

WHITE PAPER

Overcoming VM Stall | August 2010

getting virtualization back in gear: overcoming VM stall through 1:1 virtualization

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executive summary

The potential benefits of virtualization are well documented: increased agility, improved disaster recovery capability, and significant cost savings due to server consolidation. However, many companies experience political and cultural barriers after virtualizing 15-30% of IT processes. IT leaders often cite security, compliance, and visibility as the primary concerns behind these barriers.

This brief will discuss one potential strategy for overcoming this roadblock. Though the primary benefit of virtualization comes from the ability to consolidate multiple virtual machines onto individual servers, virtualization can make a significant impact even without consolidation. Unconsolidated or 1:1 virtualization alleviates many of the most common fears about virtualization, such as performance problems, VM sprawl, and server failures. Even without the cost savings of server consolidation, this technique provides meaningful benefits in both agility and disaster recovery, as well as a simple and manageable approach to virtualization. It is also an important stepping-stone toward larger-scale virtualization, which, with the right management tools, can harness the full benefits of the technology.

the background of VM stall

Many organizations have encountered VM stall in their efforts to maximize the ROI and agility gains from virtualization. It occurs when organizations complete physical to virtual (P2V) conversions on 15-30% of their infrastructure but encounter technological and cultural barriers that make further virtualization difficult. It is relatively easy to justify using virtualization on low-priority systems and in the development arena, where ROI and agility gains are high and risk is low. The results for most organizations are very positive: significant cost savings and dramatically improved agility. However, despite considerable early success, many organizations find themselves at a crossroads where the next step is unclear.

When considering moving business-critical applications to virtual environments, application specialists are often wary due to a fear of decreased performance that would reflect negatively on their work. Traditional servers guarantee a fixed quantity of resources to every application, whereas virtual servers pool their resources and may not effectively allocate them to applications based on need. Failures of managing the allocation of resources effectively can damage application performance. Traditional servers can more easily guarantee that resources will always be available, which is understandably more appealing to someone responsible for ensuring application performance and availability.

Even some IT departments are skeptical of moving key systems to virtual environments for fear of the 'guilty until proven innocent' phenomenon—in which the virtualization infrastructure is blamed for problems until it is definitively shown otherwise. As resources are delivered to applications in pools, application specialists and others outside of the systems management department have far less visibility than in a traditional physical environment into the systems on which their applications run. When problems arise, employees are far more likely to blame the virtual infrastructure, as they cannot troubleshoot it themselves. Even if the problem has to do with the operating system or application itself, virtualization administrators worry that application owners will blame them until they can locate the problem and show that it is not a fault in the virtual infrastructure.

In addition to application specialists, business leaders can also have cause for hesitation when considering virtualization. Problems in the process of virtualization, as well as service outages or slowdowns due to difficulties with managing the virtualized environment, can easily negate any potential benefits. Licensing and compliance is also a cause for very legitimate concern in virtualization, because license usages are not always authorized, systems are easier to deploy yet harder to track, and system configurations and patches are more difficult to maintain. Training costs can also be a factor, as IT management must ensure that administrators are proficient in managing a virtual environment. All of these obstacles are legitimate problems that must be addressed when considering large-scale virtualization rollouts.

costs of remaining stalled

Though the hesitation to further virtualization is understandable, it is also costly. The lost opportunities and real costs due to VM stall are substantial.

For example, partial virtualization creates organizational difficulties in the data center that introduce additional complexity to the structure of IT departments. Having just some systems virtualized requires a silo of virtualization-trained administrators as well as the normal regiment of administrators on the physical side. This segregates administrators and their knowledge sets, raising a hard barrier to both effective troubleshooting and resource allocation for new project rollouts. Strategic management and coordinated effort is critical in IT departments. The greater the virtualization rollout, the easier it is to ensure that all administrators are trained to work with virtualization, reducing the need for a silo.

Partial virtualization creates considerable disparity between different areas of the business in terms of agility too. This adds additional difficulty in strategic planning when business and IT leaders have to account for greatly varying speeds of deployment and degrees of flexibility between different sectors of the business. Cross-silo cooperation and coordination becomes more difficult and business unit politics interfere with effective decision-making, which can considerably hamper business performance in a competitive global environment that requires more and more integrated solutions.

Partial virtualization also leaves money on the table, as potential savings from server consolidation and reduced labor costs are not realized. CapEx savings come from reductions in deferred server purchases as well as reduced need to expand physical data center capacity. OpEx savings can be found in reduced electrical and cooling bills, as well as labor costs in activities that can be automated in a virtual environment.

All in all, partial virtualization fails to capture the full potential of the technology.

getting in gear

What then, is the best way to overcome VM stall and get back in gear? Many organizations are finding that new management techniques and tools are the key to success in the virtualization space. IDC reports that over the next four years “IT organizations will find that provisioning, change control, and troubleshooting processes that worked for physical or lab environments will not adequately support the needs of highly virtualized production datacenters.”¹

However, creating an end-to-end virtualization management solution and convincing business leaders that it will deliver as promised can be very difficult.

There is an alternative path to a fully virtualized environment—unconsolidated or “1:1 virtualization.” This is the process of moving the entirety of an organization’s physical environment to a virtual environment without consolidating virtual machines, thus leaving the ratio of applications to servers at 1:1. A hypervisor is installed on every server, and the application running on the server is turned into a virtual machine, but the final step of consolidation of those VMs is not taken.

This plan may seem counter-intuitive at first because the primary benefits of virtualization come from the consolidation of servers. That initial intuition is correct, and even after this process, one should never forget that consolidating virtual servers is the only way to achieve all the benefits of virtualization. However, 1:1 virtualization has a number of benefits in situations when full-scale virtualization is difficult or impossible, not the least of which is facilitating the transition to a fully virtualized environment.

why 1:1 virtualization?

The benefits of 1:1 virtualization are numerous:

Virtual process automation

With 1:1 virtualization, IT operations and administrators are better able to automate a wide range of routine, error-prone maintenance processes—such as routine deployment, change and configuration management, and capacity management. The results of virtual process automation include considerable savings in labor costs and employee time; a newfound ability for junior staff to handle complex processes; freeing up of senior staff for more valuable work; a reduction of human errors; and improved security and audit control.

Virtual process automation also greatly increases the speed of deployment of new machines, making the business far more agile and responsive to market conditions. With adequate capacity planning and management, virtualization can improve deployment time by up to 240 times, greatly improving time to market and the competitive position of the business.²

Storage flexibility

1:1 virtualization offers increased flexibility for organizations to choose either direct-attached storage (DAS) or centralized storage (either SAN or NAS). The complete benefits of virtualization, 1:1 or otherwise, can only be realized with centralized storage. However, upgrading from DAS to central storage can be prohibitively expensive, especially for mid-to-large enterprises.

This problem comes from the fact that VMs can only be migrated instantly from machine to machine if their data is stored in a central location and does not need to move with them. However, in a 1:1 virtualization deployment the need for live migration is considerably reduced, as the shared resource conflicts that tend to drive migration are no longer an issue. This makes maintaining DAS a viable option in a 1:1 virtualization rollout. The ability to gain many of the agility benefits of virtualization without the need for a four or five figure investment in storage will appeal to many organizations.

Disaster recovery and maintenance

Virtual machines can be backed up, transferred, and restored with far greater ease than traditional machines. Especially with centralized storage, system administrators can take control over the management of virtual machines in a way that is impossible in the physical world. This allows the IT department to greatly increase uptime as server repair does not take the application offline. It can simply be transferred to an unused server, the repair performed, and then the VM returned to its original location.

Routine server maintenance is similarly improved. Even with DAS, the time it takes to transfer the server and its data to a new machine can still noticeably improve availability. Achieving far greater uptime, meeting SLAs, and improving the end-user experience with fewer server failures are obtainable and inexpensive outcomes with 1:1 virtualization, and can make a meaningful contribution to business performance.

Organizational benefits

1:1 virtualization can also have cultural benefits for IT departments. One underrated benefit of the automation of menial tasks is its effect on system administrator morale. When administrators are able to focus on more interesting and engaging tasks, as opposed to the endless repetition of provisioning and de-provisioning, they are often more effective and efficient. The result is better management of the data center as a whole, not just the areas specific to virtualization.

A more engaging working environment also improves an organization's ability to obtain and retain top-quality talent in a competitive marketplace for skilled employees.

The 1:1 system also saves considerable amounts of money and effort on training costs, as administrators are able to obtain on-the-job training in virtualization with less need for specialized courses throughout the organization. This is because of the simplicity of 1:1 virtualization, which allows administrators to familiarize themselves with the specific tools and characteristics of the virtualized environment without prior training on the complexity of managing multiple disparate VMs on every server. The result is a smoother and less expensive transition.

Path to full-scale virtualization

1:1 virtualization is also an excellent starting point for the path to full-scale virtualization. It familiarizes business leaders and application specialists with the technology as well as its benefits. It gives IT leaders both the time and know-how to create a customized end-to-end management strategy, so they can tackle problems as they arise during all phases of the virtualization process.

Once the actual hypervisors are in place, and a management strategy has been completed, it also becomes far easier to demonstrate the improved agility and cost-savings of virtualization, and prove its value to the business.

Consolidating VMs is also a simpler task once the virtual platform is in place, and can be performed at whatever pace the organization feels comfortable with once the virtualization infrastructure is already in place.

conclusion

Ultimately, 1:1 virtualization cannot harness the full benefits of a virtualized environment. As a result, it is a step on the road to virtualization, but certainly not a final destination. However, for companies experiencing VM stall after moving low-priority machines to a virtual environment, 1:1 virtualization offers distinct and tangible benefits, a positive stepping stone toward full deployment, and a strong mechanism for reducing risk in large scale virtualization rollouts.

Specifically, it offers savings on training, improved deployment times, improved administrator effectiveness, better disaster recovery, and the infrastructure for a dynamic data center.

how CA Technologies can help with 1:1 virtualization

CA Technologies can help you implement 1:1 virtualization to overcome VM stall, and move forward along the path to full virtualization, with a range of capabilities and solutions. For example, the Virtualization Management portfolio from CA Technologies includes:

- physical-to-virtual (P2V) migration tools to automate the move from physical systems to 1:1 virtualization
- configuration management solutions to help ensure your 1:1 virtualization deployments maintain consistent patch, license, and configuration controls
- performance management solutions that allow you to detect and remediate performance problems due to the introduction of 1:1 virtualization
- service assurance solutions that track true end-to-end performance of virtual services, so you can show business owners the SLA improvements of 1:1 virtualization

- Root cause analysis tools that allow the IT department to pinpoint problems, often before they happen
- automation solutions that allow you to standardize and automate complex processes, freeing up staff, driving efficiency, and improving audit with 1:1 virtualization
- security solutions that manage the additional layers introduced by 1:1 virtualization, ensuring your deployment is protected from malicious or accidental intrusion
- A complete back-up and recovery solution that ensures data on virtualized servers is protected from loss or corruption.

These solutions address the ‘virtual-specific’ requirements of stand-alone 1:1 virtualization deployments, yet also thrive in heterogeneous, enterprise-wide, hybrid physical and virtual environments. This means CA Technologies is a strategic choice that will support your requirements as you move into 1:1 virtualization, but also as you progress to consolidated virtualization and beyond to a truly dynamic data center.

Moreover, the CA Virtualization and Cloud Strategy group—a competency practice within CA Services—has experience in hundreds of virtualization engagements, and can help you to move quickly, pragmatically, and successfully on the path to 1:1 virtualization (and beyond) by providing strategic advice and implementation expertise.

To ensure that your organization is getting the most business value possible out of your existing IT infrastructure, please contact a CA Technologies representative today to help you develop a strategy for the implementation, management, and success of a 1:1 virtualization plan.

CA Technologies (NASDAQ: CA) is an IT management software and solutions company with expertise across all IT environments—from mainframe and distributed, to virtual and cloud. CA Technologies manages and secures IT environments and enables customers to deliver more flexible IT services. Our innovative products and services provide the insight and control essential for IT organizations to power business agility. The majority of the Global Fortune 500 relies on CA Technologies to manage evolving IT ecosystems.

1 IDC, "Worldwide Distributed Virtual Server Management Software 2010–2014 Forecast Update and 2009 Vendor Shares", Mary Johnston Turner, August 2010

2 "Reducing Operational Expense (OpEx) with Virtualization and Virtual Systems Management," EMA, 2009 Note: This assumes that unused servers are available and do not need to be procured, meaning that 1:1 virtualization requires good capacity planning to be effective.