AFCOM The Communique
AFCOM's Monthly Newsletter for Data Center Management Professionals

Data Centers Enter New Stage Of Maturity

By Ron Bednar

The data center as we know it today took shape as the dot-com bubble expanded in the late 1990s. Growth slowed when the bubble burst, but by 2003 the pace of change was accelerating again as IT organizations scrambled to meet demand for computing and 24x7 availability. In the absence of management tools to predict future capacity, data centers routinely were built to handle capacities two to three times the initial requirements.

At the same time, the energy consumption issue was emerging. The Uptime Institute reports data center energy use doubled between 2000 and 2006 and predicts it will double again by 2012. With this in mind, the industry started to turn its attention to reducing energy consumption.
Those efforts ramped up in the second half of 2008 as the U.S. economy entered a deep recession and companies were forced to find ways to reduce spending. IT organizations began to look seriously at energy efficiency in terms of cost savings as well as environmental responsibility.

Now, on the cusp of this century's second decade, the data center finds itself balancing efficiency and availability while computing demand and energy costs are increasing and IT budgets are contracting.

The challenge for data center managers now is to maintain or improve availability in increasingly dense computing environments while reducing costs and increasing efficiency. A rash of well-publicized data center outages in 2008 and 2009 led to speculation that cost-cutting was resulting in increased downtime.

To meet the sometimes conflicting objectives of reducing costs and increasing availability, data center management must enter a new stage of maturity. That can be accomplished by establishing data center infrastructures that leverage four opportunities to enhance efficiency without compromising availability. These opportunities will drive data center infrastructure design and management in the coming years.

1) *High-density design*—Industry estimates put the average cost to build a data center shell at $200 to $400 per square foot. By building a data center with 2,500 square feet of raised floor space operating at 20 kW per rack versus a data center with 10,000 square feet of raised floor space at 5 kW per rack, the capital savings could reach $1 million to $3 million. Operational savings also are impressive. About 35 percent of the cost of cooling data center is eliminated by high-density cooling infrastructure.

2) *Ensuring availability*—As mentioned earlier, a number of high-profile data center outages seemed to refocus businesses on the importance of availability. Understanding that a large percentage of outages are triggered either by electrical or thermal issues, the challenge is optimizing the efficiency gains related to power and cooling approaches while understanding IT criticality and the need for availability. Making smart choices in terms of UPS topology and configuration, prudent use of economizers for cooling, and holistic, proactive service strategies can ensure availability and eliminate the often sky-high costs associated with data center downtime.

3) *Providing flexible support*—IT demand can fluctuate. Responding to those swings without compromising efficiency requires infrastructure technologies capable of dynamically adapting to short-term changes while providing the scalability to support long-term changes. Previous generations of infrastructure systems were unable to adjust to variations in load and were inherently inefficient. Cooling systems had to operate at full capacity all the time, regardless of actual load demands. UPS systems, meanwhile, operated most efficiently at full load, but full load operation is the exception rather than

norm. Today, there are technologies available that enable the infrastructure to adapt to those changes. Where previous generation data centers were unable to achieve optimum efficiency at anything less than full load, today's facilities can take advantage of these innovative technologies to match the data center's power and cooling needs more precisely, regardless of load demands and operating conditions.

4) *Visibility and control enable optimization*—Management systems that provide a holistic view of the entire data center are key to ensuring availability, improving efficiency, planning for the future and managing change. Today's data center supports more critical, interdependent devices and IT systems in higher density environments than ever before. This fact has increased data center management complexity and created the need for more sophisticated and automated approaches to IT infrastructure management. Gaining control of the infrastructure environment leads to an optimized data center that improves availability and energy efficiency, extends equipment life, proactively manages the inventory and capacity of the IT operation, increases the effectiveness of staff and decreases the consumption of resources. The key to achieving performance optimization benefits is comprehensive infrastructure management.

During the next decade, opportunities to improve efficiency and optimize performance will exist throughout the data center life-cycle—from design and deployment through operations, management and planning. Businesses that succeed in this effort will look beyond energy when considering efficiency and take every opportunity throughout that life-cycle to achieve efficiencies without compromising performance and availability.

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