Powering Business Worldwide

Thought Leadership White Paper

Power Management for Server Virtualisation

Strategies for preserving business continuity and data integrity in virtualised data centres

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Executive summary

Server virtualisation empowers businesses to lower hardware spending, simplify administration and boost availability. It's no surprise, then, that nearly 80 percent of server workloads supported by x86 hardware will be running on Virtual Machines (VMs) by 2016, according to analyst firm Gartner Inc.

For IT and facilities managers, however, server virtualisation introduces both challenges and opportunities. In particular, while it makes preventing downtime during utility failures dramatically easier, provided your data centre is equipped with the proper power management software, it also adds new complexities to the demands of avoiding data loss during electrical outages when shutting down servers is unavoidable.

This white paper discusses server virtualisation's impact on both maintaining business continuity and preserving data integrity during power outages, and then explains how state-of-the-art power management solutions can help virtualised data centres cope with utility failures more effectively.

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Maintaining business continuity

Downtime is enormously expensive, so a truly comprehensive power protection environment must be designed to ensure that essential applications remain continuously available.

In principle, server virtualisation makes preserving business continuity during electrical service interruptions significantly easier by enabling data centres to move virtual machines onto unaffected host servers elsewhere on the network. In reality, however, managing that process is harder than it sounds.

The challenges

VMware, Microsoft, Citrix and other server virtualisation 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 virtualised server environments come with their own command console. As a result, technicians must use one tool for virtualisation management and a separate one for power management. This weakens their productivity and can delay their response time during utility failures.

The solution

Deploying modern power management software significantly eases the complexities of keeping critical applications continuously available during power outages.

For starters, some such solutions integrate closely with leading virtualisation management products, including VMware vCenter Server, Microsoft SCVMM and Citrix XenCenter. This enables technicians to view, monitor and administer not only physical and virtual servers but Uninterruptible Power Supplies (UPSs) and other power devices through a single console.

Figure 1. *Plug-ins now available with some power management solutions integrate closely with leading virtualisation management systems, enabling technicians to view, monitor and administer all of their server, storage and power management assets through a single console.*

The newest power management solutions can also automatically and transparently move virtual machines from host servers impacted by an electrical outage to unaffected servers elsewhere within the server cluster.

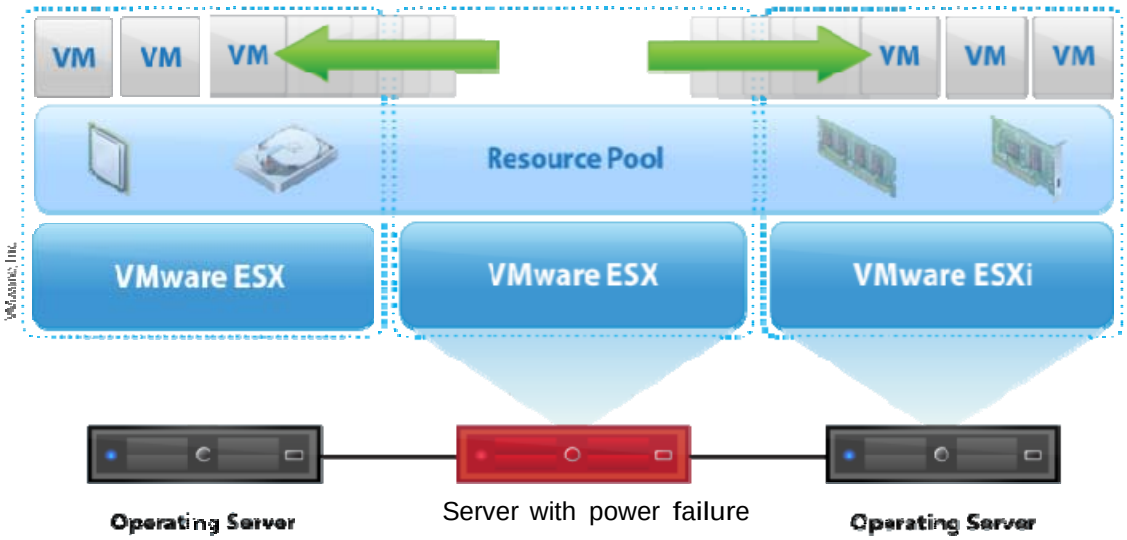

Figure 2. *Sophisticated power management solutions maintain business continuity during power failures by automatically migrating virtual machines to unaffected parts of the network or to an offsite backup facility, colocation data centre or cloud computing infrastructure.*[1]

Migrating virtual machines into cloud computing data centres

Looking to increase their efficiency, agility and scalability, businesses today are rapidly adopting cloud computing technologies. In the near future, the most sophisticated power management solutions will be equipped to help organisations capitalise on cloud computing's benefits more easily by enabling them to migrate virtual machines into the public portion of a hybrid cloud automatically during power failures, using similar tools and processes they employ when moving virtual servers onto in-house servers. Data centres that take advantage of this capability will be free to choose between two different kinds of public cloud infrastructure:

- Platform-as-a-Service (PaaS) solutions provide online access to computing resources and programming tools that developers can use to create and host cloud-based applications.
- Infrastructure-as-a-Service (IaaS) solutions offer infrastructure resources such as storage space and processing power over the Web.

Major PaaS providers such as Eucalyptus Systems Inc. and OpenStack typically rely heavily on open source software. Consequently, advanced power management solutions that are optimised for ease of integration with open source environments will be best positioned to take advantage of this powerful new failover capability.

Preserving data integrity

Keeping critical workloads operational is a data centre's top priority during power outages. Preventing data corruption is essential as well however and sometimes shutting down servers is the only way to meet that goal. Data centers have long relied on a combination of UPSs and power protection software to shut down servers in an orderly fashion during utility outages. Server virtualisation, however, makes safeguarding data during power failures significantly more complicated.

The challenges

When a virtualised data centre loses power, technicians must shut down not only their physical servers but the virtual machines running on those host servers as well. Additionally, they must execute the many steps in that process in a specific sequence, often in the face of intense time pressure. For example, they must shut down virtual machines before physical ones, and core devices - such as domain controllers and shared storage arrays - after the servers that depend on them.

The solutions

Companies can overcome these challenges in several ways:

- *Download open source management code.* Pre-written, open source operating system code for shutting down servers gracefully and in the correct sequence during power failures is being developed and distributed via websites such as Network UPS Tools (www.networkupstools.org). By downloading, installing and customising such code, data centre managers can equip their infrastructure to shut down servers in the proper order when utility/server power becomes unavailable. This solution offers an easy yet extremely powerful and highly configurable power management option to organisations that use and customise Linux or other open source solutions, a category that includes most operators of cloud computing data centres.

- *Deploy advanced power protection software.* Though power protection applications enable organisations to shut down servers in an orderly manner during utility failures, most such systems support physical devices only. The latest and most sophisticated power protection solutions, however, support virtual machines, as well as hosts such as VMware ESX, Microsoft Hyper-V, Citrix XenServer and Red Hat KVM. Consequently, as illustrated in figure 3, they can be configured with the aid of the virtualisation management system to shut down both physical and virtual servers in pre-defined sequences that minimise exposure to data loss.

- *Add automated scripts to advanced power protection software.* Many advanced power protection solutions enable users to create scripts that automatically respond to specific alarms in a pre-defined manner. Companies can use such scripts to augment their power protection system's built-in functionality in sophisticated ways. For example, technicians could extend UPS battery runtime by creating a script that automatically shuts down virtual machines running non-critical workloads early in a power outage and then consolidates the remaining virtual machines onto a smaller number of host servers.

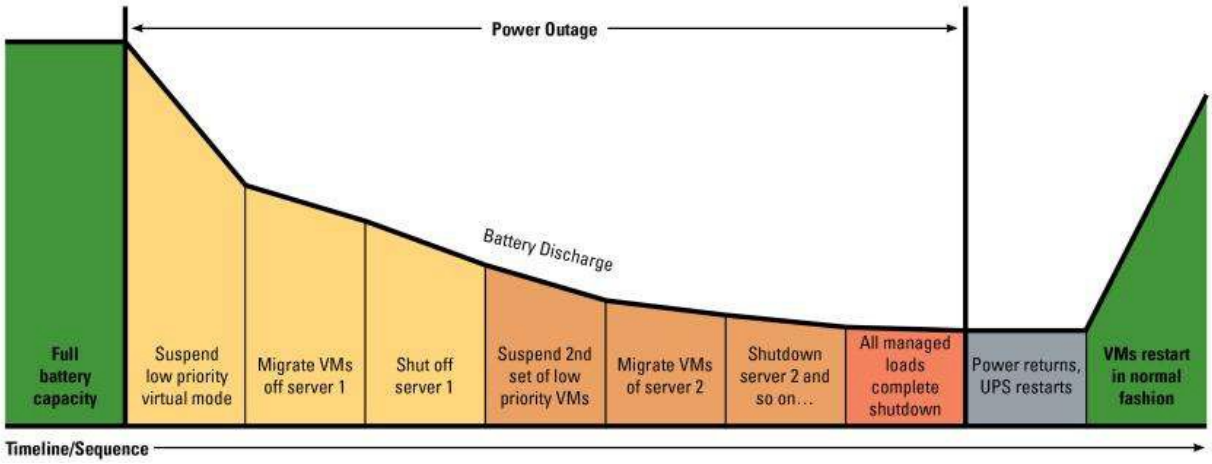

Figure 3. *Should a power outage threaten to outlast UPS battery capacity, advanced power protection software can shut down impacted servers automatically and gracefully.*

Conclusion

Within the span of a few years, server virtualisation has progressed from promising new technology to data centre mainstay. Along the way, it has armed IT and facilities managers with potent new tools for maintaining business continuity during electrical failures while making preserving data integrity during power outages more complicated.

The latest power management solutions position companies to take full advantage of server virtualisation's rewards while mitigating its risks by enabling data centre managers to migrate virtual machines onto unaffected host devices automatically during utility service interruptions. They also equip IT and facilities

managers to shut down physical servers gracefully when such measures are unavoidable. Companies should therefore view advanced power management software as an essential component of any well- designed server virtualisation environment.

About Eaton

Eaton Corporation is a diversified power management company with more than 100 years of experience providing energy-efficient solutions that help our customers effectively manage electrical, hydraulic and mechanical power. With 2011 sales of $16.0 billion, Eaton is a global technology leader in electrical components, systems and services for power quality, distribution and control; hydraulics components, systems and services for industrial and mobile equipment; aerospace fuel, hydraulics and pneumatic systems for commercial and military use; and truck and automotive drivetrain and powertrain systems for performance, fuel economy and safety. Eaton has approximately 74,000 employees and sells products to customers in more than 150 countries. For more information, visit www.eaton.eu

About the author

Hervé Tardy, 49, graduated from ESSEC Business School in Cergy-Pontoise, France and Stanford Executive Program. He is a 26-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 electrical device, and he turned out to become an expert in power management and software communication solutions. Hervé joined Eaton in November 2007 as Vice President and General Manager of their Distributed Power Solutions business unit, with responsibility over single-phase UPSs, software and connectivity products to reinforce the technology leadership of Eaton. His responsibility has recently been expanded to include the management of marketing and sales initiatives through the fast growing IT channel in the Americas. Tardy is based in Raleigh, North Carolina.