



Energy-efficient computing in the next generation data center

HP: Taking a holistic approach to power and cooling issues



“The problems associated with data center heat and power management have come roaring back over the past two years, thanks to complex interactions between multiple factors, ranging from chip technology to data center design.”

– Richard Fichera,
“Power And Cooling Heat Up The Data Center,”
Forrester Research,
March 8, 2006

Data center capacity constrained by power and cooling

Around the world, enterprise data centers are running into a power and cooling wall as they try to deploy new servers, storage and blades, which, in addition to consuming more power than their predecessors, are often much more dense. Businesses continue to implement more powerful applications, which in turn put more pressure on IT organizations to deploy the latest technology. As more powerful computing systems are deployed, they bring more heat to the data center, pushing the limits of cooling systems.

In essence, Moore’s Law of steady advances in computing power is bumping up against the laws of physics. If CIOs and IT managers can’t find better ways to take the heat out of data centers, they can’t take advantage of ongoing improvements in processor performance and system density.

Then there is the other side of the equation: money. Energy costs are rising sharply, new computing systems require more power, and data center cooling systems are using more electricity. It all adds up to a higher total cost of ownership. Some companies now spend more on data center utility bills than they spend to acquire new computers.

A holistic approach is needed

To achieve energy-efficient computing, an enterprise must look at more than just processors or even the servers themselves. This challenge is best addressed from a holistic, systems and services perspective that considers all components of the overall problem—including the design of processors, racks and the data center itself and the management of resources. This multifaceted approach is key to delivering an energy-efficient infrastructure that allows an organization to increase computing density, improve power utilization and hold the line on soaring energy costs.

HP leadership: breaking new ground

To simplify a complex set of issues, there are two primary ways to improve energy efficiency in data centers: Design more energy-efficient facilities and design machines that generate less heat. Our server, storage, services and labs organizations are developing both. To date, HP as a whole has more than 1,000 patents for advances in power and cooling technology.

We are making ground-breaking advances in power optimization for servers and data centers. Areas of focus include temperature-aware scheduling, hardware-software coordination to enforce power budgets, and new blade designs for lower power consumption. Some of these optimization efforts have reduced system power needs by 20 to 50 percent.

The big picture

Power and cooling is a critical aspect of building an Adaptive Infrastructure. To build an energy-efficient data center, power and cooling must be managed as an agile resource that enables the data center to scale as computing demands increase.

The HP Adaptive Infrastructure is HP's way of addressing the next-generation data center market trend—moving your organization from high-cost IT islands to low-cost pools of IT assets. These modular systems, software and services drive gains across broad areas of your data center—including power and cooling, infrastructure management, security, virtualization and automation—to provide a foundation for an Adaptive Enterprise, in which business and IT are synchronized to capitalize on change.

Our researchers are making similar advances in cooling technologies, even beyond the products we've already delivered. Areas of research include the creation of management solutions that help organizations better understand their cooling requirements and apply new technology when needed, without over-provisioning.

In addition, we have been proactive in developing and adopting new standards in power and cooling. In 1999, HP embraced the Uptime Institute's "Fault Tolerant Power Compliance Specification." And all the while, we have maintained a strong corporate focus on the environment—a focus that has resulted in approximately 1,000 HP products achieving Energy Star® qualification from the U.S. Environmental Protection Agency.

Innovative technologies and services

While some vendors focus on only a single aspect of the overall power and cooling problem, HP takes a broader approach. We work actively to optimize systems, racks and data centers to increase energy efficiency. In particular, we are driving advances in efficient systems to reduce power consumption, flexible designs to increase power density, and energy-aware provisioning to optimize power utilization.

Innovative technologies

One of the many examples of HP innovation in energy-efficient computing is the HP Modular Cooling System. This system uses chilled water technology to triple the standard cooling capacity of a single rack to 30 kilowatts, matching almost any rack cooling need. The Modular Cooling System helps take the heat out of high-density deployments of servers and blades, enabling greater densities in data centers.

Meanwhile, HP Thermal Logic is an innovative technology strategy built into the next-generation HP BladeSystem c-Class. This technology enables a controllable balance between power and cooling to boost data center energy efficiency at the component, enclosure and rack levels.

In addition, virtualization and consolidation technologies on HP Integrity servers provide tangible savings in power and cooling costs, and new power management technologies, such as our Power Regulator for ProLiant offering, help address energy consumption concerns without sacrificing performance. And the list goes on.

Innovative services

HP service professionals help organizations analyze power and cooling issues and opportunities, including those driven by high-density blade configurations. Through our HP Data Center Services, we offer expert, customizable assessment and site planning services to help you evaluate your environment and develop more effective and efficient cooling strategies for better utilization.

For example, our intelligent cooling Data Center Thermal Assessment Services leverage sophisticated modeling tools and techniques to determine the unique thermal conditions for high-density server and storage equipment. Drawing on pioneering research from HP Labs, our data center power and cooling services provide proven solutions that have delivered as much as a 20 percent savings in power consumption.

Create an agile, energy-efficient data center

Through our power and cooling technologies and services, we strive to provide the information and insights that managers need to plan more effectively, add the right equipment when it is needed, and create an agile data center. Collectively, our innovative offerings stem from our long-running commitment to help IT and facilities teams manage power and cooling as a portion of IT spend and to design energy-efficient data centers that can scale up as a business grows.

To learn more

For more information on HP power and cooling solutions, visit: www.hp.com/go/powerandcooling

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