



## Collaborate with IBM and develop competitive advantage through the innovations of High Performance Computing

### Competitive challenges demand leadership Innovation

Right now, your competitors are developing new products, lowering their costs, creating new marketing strategies, talking to your customers.

More and more, companies are using High Performance Computing (HPC) to accomplish their objectives and gain a competitive edge. The double-digit annual growth in HPC spending continues apace, evidence of the increasing influence HPC is having across industry segments.

Many companies rely on High Performance Computing to run workloads faster, to reduce the time to solution, and to streamline operations to save money.

The best companies get something else out of their HPC solutions: Insight. Insight into how complex systems behave is what leads to innovation. It's what accelerates research breakthroughs. Fundamentally, insight is the core to achieving long-term, sustainable competitive advantage.

But it takes more than buying a fast computer to gain insight and competitive advantage. In fact, just buying a fast computer without taking into consideration

all the elements involved in deployment, administration and usage can actually hobble a company, impacting productivity and ultimately damaging profitability and brand value.

### IBM Deep Computing takes an holistic approach to HPC

Why does IBM refer to its HPC business as "Deep Computing"?

"Deep Computing" captures the notion that scientists and researchers seek insight that comes from exploring far below the surface of a problem. While "HPC" emphasizes computer performance, the Deep Computing team recognizes that real innovation and competitive advantage require much more than speedy processors.

IBM takes an holistic approach to HPC that involves designing and delivering complete, robust technical solutions that are easy to acquire and access, environmentally responsible, competitively priced, and backed by world-class support.

Clients of IBM Deep Computing have a broad choice of high performance computing options from a portfolio that includes highly scalable supercomputers, hybrid-accelerator models, industry-standard clusters, high-speed storage, and innovative software tools. IBM has

solutions for every type of HPC workload.

IBM maintains a worldwide network of benchmarking centers and technical centers of competence, which are available to clients to port, test and run applications. The Deep Computing Capacity on Demand center offers options for running workloads on systems hosted at secure IBM locations, eliminating the burden of administration and facilities management.

As a global leader in HPC, IBM maintains partnerships with the major independent software vendors, OEM suppliers, and resellers. IBM is in the best position to offer complete solutions in all HPC disciplines.

### Collaboration sets IBM apart from the other HPC vendors

When it comes to collaboration, no one can top IBM. With its worldwide staff of Deep Computing professionals, strong investment in R&D, massive patent portfolio, and competitive leasing and financing options, IBM is the right partner to help you innovate, break through, and establish sustainable competitive advantage.

Learn more at [ibm.com/deepcomputing](http://ibm.com/deepcomputing)

**IBM offers the broadest portfolio of Deep Computing solutions**

*Blue Gene*

The IBM® System Blue Gene® Solution, the world's fastest supercomputer is optimized for bandwidth, scalability and the ability to handle large amounts of data while consuming a fraction of the power and floor space required by today's high performance systems.



The level of performance provided by Blue Gene can enable a tremendous increase in the scale of simulations beyond what is possible with other supercomputers.

*Cell/B.E.-based Systems*

The IBM BladeCenter® QS21, based on the multi-core Cell Broadband Engine (Cell/B.E.) processor, when used to complement systems based on traditional processors, can yield application results faster and with more fidelity.

Cell/B.E. processors offer extreme performance to accelerate compute-intensive tasks such as image processing, signal processing and graphics rendering.

*Scalable Power® Systems*

IBM's Power technology provides leadership performance, scalability, reliability and flexibility for a broad array of HPC workloads. Clusters consisting of large, dense SMPs can handle the most challenging problems facing researchers and

scientists conducting drug design, oil reservoir modeling, weather forecasting, financial simulation and business intelligence. Power technology is also available in compact blade form-factors as well.

*Industry Standard Clusters*

IBM's industry standard clusters offer significant price-performance advantages for many high-performance workloads by harnessing the advantages of low-cost servers plus innovative, easily available open source software.

IBM offers clusters running both Linux and Microsoft Windows using advanced Intel® Xeon®, AMD Opteron™ and IBM Power Architecture™ technology-based server nodes and blades, proven cluster management software and optional high-speed interconnects,



*High Performance Storage*

IBM System Storage™ is designed to address the storage needs of highly scalable data streaming applications.

IBM's Storage offers high reliability with redundant components, reduced backup and recovery times, and a small footprint for reduced floor space.

*Visualization*

IBM Deep Computing Visualization provides a scalable, collaborative, middleware infrastructure to help support and enhance the graphics functions of OpenGL software applications. A Deep Computing Visualization implementation is economical and highly adaptable solution designed with a commitment to interoperability based on open standards.

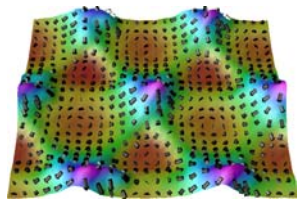
*Software Tools*

For over twenty years, IBM has invested in the design and development of software tools critical to successful implementation of HPC systems. IBM HPC software eases cluster management, ensures proper utilization of resources, aids programmers with highly tuned math libraries, and enables scalable, parallel code implementations.



### Around the world, IBM Research professionals are ready to assist

What could be more important to a company than gaining an edge over others in the field? As a leader in the information technology industry, IBM and its Research division realize the importance of delivering innovation and competitive advantage to our clients. To aid them in achieving their specific goals, IBM Research has created On Demand Innovation Services, the First-of-a-Kind program and the Industry Solutions Lab.



First-of-a-Kind projects are partnerships between IBM and clients that turn promising research into market-ready products. This is a great way to match researchers with target companies to explore new and innovative technologies for emerging opportunities. Clients have a research team to solve problems that don't have ready solutions. Researchers get immediate client feedback to further enhance their projects.

IBM maintains eight Research Laboratories around the world working in such areas as computer science, materials science, nanotechnology, analytics, business transformation, life sciences, and semiconductor technology.

IBM's rich history of discovery and innovation has brought international recognition. In addition to five Nobel prizes, IBM researchers have been

recognized with seven U.S. National Medals of Technology, five National Medals of Science and 21 memberships in the National Academy of Sciences. IBM Research has more than 59 members of the National Academy of Engineering and well over 300 industry organization fellows.

### System Services help clients design, develop and verify solutions

IBM offers a full range of services to help customers design, develop, integrate, optimize, validate and deploy comprehensive solutions.

The IBM Executive Briefing Centers provide comprehensive, in-depth technology briefings, product demonstrations and solution workshops with expertise and advice required to build and adapt IT environments for today's ever-changing business requirements.

The IBM Benchmark Centers help provide benchmark capability for IBM server and storage technology, including proof of concept, scaling and performance services, as well as helping execute ISV application benchmarks.

IBM Systems and Technology Group Lab Services help is available to optimize the utilization clients' data centers and system solutions. We specialize in providing services and support for new technologies that are emerging from IBM

product development labs and important niche technologies.

IBM Deep Computing Capacity on Demand delivers additional capacity and services to help clients meet short-term computational requirements that may not be satisfied by their in-house computing resources.

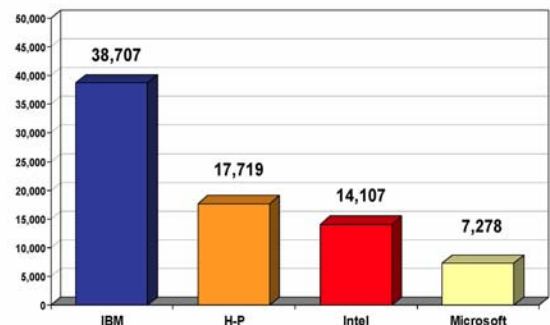
### Fifteen straight years of patent supremacy

In 2007, IBM received 3,125 U.S. patents from the US Patent and Trademark Office. This is the fifteenth consecutive year that IBM has received more US patents than any other company in the world.

Since 1996, IBM has invested approximately \$5 billion per year in research, development and engineering. IBM's current active portfolio of about 26,000 patents in the United States and over 40,000 patents worldwide for inventions in areas of primary technology focus for all IBM customers, is a direct result of that investment.

In addition to delivering these innovations through its products and services, IBM maintains an active patent and technology licensing program.

U.S. Patents: IBM vs. the competition 1993-2007  
IBM #1 for 15 Consecutive Years





## Project Big Green: Reducing data center energy consumption

Recently, discussions of cost savings within the HPC community have evolved to concerns over energy efficiency. Faced with the issue of an energy efficient data center, businesses are looking for ways to optimize their computing environments to the benefit of their bottom line and our planet. IBM believes the two efforts are complementary.

IBM is committed to delivering servers that lead the market for environmental efficiency.

For example, Blue Gene holds the top 25 positions on the list of the world's 500 most power efficient supercomputers<sup>1</sup>. Blue Gene was specifically designed to deliver the most performance per kilowatt of power consumed, and per square foot of floor space occupied. The low-frequency, low-power embedded processors in Blue Gene are superior to today's high-frequency, high-power microprocessors by a factor of 2 or more.

IBM BladeCenter is the leader in energy efficient system design for industry standard

HPC clusters, by virtue of its low power, high density packaging. A vectored cooling system utilizes two high efficiency cooling fans for the entire chassis, and pluggable network and I/O blades consolidate devices to eliminate extra power supplies and cooling fans. And IBM's Cool Blue rear door heat



exchanger reduces heat discharged into the data center by 55%.

IBM also offers a comprehensive approach to

helping businesses develop energy efficient and environmentally responsible green data centers.

Services available from IBM include facilities integration, energy efficiency assessments, server and storage data center best practices, data center thermal analysis and optimization, state-of-the-art designs, and knowledge transfer to internal staff.

### For more information

To learn more about IBM Deep Computing and High Performance Computing, please contact your IBM marketing representative or visit the following Web site:  
[ibm.com/deepcomputing](http://ibm.com/deepcomputing)

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March 2008  
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<sup>1</sup> [www.green500.org](http://www.green500.org), February 2008