



Virtual Machine Software Isn't a Panacea

By Dan Kusnetzky, Principal Analyst

OVERVIEW

Virtualization in the form of virtual machine software has been presented by the media as a panacea that will resolve all of the problems an organization has with their IT infrastructure. They also present the image that this is new technology that has just recently burst upon the scene. While it is true that this technology can be a powerful aide to IT organizations, it also brings along management and security concerns that are causing organizations to take a cautious and methodical approach to deployment.

This paper is meant to take an honest look at virtual machine software, where it fits in the Kusnetzky Group model of virtualization technology and consider its strengths and its current weaknesses from the viewpoint of the enterprises evaluating its long term value and use.

WHAT IS VIRTUALIZATION?

Virtualization is a way to abstract applications and their underlying components away from the hardware supporting them and present a logical view of these resources. This logical view may be strikingly different than the physical view. The goal usually is one of the following: higher levels of performance, scalability, reliability/availability, agility or to create a unified security and management domain. Those adopting virtual machine software traditionally have a more narrow focus on consolidation of resources to reduce hardware and software costs or application agility.

GRAND HISTORY OF VIRTUALIZATION

Although some would claim that virtualization is something new and exciting, it is really an established set of technologies that have been steadily evolving for well over 30 years. Mainframe and midrange system suppliers have been offering virtualization technology, making it possible for many computing resources, such as storage, networking, user access, application development and deployment and processing itself to live in a logical world that is not limited to the constraints of the underlying physical system.

Industry advancements have demonstrated that each layer of a computing environment can experience benefits from virtualization technology. Access mechanisms, application development and deployment frameworks, data management, operating systems, storage management and even networking technology have all been enhanced through the careful application of this concept.

No single tool, in this case virtual machine software, is a panacea for all problems. Use of virtual machine software does offer many benefits. It also introduces new challenges.

KUSNETZKY GROUP'S MODEL OF VIRTUALIZATION TECHNOLOGY

The Kusnetzky Group has developed a model that describes each of the layers of virtualization technology in use today. Each of these layers allows solutions to

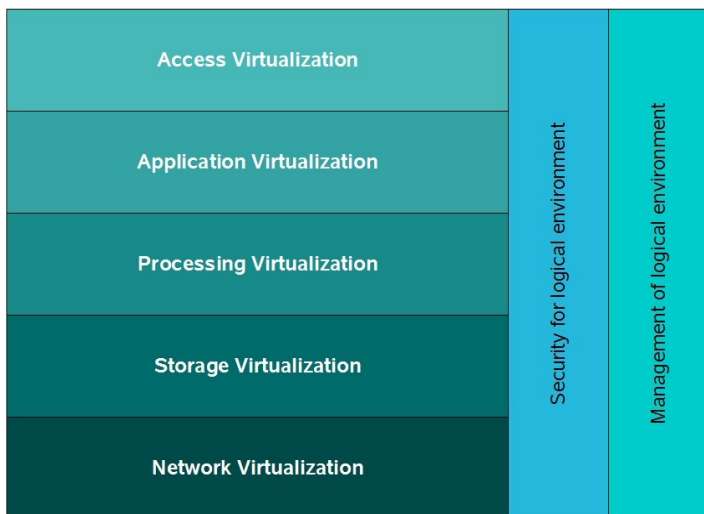
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exist in a logical or virtual world rather than having to live within the physical constraints of the underlying systems. If one reviewed all of the IT solutions in use in an organization's datacenter, it is likely that all of these layers of technology would be found. Let's consider each of these layers of technology in turn.

ACCESS VIRTUALIZATION



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Access virtualization includes hardware and software technology that allows nearly any device to access any application without either having to know too much about the other.

APPLICATION VIRTUALIZATION

Application virtualization includes software technology allowing applications to run on many different operating systems and hardware platforms. This layer of technology makes it possible to restart an application in case of a failure, start another instance of an application if the application is not meeting service level objectives, or provide workload balancing among multiple instances of an application to achieve high levels of scalability.

PROCESSING VIRTUALIZATION

Processing virtualization includes hardware and software technology that hides physical hardware configuration from system services, operating systems or applications. This type of Virtualization technology ranges from the ability to make one physical system appear to be many (virtual machine software) or many systems appear to be a single computing resource (single system image clustering software)

STORAGE VIRTUALIZATION

Storage virtualization includes hardware and software technology that hides where storage systems are and what type of device is actually supporting applications and data. This technology also makes it possible for many systems to share the same storage devices without knowing that others are also accessing them

NETWORK VIRTUALIZATION

Network virtualization includes hardware and software technology that presents a view of the network that differs from the physical view. So, a personal computer may be allowed to only see systems it is allowed to access. Another common use is making multiple network links appear to be a single link.

MANAGEMENT OF VIRTUALIZED ENVIRONMENTS AND SECURITY

Two of the most important layers of virtualization are the layers that manage and make secure all of the other layers of virtualization technology. This software technology makes it possible for multiple systems to be provisioned and managed as if they were a single computing resource. Without this layer of technology, organizations would face greater complexity, risk, and costs in a virtual environment than they did when they were using only physical systems.

The adoption of all of the layers of virtualization increases the importance of a management framework that allows the organization to:

- discover all of their virtual resources,
- create new virtual environments,
- provision newly created virtual environments,

- ☒ query and destroy unneeded virtual resources and
- ☒ Administer physical and virtual resources so as to meet service level objectives, maintain separation of functions to minimize harmful interactions or carefully control where functions and data reside.

All of this must be possible without requiring the administrative and operational staff to be aware of the complexities or how they all fit together.

W E ' V E M E T T H E E N E M Y A N D I T ' S V I R T U A L S P R A W L

Virtual machine technology makes it possible for IT staff and business staff to easily create a new virtual server or virtual client, load application and development tools software and deploy this image. Some suppliers of virtual machine software would claim that it is possible to create, provision and deploy a new image in less than 5 minutes rather than the hours it might take to create a physical image.

Moving this image from one machine to another, from one datacenter to another is no more difficult than copying the virtual machine file. Some IT executives are hesitant to roll out some of the more advanced features of virtual machine software, such as VMware's vMotion or XenSource's XenMotion, that enable "rapid provisioning" without a full test of the capabilities of these products.

Running more than one copy of an image is very easy as well. All staff members have to do is tell the hypervisor to load up another virtual machine and away it goes.

What does the agility provided by virtual machine technology mean to the organization? It can mean a more flexible application infrastructure, a more immediate response to changing requirements. It also provides a way for the environment to circumvent policy, negate security measures and get totally out of control. The environment could easily move from hundreds or perhaps thousands of systems in the datacenter that can be seen and touched to an unknown number of virtual systems that may be running on staff member's laptops, desktops or on servers throughout the organization.

Without the proper management tools, it is likely that the environment will evolve rapidly into a sprawl of virtual systems (client and server). Those responsible for managing licenses, policies or security are very unlikely to know what these virtual systems are running, where they are, or even what critical or proprietary data they contain. In speaking with numerous adopters of virtualization technology, these eventualities loom large as barriers to building more dynamic, rapidly provisioned and highly mobile virtual environments.

C A N Y O U M A N A G E W H A T Y O U C A N ' T S E E ?

It is evident from the tempered enthusiasm and incremental deployment in most IT departments that virtualization can introduce new risks into an IT environment. It is very easy to envision an environment, one that doesn't have proper management controls, in which virtual machines are all over the organization's network, some active and some lying dormant waiting to be activated. How can the IT administrators know how many are in existence, where they are, whether all of the software is properly licensed or even if critical data is being backed up properly? This is clearly a CIO's nightmare.

The following functions must be in place before virtual machine technology can be safely considered a business asset.

- ☒ **Discovery** –IT administrators need to be able to find all physical *and virtual* resources that currently exist on the network regardless of whether they are active or dormant. Ideally, this would involve both a granular inventory of every physical server, hypervisor, virtual machine or application, as well as a global visualization of the entire infrastructure.
- ☒ **Command/control** – IT administrators need to be able to create new trusted virtual resources, destroy unneeded and untrusted virtual resources, migrate resources from one place to another as needed (logical to physical, physical to logical, physical to physical), and control virtual machine execution based on policy.
- ☒ **Provisioning** – it must be possible for applications, data management software, application framework software and other important application components to be moved into previously created images. Once that has been accomplished, it must be possible to easily configure that software.
- ☒ **Resource allocation** – the administrator must be able to provide virtual and physical images with the proper amount of memory, storage and network bandwidth so they can function properly
- ☒ **Maintenance** – nothing in the world if information technology is static. Virtual resources are not static entities. Tools must be available to update or patch virtual resources without requiring that established images be re-created each and every time a patch or update is made available.
- ☒ **Automation** – Tools must make it possible for IT administrators to constantly review how resources are being consumed, compare that information to policy and service level guidelines, and optimize use of resources by calling upon other functions to create, provision, migrate or destroy virtual resources as needed.
- ☒ **Systems, Storage and Network Management** - The underlying physical configuration must be managed in an automated fashion as well.

Does this seem to be impossible? Without these capabilities, how can virtual machines be treated as valuable business assets? It is clear that many additional capabilities must be put into place. Today, traditional management vendors are struggling to keep pace with the innovation of the virtual infrastructure. This is making way for the rise of new, innovative approaches being brought to market by a variety of 3rd party vendors.

INDUSTRY STANDARD SERVERS AREN'T THE ONLY RESOURCES TO CONSIDER

- ☒ The organization must consider that industry standard systems aren't the only computers in the datacenter and that the datacenter isn't the only place within the organization in which computing is happening.
- ☒ Mainframes and midrange systems are important to the organization and shouldn't be left out of a management framework. They have their own forms of virtualization technology and virtualized images coming from these worlds are not interchangeable with those coming from the world of industry standard systems.
- ☒ Virtual machine software is increasingly found on laptops, desktops and workstations as well. Knowledge workers are utilizing this technology to drive innovation but are also introducing unknown risks to enterprises. Management frameworks must encompass solutions that cover the data center to the desktop.

- ☒ As virtual appliance downloads increase, how much space is being consumed, do they include operating systems, data management tools and applications, are they safe, secure and in alignment with compliance initiatives?

S U M M A R Y

All in all, organizations have a hybrid environment to consider and trying to repurpose older management tools developed for the physical infrastructure may not help them achieve their goals. The Kusnetzky Group recommends that IT decision makers take time to create an overall architecture for the adoption of virtualization technology that includes a strong management component. This means the adoption of tools that meet all of the requirements mentioned in this paper that give the organization a complete understanding of the software supporting its business.

Poorly designed plans or poorly implemented plans are unlikely to help the organization reach its goals of efficiency, cost control and performance.

Future papers in this series will focus more attention on the challenges virtual systems can impose on the organization as well as the proper role of management in virtualized environments