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Power management for server virtualization and integrated environments

Executive summary

Server virtualization empowers businesses with significant advantages that include reduced hardware expenses, simplified administration and heightened availability. As a result, nearly 80 percent of server workloads supported by x86 hardware are now running on virtual machines, according to Gartner estimates. However, despite its widespread adoption and benefits, the technology is not without its challenges.

In principle, server virtualization can be instrumental in helping IT and facilities managers prevent downtime during power failures. However, the caveat to achieving that promise is to ensure that your data center is equipped with the proper power management software.

This white paper discusses how the latest power management solutions enhance server virtualization's impact on business continuity and help virtualized data centers, including those using integrated infrastructure, more effectively cope with utility failures. At the same time, cutting-edge software solutions hold the key to increased control, productivity and responsiveness, while reducing infrastructure requirements and operating costs.

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Powering Business Worldwide



Maintaining business continuity

There's just no downplaying the devastation that can result from unexpected downtime. From substantial financial losses to irreversible reputation damage, power outages take a toll on businesses of all sizes, across every industry.

Chances are that you've experienced some type of downtime within the past year. A recent Eaton survey published in coordination with Tech Target found that 37 percent of IT professionals suffered an unplanned outage in the past 12 months. Of those respondents, 32 percent reported that the outage lasted more than four hours.

To put the expense of downtime into perspective, consider that a typical medium-sized organization (100–1,000 employees) will experience an average of 3.5 downtime events per year at a cost of more than \$880,000, according to Zetta.net. For a larger company, that price tag rings in at more than \$2.7 million annually. Other effects of unplanned downtime are more difficult to measure, such as losses to user productivity and damage to an organization's reputation.

Even more disconcerting is the fact that the cost of data center outages is on the upswing, according to a 2016 Ponemon Institute report. The study, which analyzed 63 U.S. data centers that had experienced at least one unplanned power cut over the past 12 months, found that the average cost of an outage has steadily increased—from \$505,502 in 2010 to \$740,357 today, representing a 38 percent change.

Clearly, organizations need solutions that help them avoid the astronomical expenses of downtime. A comprehensive power protection infrastructure must be designed to ensure business continuity and keep essential applications continuously available.

It's true that server virtualization makes it easier for organizations to preserve business continuity during electrical service interruptions by enabling virtual machines to be moved onto unaffected host servers elsewhere on the network. However, managing that process isn't as easy as it sounds.

The challenges

VMware, Microsoft, Citrix and other popular server virtualization software vendors all offer "live migration" products that can swiftly transfer virtual machines from one host server to another for load balancing purposes or when the original server experiences operational problems or requires maintenance.

However, none of those systems include built-in functionality for responding to power outages.

Furthermore, most power protection systems for virtualized server environments come with their own command console. As a result, technicians are forced to use one tool for virtualization management and a separate one for power management, which hampers productivity and can delay response time during utility failures. Because a high level of monitoring and management is essential to IT professionals, new software must deliver these crucial capabilities.

A third challenge is acquiring a solution that has undergone sufficient testing. While most applications will operate in a virtualized environment and are certified as "virtualization-ready," prospective users should approach this claim with caution. The reality is that many manufacturers have not fully tested their software on virtualized hosts, or their applications have encountered some kind of problem in the virtualized environment.

The solution: Software-defined power

Deploying advanced power management software significantly eases the complexities of keeping critical applications continuously available during power outages. With the proper software-defined power solution in place, IT managers can maintain business continuity even during a prolonged power cut.

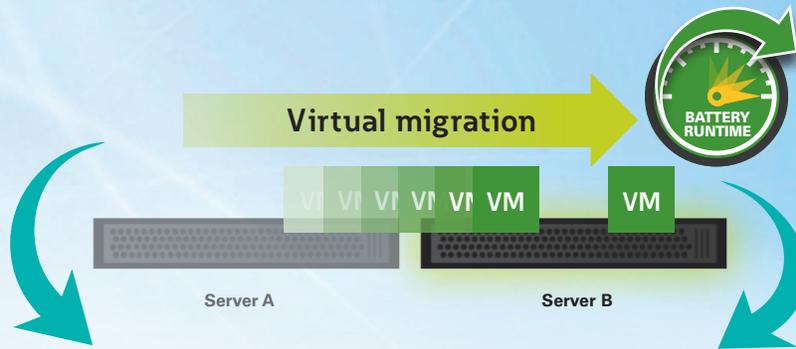
Software-defined is the continuous management of power via virtualization platforms and disaster recovery techniques to optimize power and cooling consumption and ultimately save users money, improve operational flexibility and avoid unplanned downtime.

A solution that integrates closely with leading virtualization management products—such as VMware vCenter Server, Microsoft SCVMM and Citrix XenCenter—enables users to view, monitor and administer all of their critical devices through a single console.

In addition, the more sophisticated power management software will automatically and transparently move virtual machines from host servers that are impacted by a power outage to unaffected servers elsewhere in the cluster.

Modern software goes beyond business continuity with more enhanced features for saving time, saving money and reducing risk. For example, an intelligent load shedding feature can suspend non-critical virtual machines, thereby increasing system uptime while extending battery runtime and minimizing generator load. In addition, a software solution that offers a site recovery manager failover helps avoid data loss and ensure data integrity.

Maintain business continuity: Minimize operating expenses



- **Intelligent load shedding:** Increase system uptime while extending battery runtime and minimizing generator load by suspending non-critical virtual machines.
- **Site Recovery Manager failover:** Avoid data loss and ensure data integrity at all times. Reduce data recovery expenses by syncing primary and disaster recovery sites prior to power failures.
- **Power capping on demand:** Keep critical workloads running longer during a power outage by limiting server power consumption.

Save money by doing more with less

In addition to helping IT professionals maintain uptime, some leading power management software solutions deliver valuable features that can reduce an organization's capital expenses, as well as preserve space and promote a greener environment.

Load shedding: A solution that offers hypervisor integrated load shedding capabilities will slash physical infrastructure costs and space requirements, benefitting a company's bottom line. Because load shedding prolongs runtime for critical devices, the UPS can be equipped with fewer batteries—lowering up-front purchase costs.

Space-saving: Substantial savings can be realized through lower ongoing battery replacement and maintenance costs throughout the life of the UPS. Even more, reducing the number of external batteries frees up valuable data center real estate space while lowering energy consumption.

Consider an average medium size server room deployment of three, 6kVA rackmount UPS systems. Load shedding capabilities will save approximately \$3,000 in upfront CapEx costs by requiring fewer external battery modules, not to mention replacement battery savings down the road. Under this scenario, an organization will also gain an average of 6U of rack space, while achieving the same runtime.

Furthermore, an organization can avoid data retrieval costs of \$2,450 per hardware device through environmental load shedding (shutting down hardware to prevent over temperature and equipment failure), as well as reduce generator fuel consumption by an average of 54 percent to ride through long-term power outages, keeping the most critical VMs running longer.

Power capping on demand: Another beneficial feature afforded by some premium power management software solutions is power capping. Keeping critical workloads running longer during a power outage by limiting server power consumption, this tool can yield gains of up to 200 percent runtime with the same number of battery modules, when paired with integrated load shedding.

It's not surprising that a software solution offering these advantages provides exceptional return on investment (ROI), often paying for itself in as little as a few months.

Save time by simplifying tasks

Even the most highly touted power management software will fail to impress if it's cumbersome and/or time-consuming for IT managers to deploy and manage. Conversely, a solution offering ease of use will significantly bolster productivity and responsiveness.

System integration is the first consideration. The software setup process should be straightforward and reduce the learning curve by seamlessly integrating into existing virtual management systems. In fact, one leading brand can be up and running in just 10 minutes, minimizing potential data center downtime and freeing up IT managers to focus on other critical tasks.

Likewise, power management software that offers remote agentless host management bolsters productivity and responsiveness by conserving valuable time when remotely shutting down servers, as it eliminates the need for agents that consume resources and slow performance.

Simplified power management is achieved with a software solution that provides a comprehensive, single pane view across the entire network. In this manner, all UPSs and rack-based power distribution units can be viewed and managed from the same virtualization dashboard, together with network, servers and storage devices. This capability eliminates the need for IT managers to run separate software to manage all their power devices, saving time and further boosting productivity.

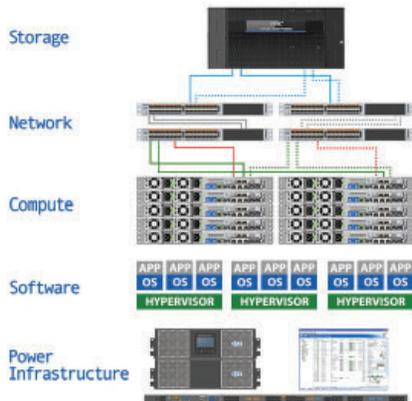
The optimal software product will also have undergone hundreds of hours of validation testing on the leading IT platforms. This measure provides the assurance of application-specific environmental monitoring, remote health check and notifications, remote management, and infrastructure shutdown/cloud failover capability, allowing for VM migration and full host control during critical environmental and power disruptions.

Beyond traditional server virtualization, there are other straightforward methods to virtualize and simplify the IT environment today, and power integrations and validation has an important role there, too.

Integrated software for CI and HCI solutions

Converged infrastructure (CI) is an approach to data center management that seeks to minimize compatibility issues between servers, storage systems and network devices while also reducing costs for cabling, cooling, power and floor space. Its sister method, hyperconverged infrastructure (HCI), collapses the physical components with virtual aspects into a single appliance form factor, in which servers, storage and virtualization layers are bundled into one scalable pool of resources and completely integrated for easier, faster and more cost-effective management.

It's no surprise that a growing number of organizations are deploying these integrated solutions, considering their benefits of flexibility, scalability, efficiency and low cost. Yet the movement has also made the requirement for continuous uptime and business continuity even more critical.



The uptime threshold rests on fewer elements, which means backup power and environmental monitoring, management and control related to power is much more vital. In fact, power protection is so essential to the successful operation of this type of architecture that it is widely regarded as the fifth element of a complete converged infrastructure solution, alongside servers, storage, networking and software. This dependency is not lost on the CI and HCI providers, and the main players in the space have chosen to partner with power management providers to develop integrated solutions and produce lab validated designs.

A high-quality power infrastructure (enclosures, rack PDUs, UPSs and power management software) will help users better organize, protect and manage these modern deployments. Together, the solution providers allow users to mitigate risk and drive business continuity.

Conclusion

Without question, the rewards of server virtualization have made the technology increasingly attractive to IT managers, evidenced by its widespread adoption across virtually all business sectors. However, while virtualization arms IT managers with potent tools, it also presents other challenges.

Thankfully, many of these struggles can be overcome by deploying the proper power management software. As such, companies should view advanced power management solutions as an essential component of any well-designed server virtualization environment. Cutting-edge software solutions will not only better facilitate business continuity, but can significantly slash operating expenses, reduce infrastructure requirements, and boost productivity and responsiveness.

About Eaton

Eaton's electrical business is a global leader with expertise in power distribution and circuit protection; backup power protection; control and automation; lighting and security; structural solutions and wiring devices; solutions for harsh and hazardous environments; and engineering services. Eaton is positioned through its global solutions to answer today's most critical electrical power management challenges.

Eaton is a power management company with 2015 sales of \$20.9 billion. Eaton provides energy-efficient solutions that help customers effectively manage electrical, hydraulic and mechanical power more efficiently, safely and sustainably. Eaton has approximately 97,000 employees and sells products to customers in more than 175 countries. For more information, visit Eaton.com.

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Hervé Tardy is Vice President and General Manager of Eaton's Distributed Power Solutions business unit. In this role since 2007, Herve manages the Americas product roadmap for single-phase UPSs, software and connectivity products to reinforce the technology leadership of Eaton. He also has responsibility for the Eaton IT channel. Tardy is based in Raleigh, North Carolina. Herve graduated from ESSEC Business School in Paris, France and Stanford Executive Program. He is a 29-year veteran in the UPS industry and held multiple positions in sales, channel marketing, marketing communications, product marketing and product development. His focus has always been to position the UPS as an IT peripheral more than a simple power device, and he turned out to become an expert in power management and software communication solutions.

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