GHz PowerXCell 8i processors and up to 32 GB of processor memory. The PowerXCell 8i processor's breakthrough multi-core architecture and ultra high-speed communications capabilities deliver vastly improved, real-time response. By incorporating advanced multiprocessing technologies, the PowerXCell 8i processor is especially suitable for high performance workloads.

The PowerXCell 8i processor is an asymmetric multi-core processor that is optimized for parallel processing and streaming applications. Unlike symmetric multi-core, cache-based architectures which may not be able to efficiently handle streaming applications, the PowerXCell 8i processor is designed to offer very high performance and fast response. The PowerXCell 8i processor includes a Power Processor

Element (PPE) and eight highly optimized enhanced double precision (eDP) SIMD engines called Synergistic Processor Elements (SPE).

PowerXCell 8i processor performance is about an order of magnitude better than traditional processors for media and other applications that can take advantage of its SIMD capability. The PPE is intended to run the operating system and coordinate computation. Each SPE is able to perform mostly the same as, or better than, a General Purpose Processor with SIMD running at the same frequency. A key performance advantage comes from its eight de-coupled eDP SPE SIMD engines with dedicated resources including large register files and DMA channels.

High-performance density and flexibility

The QS22 provides very high performance in a standard blade form factor:

- *460 single precision (SP) GFLOPS/217 double precision (DP) GFLOPS per blade*
- *Up to 6.4/3.0 TFLOPS (SP/DP peak) in a single BladeCenter H chassis*
- *Up to 25.8/12.18 TFLOPS (SP/DP peak) in a standard 42U rack with 56 blades installed*

The QS22 offers a great deal of flexibility. Coupled with the robust IBM BladeCenter H chassis which offers advanced high-speed communication fabric, the processing power of the QS22 can be fully leveraged by compute-intensive applications. Equipped with dual Gigabit Ethernet and optional dual-port 4x InfiniBand® adapters connected through PCI-Express, the QS22 is able to connect to a substantial number of host systems with extraordinary throughput. The addition of an optional I/O buffer is designed to further accelerate applications that are designed to leverage it.

Compared to the rigid pipelines and fixed functions of many graphics processors, the BladeCenter QS22 is more robust. Unlike specialized add-in floating-point accelerators it is able to also boost performance on fixed-point arithmetic through the use of the eight powerful SPEs and their SIMD execution units. The capabilities of the QS22 complement blade servers based on Intel® Xeon®, AMD Opteron™ and IBM POWER™ processors. Blades can be mixed in the BladeCenter chassis so you can build an efficient infrastructure for your multi-platform environment.

Power and cooling benefits

The BladeCenter QS22 offers a peak 1.84 single precision or 0.87 double precision GFLOPS floating point performance per watt of energy consumed. This means that in today's budget constrained environment, you may be able to save money on energy in your data center. And because the overall BladeCenter infrastructure uses super energy-efficient components and shared infrastructure architecture, you can realize even lower power consumption when compared to many alternative designs.

Enhanced operating system, developer support

The QS22 is supported by the Red Hat Enterprise Linux® 5¹ (RHEL) operating system so you can leverage a broad ecosystem of hardware and software vendors committed to RHEL. Along with the extraordinary performance of the PowerXCell 8i processor, RHEL features industry-leading security, auditing, file system and virtualization capabilities to support your applications.

The IBM Software Development Kit for Multicore Acceleration² includes an Eclipse-based Integrated Development environment, libraries and frameworks, performance tools, and example code. Clients can download the latest fixpack for SDK to get the latest fixes and enhancements that enable the new features and capabilities of the QS22. In addition, the IBM XL C/C++ and XL Fortran² compilers have been optimized for PowerXCell 8i code development.

The RHEL operating system, the IBM SDK for Multicore Acceleration v3.0 and the IBM compilers have been closely integrated to make it easier than ever to leverage the power of the PowerXCell 8i processor for your applications.

For most demanding applications

With the processing power of the new IBM PowerXCell 8i chip, and available 32 GB memory, the BladeCenter QS22 is designed to offer the computing performance you need for your most demanding, compute-intensive applications.



IBM BladeCenter QS22 at a glance

Form factor	Single-wide blade server for BladeCenter
BladeCenter Compatibility	BladeCenter H, HT and S
Processors	3.2 GHz IBM PowerXCell 8i Processors
Number of processors	Two standard, each with one PPE core and eight enhanced double precision (eDP) SPE cores
L2 cache	512 KB per IBM PowerXCell 8i Processor, plus 256 KB of local store memory for each eDP SPE
Memory	Up to 32 GB (16 GB per processor)
Internal disk storage	Optional 8 GB flash drive
Optional external storage	BladeCenter boot disk system (1726-22B) ³
Networking	Dual Gigabit Ethernet
I/O upgrade	Serial Attached SCSI (SAS) daughter card connected via PCI-X (CFFv) BladeCenter PCIe expansion unit (43W4391)
Optional connectivity	Dual-port DDR InfiniBand 4x HCA connected via PCI-Express (43W4423)
Operating systems	Red Hat Enterprise Linux
Warranty	3-year

For more information

Contact your IBM representative or IBM Business Partner or visit:

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¹ For detailed technical specifications refer to ibm.com/systems/bladecenter/hardware/servers/qs22

² For detailed technical specifications refer to ibm.com/technology/cell/software.html

³ BladeCenter H and BladeCenter HT only



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