Premier blade for double precision, floating point workloads

IBM BladeCenter QS22

Product Overview

Premier blade for double precision floating point workloads that require a large amount of CPU memory

The IBM BladeCenter QS22

- More computing power than traditional processors for targeted workloads
- 5 times faster double precision processing than previous generation blades
- 16 times more memory (maximum) than the previous generation blade

Suggested uses: image processing, signal processing, and graphics rendering applications in aerospace/defense, financial markets, medical imaging, EDA, digital video solutions, petroleum exploration and other industries.

IBM PowerXCell™ 8i multi-core innovation

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.

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

Optimized for 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 high performance computing (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. 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 (GPP) with SIMD.
Premier blade for double precision, floating point workloads

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.

These processor features along with the availability of 32GB of memory – 16 times the memory
capacity of the previous generation blade – mean that the QS22 offers up to five times faster
double precision processing than the previous generation blade. And when compared against
traditional processor architectures, the QS22 can offer significantly better performance for
targeted workloads.

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
- 6.4/3.0 TFLOPS (SP/DP peak) in a single BladeCenter chassis
- 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 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. An optional I/O
buffer is designed to further accelerate applications that can 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 inter-mixed in
the BladeCenter H 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 datacenter. 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 and developer support

QS22 is supported by Red Hat Enterprise Linux® 5.2 (RHEL) operating system upon availability.
You can leverage a broad ecosystem of hardware and software vendors committed to RHEL
along with the extraordinary performance of PowerXCell 8i. RHEL also offers industry leading
security, auditing, file system and virtualization capabilities to support your applications.

The IBM Software Development Kit for Multicore Acceleration v3.0 includes an Eclipse-based
Integrated Development environment, libraries and frameworks, performance tools, and
example code. In addition, the IBM XL C/C++ v9.0 compiler and XL Fortran v11.1 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. Clients should download the latest fixpack for SDK v3.0 to get the
latest fixes and enhancements that enable the new features and capabilities of QS22.

IBM BladeCenter QS22 for your most demanding applications

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

Selling Features

- Featuring the new IBM PowerXCell 8i processor, the BladeCenter QS22 offers 460 single precision
  (SP) GFLOPS and 217 double precision (DP) GFLOPS per blade
- 5 times faster double precision processing than the previous generation blade and 16 times more
  memory (maximum) than the previous generation blade
- Single-wide blade, up to 56 blades in a 42U rack offers 25.8 single precision and 12.18 TFLOPS
double precision peak performance per rack
- Offers significantly better performance for targeted workloads
### Performance Summary

<table>
<thead>
<tr>
<th>Type</th>
<th>Algorithm implementation</th>
<th>x86 blade / result</th>
<th>QS22 with IBM PowerXCell 8i 3.2 GHz processor(s) / result</th>
<th>Comparison Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Performance Computing (HPC)</td>
<td>Matrix Multiplication (S.P.)</td>
<td>x86 blade (2.66GHz Quad-Core Intel X5355) / 77 GFlops</td>
<td>8 SPEs / 203 GFlops</td>
<td>2.6x</td>
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<tr>
<td></td>
<td>LINPACK (S.P.)</td>
<td>x86 blade (2.66GHz Quad-Core Intel X5355) / 73 GFlops</td>
<td>8 SPEs / 164 GFlops</td>
<td>2.2x</td>
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<tr>
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<td>Matrix Multiplication (D.P.)</td>
<td>x86 blade (2.66GHz Quad-Core Intel X5355) / 38 GFlops</td>
<td>8 SPEs / 101 GFlops</td>
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<td></td>
<td>LINPACK (D.P.) (*)</td>
<td>x86 blade (2.66GHz Quad-Core Intel X5355) / 36 GFlops</td>
<td>8 SPEs / 84.8 GFlops</td>
<td>2.3x</td>
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<tr>
<td></td>
<td>3-step 2D PFAFFT</td>
<td>x86 blade (3.0 GHz Dual-Core Intel X5160 x2) / 16 - 687 seconds</td>
<td>16 SPEs / 6.6 - 89 seconds</td>
<td>2.4-7.7x</td>
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<tr>
<td>Medical / HCLS</td>
<td>HMMer</td>
<td>x86 blade (3.0 GHz Dual-Core Intel X5160) / 428 sec</td>
<td>8 SPEs / 34.4 sec</td>
<td>12.4x</td>
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<tr>
<td>Financial Services Sector (FSS)</td>
<td>American Option using Binomial Tree</td>
<td>x86 blade (2.33 GHz Quad-Core Intel E5345) / 19K Options per second</td>
<td>8 SPEs / 107K Options per second</td>
<td>5.6x</td>
</tr>
<tr>
<td></td>
<td>Collateralized Debt Obligation (CDO)</td>
<td>x86 blade (2.8 GHz Quad-Core Intel E5440) / 28 TSp</td>
<td>8 SPEs / 211 TSp</td>
<td>7.5x</td>
</tr>
<tr>
<td></td>
<td>European Options using Black-Scholes (D.P.)</td>
<td>x86 blade (2.66 GHz Quad-Core Intel X5355)</td>
<td>8 SPEs / 125 MBOPS</td>
<td>3.5x</td>
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<tr>
<td></td>
<td>European Options using Monte-Carlo</td>
<td>x86 blade (2.33 GHz Quad-Core Intel E5345)</td>
<td>8 SPEs / 1300 MSps</td>
<td>S.P. 6.1x</td>
</tr>
<tr>
<td>Linear Algebra Libraries</td>
<td>BLAS routines</td>
<td>x86 blade (2.33 GHz Quad-Core Intel E5345 x 2)</td>
<td>16 SPEs / DDOT: 0.37 GFlops / DAXPY: 0.27 GFlops / DTRMM: 41 GFlops</td>
<td>DDOT: 5.1x / DAXPY: 5.1X / DTRMM: 3.0X</td>
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<tr>
<td></td>
<td>LAPACK routines</td>
<td>x86 blade (2.33 GHz Quad-Core Intel E5345 x 2)</td>
<td>16 SPEs / DGETRF: 28 GFlops / DPOTRF: 31.7 GFlops</td>
<td>DGETRF: 3.7X / DPOTRF: 4.4X</td>
</tr>
</tbody>
</table>

The source for all data is IBM internal benchmark testing as of April 15, 2008. Different applications implementing these algorithms may affect performance results. These results were derived using particular hardware and software configurations; differences in hardware and software configurations may affect performance results.

Notes: refer to “Notes on Benchmarks and Values” below; S.P.: Single Precision; D.P.: Double Precision; GFlops: Giga Floating point operations per second; seconds: Elapsed time in seconds; second: Gbps = Gigabits per second; PPE: PowerPC™ Processing Element; SPE: Synergistic Processing Element; MBOPS: Million Blacksholes operations per sec; MSps: Million Simulations per second;


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**IBM BladeCenter capabilities**

- The extremely high degree of integration in the various BladeCenter chassis reduces the need for complex cooling systems.
for server components, replacing numerous fans, KVM and Ethernet cables, power supplies, external switches and other components with fewer shared/redundant components in the chassis itself. This integration also can greatly reduce the amount of power consumed and heat produced, relative to an equivalent number of 1U servers. This can significantly reduce a data center’s power bill. The reduced datacenter footprint can also save on infrastructure cost.

- The chassis midplane provides high-speed blade-to-blade, blade-to-switch-module and module-to-module communication internally as well as externally.
- The various BladeCenter chassis use ultrahigh efficiency power supplies. Most industry-standard servers use power supplies that are between 65-75% efficient at converting power from AC wall current to the DC power used inside servers. BladeCenter power modules can be more than 90% efficient. This helps save even more money, as more of the power input you are paying for is used for processing, rather than released into the data center as waste heat.
- BladeCenter also reduces the number of parts required to run the system. Sharing fans, systems management, floppy devices and media means fewer parts to buy and maintain, and fewer items that can bring the solution down.

**Flexibility**

- QS22 blades can be used in the same chassis as QS21 blades, Intel processor-based HS20/HS21/HS40 blades, Opteron processor-based LS20/LS21/LS41 blades, and IBM POWER processor-based JS20/JS21/JS22 blades.
- Every HS/LS/JS blade server ever released by IBM is supported in BladeCenter H, and most are supported in every BladeCenter chassis ever released, going back to 2002. Every switch module released by IBM is equally compatible. (Ask HP and Dell how far back their compatibility goes.) Future blades and fabric switches are expected to continue to be compatible with previous chassis for the foreseeable future.
- A blade server has access to as many as 10 communication switches and/or bridges in one BladeCenter H chassis. And the switches can be Ethernet, iSCSI, InfiniBand, Fibre Channel, Myrinet, or anything else designed and ServerProven for BladeCenter use. Switches, bridges and interface cards are currently available from such vendors as Brocade, Cisco, Intel, McData, Nortel, QLogic, Cisco Topspin and others, in addition to IBM.

**Manageability**

- The QS22 blade server includes a Baseboard Management Controller (BMC) to monitor server availability, perform Predictive Failure Analysis, etc., and trigger IBM Director alerts.
- Each BladeCenter chassis includes an Advanced Management Module to provide additional systems management capabilities, including Web-based out-of-band control; virtual floppy and CD-ROM support; Windows "blue screen" error capture; LDAP and SSL support; and remote redirection of video, text, keyboard and mouse.
- Integrated industry-standard IPMI 1.5 support works with the BMC to alert IBM Director to anomalous environmental factors, such as voltage and thermal conditions. It also supports highly secure remote power control.
- IBM Systems Director Active Energy Manager, an IBM-exclusive, is designed to take advantage of new system power management features, by monitoring actual power usage and providing power consumption capping features. More accurate power usage data helps with data center construction planning and the sizing of power and cooling needs, as well as allowing you to use available power more efficiently.
- IBM Director is included for proactive systems management and works with both the blade’s internal BMC and the chassis’ management module. It comes with a portfolio of tools, including IBM Systems Director Active Energy Manager, Management Processor Assistant, RAID Manager, Update Assistant, and Software Distribution. In addition, IBM Director offers extended systems management tools for additional server management and increased availability. When a problem is encountered, IBM Director can issue administrator alerts via e-mail, pager, and other methods.

**Availability and Serviceability**

- BladeCenter chassis are designed for operation with greatly reduced potential for single points of failure. Most aspects of operation, from blade servers to communication modules, to management modules, to power and blower modules, are hot-swappable. The midplane connections are redundant and the other features can be made so, when used in pairs.
- IPMI 1.5 supports highly secure remote system power on/off using data encryption. This allows an administrator to restart a server without having to visit it in person, saving travel time and getting the server back up and running quickly and securely.
- Environmentally tuned blower modules in the chassis adjust to compensate for changing thermal characteristics. At the lower speeds they draw less power and suffer less wear. Equally important in a crowded data center, temperature-controlled blowers produce less ambient noise in the data
center than if they were constantly running at full speed.

- **Text and graphics console redirection** support allows the administrator to remotely view QS22 text and graphic messages over serial or LAN connections.
- QS22 comes with a **standard three-year (parts and labor) limited onsite warranty** affording you peace of mind and greater potential investment protection.

### Right, Open, Easy, Green

You need to make IT decisions that will drive business success. You face management challenges and technological complexity such as space constraints, power and cooling limitations, heterogeneous environments and I/O connectivity issues. IBM brings together the widest choice of compatible chassis, blade servers, storage and networking offerings and solution providers in the industry to help you build an open and flexible IT environment. And regardless of the size of your business, you want to be up and running 24/7. With built-in redundancy, innovative power and cooling and the latest I/O and management tools, IBM BladeCenter is easy to own—so you can focus on your business demands and stay ahead of the competition.

The **RIGHT** choice, tailored to fit your diverse needs:

- **It’s flexible and modular.** As needs evolve, a one-size-fits-all solution doesn’t work.
  - Meet your needs with BladeCenter: everything from a high-performance data center to a small office with limited IT skills—IBM has you covered
  - Get flexibility with 5 compatible chassis and 5 blade types supporting multiple I/O fabrics, all managed from a common point
- **It’s robust and reliable, providing redundancy throughout and the information you need to keep your business up and running.**
  - Provide redundancy for no single point of failure with IBM BladeCenter
  - Preserve application uptime with IBM Predictive Failure Analysis® and light path diagnostics
  - Make decisions based on accurate data for quick problem diagnosis with First Failure Data Capture

**OPEN** and innovative, for a flexible business foundation:

- **It’s comprehensive, providing broad, fast, and reliable networking and storage I/O with BladeCenter Open Fabric.**
  - Match your data center needs and the appropriate interconnect using a common management point, and 5 I/O fabrics to choose from
  - Extract the most from your third-party management solutions by utilizing the BladeCenter Open Fabric Manager
- **It’s collaborative, enabling you to harness the power of the industry to deliver innovation that matters.**
  - Get flexibility from a myriad of solutions created by Blade.org members and industry leaders that have downloaded our open specification

**EASY** to deploy, integrate and manage:

- **It enables efficient integrated management, which allows you to minimize costs with the tools you need for effective management.**
  - Automate OS installation and BIOS updates remotely with IBM Director tools
  - Administer your blades at the chassis or rack level with the Advanced Management Module
  - Plug into your enterprise management software
- **It enable deployment simplicity without tradeoffs by speeding the deployment of new hardware in minutes rather than days, using BladeCenter Open Fabric Manager**
  - Get significantly faster deployment of servers and I/O than from rack solutions
  - Reduce costly downtime with integrated failover capability
  - Manage from a single point of control via the Advanced Management Module
  - Use with virtually all IBM switches, blades and chassis

**GREEN** today for a better tomorrow:

- **It offers control via powerful tools that help you optimize your data center infrastructure so you can be responsive,**
  - Understand your power requirements with IBM Power Configurator
  - Monitor, control and virtualize your power with IBM Systems Director Active Energy Manager

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1 For terms and conditions or copies of the IBM Statement of Limited Warranty, call 800-772-2227 in the U.S. In Canada call 800-426-2255. Telephone support may be subject to additional charges. For warranties including onsite labor, a technician is sent after IBM attempts to resolve the problem remotely. International warranty service is available in any country in which this product is sold.
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- Reduce data center hot spots with the IBM Rear Door Heat eXchanger
- Optimize and future-proof your data center with IBM Data Center Energy Efficiency services
- Our eco-friendly servers and services can help you be environmentally responsible.
- Become more energy efficient with IBM expertise

### Key Features

#### IBM PowerXCell 8i Processor

The QS22 is powered by the IBM PowerXCell 8i processor based on an enhanced version of the Cell Broadband Engine Architecture. The QS22 is the third generation of blades based on the Cell/B.E. framework. With the PowerXCell 8i, The QS22 is able to offer five times the double precision processing performance of the QS21 blade. This means you can accelerate your most intense workloads and improve the productivity of your business.

#### Flexible Memory Configurations

The QS22 is available in three base model configurations:

1. QS22 with 8GB Memory (8x1GB DIMMs) – MTM 0793-38y
2. QS22 with 8GB Memory (4x2GB DIMMs) – MTM 0793-39y (starting in 2H08)
3. QS22 with 16GB Memory (4x4GB DIMMs) – MTM 0793-40y

With four available DIMM slots, if desired optional memory can be added to the 39y and 40y models to build configurations of 12GB, 16GB, 20GB, 24GB, and 32GB. Highest memory bandwidth and therefore optimal performance can be achieved when all DIMM sockets are populated so these two models are intended to be the starting point for configuring QS22 blades with additional memory. Memory must be added four DIMMs at a time. Option memory kits are:

- 2GB (2x1GB) VLP PC2-6400 DDR-2 Memory (46C501)
- 4GB (2x2GB) VLP PC2-6400 DDR-2 Memory (46C509) (starting in 2H08)
- 8GB (2x4GB) VLP PC2-6400 DDR-2 Memory (46C510)

#### Special Purpose I/O Buffer Memory

IBM BladeCenter QS22 also supports an option to add special purpose I/O buffer memory. If desired, two 1GB VLP DIMMs can be added. This optional memory is sold in kits of two VLP DIMMs and can be purchased from Options by IBM under Part Number 46C0501. The function of I/O buffer memory is unlike typical processor memory in that applications must be written or modified to utilize these memory DIMMs which are attached to the IBM I/O bridge chips on the blade.

#### I/O and Storage Options

- Cisco 4x InfiniBand Adapter (32R1760)
- Cisco 4x InfiniBand High Speed Switch Module (32R1756) for BladeCenter H
- SAS Expansion Card (CFFv) for IBM BladeCenter (39Y9190)
- SAS Connectivity Module for IBM BladeCenter® (39Y9195)
- IBM BladeCenter Boot Disk System (172622B)
- 8GB uFDM Flash Drive (43W3934)
- Blade PCIe Expansion Unit (BPE3e) (43W4391) (starting in Q4'08)

#### BladeCenter Compatibility

QS22 will be supported in the BladeCenter H chassis. Starting in Q4’08 QS22 will also be supported in the BladeCenter HT and BladeCenter S chassis.

#### Software (sold separately)

- Red Hat Enterprise Linux, v5.2 or later
- IBM SDK for Multicore Acccleration v3.0
- XL C/C++ compiler for Multicore Acceleration for Linux v9.0
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XL Fortran compiler for Multicore Acceleration for Linux v11.1

BladeCenter Chassis

IBM's blade architecture offers five choices of chassis in which to use various blade servers. Each chassis serves different customer needs. The new BladeCenter S is a small, entry-level chassis that offers compatibility and interop with the other chassis. The original BladeCenter E chassis offers maximum density, great flexibility and a wide variety of expansion options at an entry-level price. The next-generation BladeCenter H chassis offers all of BladeCenter's capabilities, and adds new high-performance features. If you need a ruggedized chassis (for example, government/military or telcos), BladeCenter T offers special features optimized for those environments. The next-generation BladeCenter HT is a high-performance ruggedized telecommunications platform. There is a high degree of interchangeability and compatibility of features among the chassis. Any or all of these chassis can be installed in a rack along with other rack-optimized equipment.

See the separate BladeCenter Chassis Sales Guide for details.

Light Path Diagnostics

Light path diagnostics enables a technician to quickly identify and locate a failed or failing system component, such as a specific blower module or memory DIMM. This enables quick replacement of the component, which helps increase server uptime and lower servicing costs.

The front of each blade server—and the chassis itself—has an LED indicator light to show possible component failures. This lets the servicer identify the failing component without the need to or remove the blade server from the chassis. The light path diagnostics panel tells the servicer which component of the affected server requires attention.

In addition, many components have their own identifying LEDs. For example, each of the memory modules has an LED next to the socket, as do both processors. This allows the servicer to easily identify exactly which component needs servicing. By following the “light path,” the component can be replaced quickly, and without guesswork. (Note: In the event of a failed DIMM, the system will restart and mark the DIMM as bad while offline, thus allowing the system to continue running, with reduced memory capacity, until serviced.)

Advanced Systems Management Capabilities

Each BladeCenter chassis offers a high level of systems management capabilities that are well-suited to remote locations as well as to stand-alone environments. Features include the Advanced Management Module (AMM), Baseboard Management Controller (BMC), Automatic Server Restart, Wake on LAN® support, PXE 2.0 support, text and graphics console redirect, Real Time Diagnostics, Predictive Failure Analysis, IBM Director and Remote Deployment Manager.

The AMM, in combination with the QS22 blade server BMC, provides industry-standard Intelligent Platform Management Interface (IPMI) 1.5-compliant systems management. It provides a number of important system functions, including:

- Monitoring of system and battery voltage, system temperature, fans, power supplies, processor and DIMM status
- Fan speed control
- Product ID and Family ID detection
- Highly secure remote power on/off
- System reset control
- NMI/SMI detection and generation
- System diagnostic LED control (power, HDD, activity, alerts, heartbeat)
- IPMI over LAN
- Serial Over LAN
- Proxy server support
- LAN messaging and alerting
- Text console redirection over LAN
- VLAN support
- Enhanced authentication and encryption algorithms (RMCP+, SHA-1, AES)
- Local update of BMC firmware
- Firmware firewall
- Support for IPMI v1.5 compliant management software (e.g., xCAT)
- Other mandatory and optional IPMI BMC functions

The BMC, via the management module, alerts IBM Director to anomalous environmental factors,
such as voltage and thermal conditions—even if the server has failed. Other systems management features offered for the combination of blade server and chassis include:

- Predictive Failure Analysis for system processors, memory and HDDs, as well as chassis switch modules, blower modules and power modules
- Web-based out-of-band control
- Remote virtual media
- High-speed remote redirection of PCI video, keyboard and mouse
- SSL (Secure Socket Layer) and LDAP (Lightweight Directory Access Protocol) support

Automatic Server Restart (ASR) helps reduce downtime by restarting the server automatically in the event of a system lockup. ASR technology is a combination of hardware circuitry tied into the server’s system reset function and a device driver. As long as the server continues running, the ASR watchdog timer will keep being reset, but if the operating system crashes or the hardware freezes somehow the ASR software will be unable to reset the hardware timer. If the timer is not reset within five minutes, it automatically triggers the ASR hardware, which immediately restarts the server (and logs an ASR event with IBM Director). These features are designed so that no more than five minutes can pass before the server is restarted.

Text and Graphics Console Redirect support allows the administrator to remotely view QS22 text and graphics messages over serial or LAN.

Wake on LAN permits the server to be remotely powered on if it has been shut off. Once powered up, the server can be controlled across the network, using the Preboot Execution Environment (PXE).

Predictive Failure Analysis (PFA) enables the MM/AMM and the BMC to detect impending failure of supported components (processors; memory; expansion cards; switch, blower and power supplies; and hard disk drives) before actual failure, and alert the administrator through IBM Director. This gives you the ability to replace the failing component before it fails, resulting in increased uptime.

IBM Director software for advanced workgroup management is included with the server. IBM Director comes with a portfolio of tools, including Management Processor Assistant, Rack Manager, RAID Manager, Update Assistant and Software Distribution. System Availability (a no-charge download) and Capacity Manager (sold separately) are available as add-ons for additional server management and increased availability. IBM Director provides a single uniform graphical interface for all of these systems management functions.

IBM Director enables you to customize thresholds and monitor system components (for things like temperature, voltage regulation, etc.) to help maximize uptime.
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QS22 Images

Exterior view

Interior View
**BladeCenter QS22 Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Machine type models</strong></td>
<td>0793-38y, 0793-39y*, 0793-40y</td>
</tr>
<tr>
<td>*model 39y support scheduled for 2H08</td>
<td></td>
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<tr>
<td><strong>Form factor</strong></td>
<td>30mm blade</td>
</tr>
<tr>
<td><strong>Processor type</strong></td>
<td>IBM PowerXCell 8i</td>
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<tr>
<td><strong>Blade power draw</strong></td>
<td>250 watts with typical 8GB configuration</td>
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<tr>
<td><strong># of processors standard / maximum</strong></td>
<td>2 / 2</td>
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<tr>
<td><strong>Internal L2 cache</strong></td>
<td>512KB per processor</td>
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<tr>
<td><strong>Standard / maximum memory</strong></td>
<td>8GB standard on models 38y and 39y, 16GB on model 40y / 32GB maximum</td>
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<td><em>see “Key Features” section above for more on memory configurations</em></td>
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<td><strong>Standard memory type</strong></td>
<td>VLP PC2-6400 DDR-2 Memory</td>
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</tr>
<tr>
<td><strong># of DIMM sockets total / available</strong></td>
<td>8 total / 0 available on model 38y, 4 available on models 39y and 40y</td>
</tr>
<tr>
<td><strong># of internal HDD bays</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong># of flash drives</strong></td>
<td>One uFDM (8GB - optional)</td>
</tr>
<tr>
<td><strong># of optical drives standard</strong></td>
<td>None (one standard in chassis)</td>
</tr>
<tr>
<td><strong># of diskette drives standard</strong></td>
<td>None (one standard in BladeCenter H chassis)</td>
</tr>
<tr>
<td><strong>Internal tape drives supported</strong></td>
<td>None (SAN-attached)</td>
</tr>
<tr>
<td><strong>External disk drive support</strong></td>
<td>SAS (optional adapter card)</td>
</tr>
<tr>
<td><strong># of expansion adapter sockets</strong></td>
<td>One for optional BladeCenter CFFh or HSEC PCIe High-Speed Daughter cards</td>
</tr>
<tr>
<td><strong># of legacy PCI slots</strong></td>
<td>One for optional BladeCenter CFFv Daughter cards</td>
</tr>
<tr>
<td><strong># of video ports</strong></td>
<td>None (chassis-attached)</td>
</tr>
<tr>
<td><strong>Video controller</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Gigabit Ethernet controllers</strong></td>
<td>Dual Broadcom BCM5704S (standard)— TOE-enabled</td>
</tr>
<tr>
<td><strong># of Gigabit Ethernet ports</strong></td>
<td>2 (standard)</td>
</tr>
<tr>
<td><strong># of RS485 ports</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong># of serial ports</strong></td>
<td>None (1 direct via BladeCenter H chassis, or Serial over LAN in BladeCenter H)</td>
</tr>
<tr>
<td><strong># of parallel ports</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong># of mouse ports</strong></td>
<td>None (1 via chassis)</td>
</tr>
<tr>
<td><strong># of keyboard ports</strong></td>
<td>None (1 via chassis)</td>
</tr>
<tr>
<td><strong># of USB ports</strong></td>
<td>None (2 via chassis)</td>
</tr>
<tr>
<td><strong>Systems management controller</strong></td>
<td>Integrated BMC</td>
</tr>
<tr>
<td><strong>Diagnostic LEDs (front panel)</strong></td>
<td>Power good, blade location, information, general fault</td>
</tr>
<tr>
<td><strong>Predictive Failure Analysis support</strong></td>
<td>Processor, memory, expansion cards</td>
</tr>
<tr>
<td><strong>Power supply size</strong></td>
<td>Contained in chassis</td>
</tr>
</tbody>
</table>
Premier blade for double precision, floating point workloads

<table>
<thead>
<tr>
<th>BladeCenter QS22 Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td># of power supplies standard / maximum</td>
</tr>
<tr>
<td># of fans/blowers standard / maximum</td>
</tr>
<tr>
<td>Dimensions (HWD) / weight</td>
</tr>
<tr>
<td>Operating systems supported</td>
</tr>
<tr>
<td>Length of limited warranty</td>
</tr>
</tbody>
</table>

The Bottom Line

- The QS22 is based on the new PowerXCell 8i processor – built on an enhanced version of the Cell Broadband Engine Architecture
- The QS22 offers the capabilities you need for your most demanding computational requirements
  - Offers extraordinary double precision and single precision floating point performance
  - Supports up to 32GB of processor memory
- IBM is working with ISVs and customers to accelerate workloads on the QS22 in targeted application areas
- The QS22 is extremely efficient, offering more than 1.7 SP (or 0.8 DP) GFLOPS per watt of energy

BladeCenter QS22 is Right, Open, Easy and Green
For More Information

IBM BladeCenter QS22
IBM Cell/B.E. technology
DeveloperWorks
IBM BladeCenter Servers and Options
Electronic Service Agent
Technical Support

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ibm.com/support/electronic
ibm.com/systems/bladecenter/support

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Some machines are designed with a power management capability to provide customers with the maximum uptime possible for their systems. In extended thermal conditions, rather than shutdown completely, or fail, these machines automatically reduce the processor frequency to maintain acceptable thermal levels.

MB, GB and TB = 1,000,000, 1,000,000,000 and 1,000,000,000,000 bytes, respectively, when referring to storage capacity. Accessible capacity is less; up to 3GB is used in service partition. Actual storage capacity will vary based upon many factors and may be less than stated.

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will depend on considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

Maximum internal hard disk and memory capacities may require the replacement of any standard hard drives and/or memory and the population of all hard disk bays and memory slots with the largest currently supported drives available. When referring to variable speed CD-ROMs, CD-Rs, CD-RWs and DVDs, actual playback speed will vary and is often less than the maximum possible.

12.
Notes on benchmarks and values

The IBM benchmarks results shown herein were derived using particular, well configured, development-level and generally-available computer systems. The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput or performance improvements equivalent to the numbers stated here. Buyers should consult other sources of information to evaluate the performance of systems they are considering buying and should consider conducting application oriented testing. For additional information about the benchmarks, values and systems tested, contact your local IBM office or IBM authorized reseller or access the Web site of the benchmark consortium or benchmark vendor.

Performance information is provided "AS IS" and no warranties or guarantees are expressed or implied by IBM. Latest levels of libraries and directives were used as indicated. Number of SPUs (or equivalently number of SPEs) used as indicated. Different application implementations of the algorithms tested in these benchmarks may affect performance results.

Source for all data is IBM internal benchmark testing as of April 15, 2008.


PFAFFT is part of the CWP (Center for Waveform Phenomena) freeware seismic data processing package from the Colorado School of Mines: http://www.cwp.mines.edu/

The SCAMPI workload is a new algorithm based on SNORT: http://www.snort.org/

Image registration application was completed as a joint project between IBM and Mayo Foundation for Medical Education and Research to port the ITK library to Cell/B.E.

Refer to ITK - Image Registration Toolkit: http://www.doc.ic.ac.uk/~dr/software/

For a description of the HMMer application refer to http://hmmer.janelia.org/ and http://powerdev.osuosl.org/project/hmmerAltivecGen2mod


Source 3D data for IBM IRT provided by and used with permission of The Boeing Company RHEL 5.2 is officially supported for QS22; in some cases results were obtained with RHEL 5.1;

For a description of BLAS and LAPACK functions refer to http://www.netlib.org/lapack/faq.html ; MKL 10 and SDK 3.0.0.3 were used for BLAS and LAPACK routines.

Description of financial algorithms can be found in the open source financial library: http://www.quantlib.org/reference/overview.html

Mersenne-Twister information can be found at http://www.math.sci.hiroshima-u.ac.jp/~m-mat/MT/emt.html

Additional information on OpenMP: Simple, Portable, Scalable SMP Programming can be found at http://www.openmp.org


Additional information on Black-Scholes:


Black-Scholes formula is available:
