The Importance of Monitoring Utilization

A Viridity White Paper

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With Viridity Software organizations are immediately discovering

20–40 percent

improvements in data center energy efficiency.

Computer Efficiency Has Come a Long Way

We should give credit where credit is due. When it comes to saving energy, computer vendors have delivered. They offer better, more efficient computer, storage, and networking products that require much less power than they did just a few years ago. Configurations support smart, dynamic, distributed applications. Not only that, equipment is cheaper. Virtual machines have reduced hardware costs, and the price of a server is a fraction of what it was. Opportunities abound for thrifty, energy-savvy organizations.

Interestingly, we have laptop and mobile technology to thank for these inroads. Power considerations have been vital in the progress of these appliances, and their designers have found ways to extend both functionality and battery life. Now servers use similar technology. The CPU has become truly sophisticated in terms of power distribution, using a low-power mode when work slows down. The newest CPUs can now dynamically adjust to the volume of work at hand by turning on and off cores in the system. So unlike servers ten years ago, which used the same amount of power regardless of how much work they did, new servers can adjust their power consumption to match their workload.

Despite these dramatic improvements, IT equipment cost has actually plummeted. Servers that once cost hundreds of thousands of dollars are now just thousands of dollars. Virtualization puts the price down to only hundreds of dollars. The price of setting up shop is staggering compared to 15 years ago. Staggering.

Infrastructure Has a Long Way to Go

These advancements in IT equipment are quite impressive, the infrastructure that supports them, less so. Most data centers still rely on the same electrical setup that serviced them almost twenty years ago. They were built for data centers full of IT equipment that didn't have dynamic power, when provisioning for electricity was straightforward. The power draw of any given server was constant — whether sitting idle or processing data like a mad man all day long. The distinct technical advantage of dynamic systems is their fluidity in terms of power consumption. They have energy spikes; their power demands ebb and flow according to use – when the system is idle, they can kick themselves into a low power gear, while when they have a lot of stuff to do, they can soak up more power as required. As a result, anticipating the data center's energy requirements has become challenging.

Overload or Underprovision

Given that data centers need to function with existing electrical profiles, two different scenarios typically emerge.

Some facilities strain their electrical service. An existing electrical infrastructure can buckle under the requirements of the latest generation, dynamic IT equipment. By their very nature, these systems feature a variable rate of energy consumption — often doubling in response to utilization. Traditional electrical equipment, though, was designed for constant energy demands. For a long time, power distribution units (PDUs) and universal power uninterruptible power supplies (UPSs) have been useful for machine placement and capacity planning. They work for IT equipment with a consistent power profile. That's changed. Consider, for example, a 30-amp circuit serving an 8-server rack. The PDU indicates that the entire rack is running at 13 amps, so adding another server seems safe — until a utilization spike causes power draw to significantly increase, and the circuit trips under the additional amps of that extra server. And tripping a circuit is usually an event that begins a cascade of tripping circuits, each one causing downtime not for one but for dozens of applications.

The other alternative is to plan for power around the sole concrete piece of information available to the data center: vendor faceplate and technical specifications. While this information reflects the maximum power draw of a machine, the problem here is that the numbers are grossly inflated, sometimes by two or thee times their actual draw. If a data center manager uses only the vendor-supplied information to calculate energy requirements, the facility will be vastly under-provisioned, running with a huge, unused cushion of available energy. The financial ramifications here are plain. But, so too are the ramifications of running out of power — or even thinking that you might. Imagine spending millions (if not tens or hundreds of millions) of dollars replacing a data center that you assume has reached capacity, when the truth is that it uses less than half of its available power.

Even with upgrades that streamline electricity levels, studies indicate that by 2011, only half of all mid-sized data centers believe they will have enough power. So pick your poison: over-provision and risk massive failure, or under-provision and risk massive overspending. Great choices.

Fine Tuning Power Distribution

Regardless of the different approaches to accessing limited power resources, data-center operators everywhere recognize that maintaining flexible, dynamic systems requires special attention. These systems are complex, and they demand that managers carefully adjust workload schedules. Coordinating power requirements is no small feat.

Monitoring the utilization of individual servers and racks is crucial here. System configuration and usage are clearly the determining factors in power consumption. Without vigilant examination of when and where systems use the most electricity, energy management is impossible. Monitors exist. But, circuit-level monitors offer little insight about the highs and lows of a system's energy use, or, more importantly, about why power is being consumed at its current rate. They say nothing about the patterns of utilization in relation to the patterns of power consumption. They offer no ability to forecast and understand your workload and power loads, especially given the intricate relationship they have to one another. Still, organizations can never develop a sophisticated system around their existing electrical layout without that kind of information.

Viridity Software's Solution

Viridity EnergyCenter software was developed specifically at energy management for both IT and facility managers. It provides customers with an accurate, detailed energy consumption profile of their data centers, server by server, so they can build dependable systems around existing electrical infrastructures.

At the core of the Viridity EnergyCenter is a database that contains information specific to each customer's data center. It continually monitors individual IT components and collects information using standard protocols like SNMP, WMI, and IPMI to keep track of servers and their jobs, their speed, their locations, their disks, their memory, and other relevant information. It also features a modeling component so users can anticipate can anticipate energy consumption.

The Viridity system is in the unique position of functioning as a bridge in the data center between existing electrical service and the volatile power demands of distributed systems.

About Viridity Software

Viridity Software is the leader in energy resource management (ERM) solutions. Its software-only, sensor-less approach offers customers a cross-functional methodology for understanding the connection between physical infrastructure, IT equipment, and applications. Once these connections are fully understood, actionable information is provided so that customers can run more energy efficient data centers.

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