Power management for server virtualization, cloud orchestration and integrated IT environments

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Executive summary

Server virtualization and new cloud architectures empower 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 and cloud orchestration can be instrumental in helping IT and facility managers prevent downtime during power failures. However, the caveat to achieving that promise is to ensure that your data center is also equipped with the proper power management software.

This white paper discusses how the latest power management solutions enhance the impact of server virtualization and cloud technologies on business continuity and help virtualized data centers, including those using integrated environments, such as converged (CI) or hyper-converged (HCI) infrastructure, more effectively cope with utility failures. At the same time, cutting-edge power management software solutions hold the key to increased control, productivity and responsiveness, while reducing infrastructure requirements and operating costs.

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Maintain 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 TechTarget 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 the cost of network downtime can average €6,170 per hour for small businesses (1-100 employees), €66,170 per hour for medium businesses (100- 1000 employees), and more than €1,000,000 for large businesses (more than 1000 employees).

Cost of IT downtime for businesses	Small <100 employees	Medium 100-1000 employees	Large >1000 employees
Size of business	Small <100 employees	Medium 100-1000 employees	Large >1000 employees
Downtime events / year	1.7	3.5	3.0
Average length of even	2.2 hours	3.4 hours	0.8 hours
Downtime € / hour	€6,170	€66,170	€1,010,390
Downtime € / year	€23,080	€787,390	€2,424,520

Eaton and TechTarget survey: How "software defined" is redefining the data center.

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. 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. A comprehensive power management infrastructure must be designed to ensure business continuity and keep essential applications continuously available.

The challenges

VMware, Microsoft, Citrix, Openstack and other popular server virtualization and cloud orchestration software vendors all offer "live migration" functionality 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.

At the same time, most power protection systems 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 reactivity and process repeatability are essential for IT professionals to minimize business impacts of power outages, new software must deliver and simplify these crucial integration capabilities to virtualized and private cloud environments.
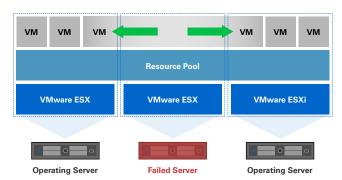
An additional challenge is acquiring a solution that has undergone sufficient testing. While most applications will operate in a virtualized environment and are certified as "virtualization-ready," prospective users should approach this claim with caution. The reality is that many manufacturers have not fully tested their power management software on virtualized hosts, or their applications have encountered some kind of problem in the virtualized environment.

The solution: Automated Infrastructure Resilience via software defined power management

Deploying an advanced power management software significantly eases the complexities of keeping critical applications continuously available during power outages. It helps IT professionals achieve automated infrastructure resilience - a software defined integration and continuous management of power within the context of physical and virtualized IT environments. This type of advanced solution enables automation of disaster prevention and recovery, in addition to power and cooling optimization policies thereby helping to lower costs, improve operational flexibility and increase business continuity through avoidance of unplanned downtime.

With a power management software solution that enables automated infrastructure resilience in place, IT managers can efficiently maintain business continuity during power and environmental events:

- The more sophisticated power management software integrates into leading virtual machine management systems and cloud orchestrators and can automatically and transparently move virtual machines from host servers that are impacted by a power outage to unaffected servers elsewhere in the cluster.

Sophisticated power management solutions maintain business continuity during power failures by automatically migrating virtual machines to unaffected parts of the network or to an offsite backup facility, colocation data centre or cloud computing infrastructure.

- An intelligent load shedding feature available in some power management software solutions can suspend non-critical virtual machines, thereby increasing system uptime while extending battery runtime and minimizing generator load, buying IT managers precious minutes of additional uptime.

- In addition, a software solution that offers a site recovery manager failover trigger feature helps to avoid data loss and ensure data integrity.

Lower costs 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. Furthermore, an organization can avoid data retrieval costs of €2,160 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: This is another beneficial feature afforded by some premium power management software solutions. 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.

Improve IT efficiency 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 power management software setup process should be straightforward and reduce the learning curve by seamlessly integrating into existing virtualization management systems - such as VMware vCenter Server, Microsoft SCVMM and Citrix XenCenter as well as cloud orchestrators such as OpenStack. This enables users to view, monitor and administer all of their critical devices through a single console. In fact, some power management software products can be up and running in a matter of minutes, minimizing potential data center downtime and freeing up IT managers to focus on other critical tasks.

Plug-ins now available with some power management solutions integrate closely with leading virtualization management systems, enabling technicians to view, monitor and administer all of their server, storage and power management assets through a single console.

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

- 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, improving IT efficiency 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.

Integrated software for CI and HCI solutions

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

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, hyper-converged infrastructure (HCI), goes a step further and condenses the physical and virtual components 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 lower cost of ownership. Yet, the movement has also made the requirement for continuous uptime and business continuity automation become even more critical as the density of business critical applications is concentrated on an even smaller set of physical infrastructure.

The uptime metric depends on fewer physical nodes, which means backup power and environmental monitoring, management and control related to power is that much more vital. In fact, power protection is so essential to the successful operation of this type of architecture that it should be considered as the integral part 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.

Eaton's intelligent power management solutions seamlessly integrate into NetApp FlexPod converged infrastructure solutions.

Conclusion

Without question, the rewards of server virtualization, cloud orchestration and converged infrastructure have made the technologies increasingly attractive to IT managers, evidenced by its widespread adoption across virtually all business sectors. However, while virtualization and converged infrastructure arms IT managers with powerful new tools, it also presents other challenges that should not be ignored.

Thankfully, many of these struggles can be overcome by deploying the proper power management software to ensure the automated resiliency of your infrastructure. 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.

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About the author

Based in Grenoble, France, Rory Higgins is responsible for Eaton's power management software products in the EMEA region and for Data Center Automation solutions worldwide. Rory has over 20 years of experience in product management and marketing in the enterprise software market. Combining strong business acumen with deep technical comprehension, Rory is working to build Eaton's vision for the infrastructure aware data centre of tomorrow.

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