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WHITE PAPER

Best Practices in Virtualization: Integrated Management

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Introduction

There's a new wind of change in the IT industry today. It's called virtualization—guest operating system (OS) or hardware virtualization that is. Guest OS virtualization is a software layer that provides the ability to simulate a physical machine on top of an existing operating system running on a hardware host. This ability to run one or more virtual machines on top of one physical host opens up several possibilities in the industry. It is now much easier to create testing, training or development environments, it is easier to create secure virtual desktop environments as well as rely on virtualization to reduce the number of physical boxes to manage, and virtualization opens up vast possibilities in business continuity.

Virtualization software first emerged in order to let users run a simulated operating system on top of another operating system. Users of the Apple Macintosh for example, were able to create virtual machines running Microsoft Windows on their Macs, giving them access to the thousands of programs that run on this platform but not on theirs. Over the years, virtualization software matured into a product of its own and spawned a multi-million dollar industry.

Today you can run several different types of virtualization software. In fact, the industry has developed four different types of virtualization software:

- **Server virtualization:** Allows users to run a server operating system inside a virtualization layer. Server virtualization is a powerful engine for server consolidation since one physical machine can run multiple virtualized server operating systems (OS).
- **Desktop virtualization:** Allows users to run a desktop operating system inside a virtualization layer. Desktop virtualization makes it easier to control desktop environments and to provide training tools, testing environments, and secure remote access.
- **Software virtualization:** Allows users to create a virtualization layer that 'sandboxes' software installations on the operating system. The software still works as usual, but it does not change the operating system that lies beneath it in any way. Software virtualization provides a much easier model for software distribution and license management.
- **Presentation virtualization:** a new term that is applied to an old technology: Terminal Services or Remote Desktops. Basically, the presentation layer of a desktop or an application is made available to a remote user without making any changes on their system. The software actually runs on a remote system, but its screens are displayed on the local system.

Of these four, server and desktop virtualization are the most widely adopted. Both fall within the guest OS virtualization category. Presentation virtualization is also quite popular, but most people don't know it by its new name. Software virtualization, though it has been around for several years, is just now breaking into datacenters as IT professionals realize its strong potential for cost savings.

The Impact of Guest OS Virtualization

Guest OS virtualization is still the most popular of the different virtualization types and rightly so. Consider all of the thousands of servers today running at less than 10 percent utilization—and many are running at less than 5 percent utilization. Each of these servers is drawing a full amount of power, requiring a full amount of cooling, and requiring a full amount of space in datacenters around the world. Then consider that when properly configured to run guest OS virtualization, the same server can actually run *between 10 and 20 virtual machines, servers or desktops*. Each of these virtual machines does not require its own power, each does not generate its own heat and each does not require space, yet each of these virtualized computers can offer up the same services it did while running on a physical machine.

Even better, each virtual machine is nothing more than a set of files on a disk somewhere. So when users take a physical instance of a server and convert it to a virtual instance—effectively performing a Physical to Virtual (P2V) conversion—they transform the physical machine into a set of files in a folder. Then once it is in this state, it can be moved it from server to server, shut down, rebooted, and more without any significant performance degradation!

Just think of what can be done with virtualized desktops by placing them in virtual instances on a server and giving users remote access to the enclosed and controlled environment a virtual desktop provides. They can be used to test patch and service pack deployment, provide support in multi-system environments, provide training to end users and technicians alike, or simply provide controlled environments. When testing or training is done, just reset the virtual machine back to its original state and its back in business, saving significant time.

In addition, the monetary savings are incredible. First there are significant savings due to the avoidance of hardware purchases. Second, there are software savings. For example, software manufacturers such as Microsoft have changed their software licensing models to support virtualization. Buying a license of Windows Server 2003 R2 Enterprise Edition now grants you up to four free virtual instances of the OS. Buying a license of Windows Server 2003 R2 Datacenter Edition gives you the right to run an unlimited number of virtualized instances of any Windows Server OS. Microsoft has even made a license calculator available on their Web site. (see <http://www.microsoft.com/windowsserver2003/howtobuy/licensing/calculator.mspx>).

Third, consider the power savings. Each single desktop system removed will reduce power consumption by 650,000 kilowatt-hours per year. Next, consider the cooling savings and finally, think of the space savings. With organizations everywhere running out of space in their datacenters, guest OS virtualization has a significant impact as it frees up valuable real estate and reduces cooling requirements. These savings are summarized in the table on the next page.

CATEGORY	POTENTIAL SAVINGS
HARDWARE	Each server <i>or desktop</i> you do not purchase puts money in your pocket.
OS LICENSING	Using Windows Server 2003 R2 Enterprise Edition saves 75% on license costs <i>if you intend to virtualize a server OS</i> . Using Windows Server 2003 R2 Datacenter Edition provides unlimited virtual machine licenses.
POWER	Each machine (server or desktop) you virtualize does not draw any more power than its host.
COOLING	Each machine you virtualize does not require any more cooling than its host.
DATACENTER SPACE	Each machine you virtualize does not require any more space than its host.

Power companies everywhere are looking to guest OS virtualization as a means of reducing energy costs and turning datacenters into greener pastures. For example, California's Pacific Gas and Electric Company is now offering rebates to customers if they begin a virtualization project to reduce their power consumption and heat generation (see www.pge.com/hightech).

Guest OS virtualization vendors abound, but three main vendors have taken the market by storm:

- VMware Corporation offer a full range of server and desktop virtualization products (see www.vmware.com).
- Microsoft Corporation also offers a host of virtualization technologies in each of the four virtualization realms with more products coming in the pipeline (see www.microsoft.com/virtualization).
- XenSource also offers a host of different services for virtualization technologies (see xensource.com) and with their recent acquisition by Citrix Corporation, is seeing its offering expand into all of the virtualization realms.

Running any of these vendor products will let you virtualize any environment whether it is training, testing, development or even production. And what's even better is that each of these vendors offers a free version of their tools, one you can use in production, with production systems. See the company's web sites for more information.

Managing Mixed Environments

Virtualization brings very powerful offerings to the datacenter and to IT professionals everywhere, but it also brings its own issues. All virtual machines are stored within folders and files on their host machines. Because of this, it is really easy to provision and perhaps, proliferate virtual machines—just take its files and copy them to create machine number two, repeat to create machine number three, repeat for number four and so on.

Virtual machines offer major benefits for testing, development, training and even production environments. Now, each project can rely on virtual machines instead of physical machines to reduce costs and maintain deadlines. In addition, desktop virtualization provides better control over how desktops behave and remote access to specific applications. In addition, desktop virtualization allows older physical desktops to access hosted virtual machines running newer operating systems such as Windows Vista. This creates virtual upgrades to computers without having to make significant desktop hardware investments. And, all virtualized desktops are centralized controlled and easily recreated should issues arise with them.

But, even though the ability to create machines in virtual instances is available, those virtual machines still need to be managed. One of the caveats of virtualization is that a virtual machine behaves exactly as a physical machine does when it comes to management and administration. It's true that companies save on hardware management, but IT administrators still need to manage the OS, update it, secure it, deploy software to it and perform other general administration tasks on it. And in addition, there is now an additional layer—the virtualization layer—to manage.

This can be a big time drain on IT professional's time, as typically, a new system is required to manage the virtual machines, in addition to the physical ones. In a recent survey of IT professionals in mid-market organizations, King Research¹ found that one of the biggest challenges IT professionals face today is working with many different tools to manage their infrastructures. On average, IT professionals have to access up to **six different tools** to perform complete end to end management. A majority of respondents said that their biggest challenge was learning to use each of these tools effectively.

Adding another tool to manage virtualization does not solve this problem, it makes it worse. What is needed is one single integrated platform for both physical and virtual machine management. That's where the KBOX from KACE comes in.

Integrated Management for Virtual and Physical Machines

As far as the KBOX is concerned, there is no difference between a physical machine and a virtual machine; both are endpoints that need to be managed. This means that IT administrators can use exactly the same simple strategies they have been using with physical machines and for virtual machines. In fact, KBOX can:

- Deploy virtual machines via K-imaging and scripted installations
- Reset and re-provision virtual machines via vState Management—a technology that reduces time and network bandwidth required to reset the state of a machine by using a pre-defined K-image file manifest to modify machine settings and files

¹ King Research: **Security and Systems Management: A Survey of Mid-market Organizational Readiness**, February 2007

- Discover and inventory existing virtual machines through agentless scanning
- Patch virtual machines through KBOX patch management
- Use the KBOX software delivery mechanism to update virtual machines and enforce software compliance
- Enforce license compliance through the KBOX Asset Management Module

Each of the components of the KBOX will treat a virtual machine exactly as if it was a physical machine.



This is a key part of the value of KACE's appliance-based approach. One single appliance is used to manage many environments. This helps you save time and money. And, it's easy to use. If you're using it already, you don't have to change anything to manage new virtual machines. If you haven't used it yet, then you'll quickly see how easy it is to learn.

What's more, KACE Appliances are affordable, not only at the initial acquisition, but also during operation since they are so easy to deploy. Plug it into your datacenter and off you go. The KBOX Family of Appliances is also very comprehensive because it includes controls for each of the most common operations you need to perform from system provisioning to retirement.

And, because your needs may differ from others, the KBOX comes in two flavors:

- KBOX Systems Management Appliance performs complete end to end systems management
- KBOX Systems Deployment Appliance deploys systems whether they be servers or desktops, virtual or physical

Better yet, use both to provide complete systems management, from initial systems deployment to retirement.

Customer “KACE” Study

Polysius Corporation (www.polysiususa.com) is a leader in the Cement and Mineral industries, providing design, supply and installation of cement plants and process equipment in North America and Europe. In the US, Polysius manages a mix of 135 servers and workstations to provide their design and engineering services. Jim Krochmal, IT Manager for Polysius USA, manages everything from a single point of administration: the KACE Systems Management Appliance.

Polysius recently moved to virtualizing desktops. “We had a significant issue,” says Jim. “We build a homegrown document management system to manage all of our computer assisted design (CAD) drawings. The architecture we used makes it that for it to access them; all CAD drawings have to be local. This causes a significant issue for our engineers who need to either work from remote offices or work from home.”

The solution: virtualize Windows XP desktops with AutoCAD. Engineers launch the virtualized desktops from wherever they are and, because the virtual machines are in the head office, the documents are actually accessed locally. “Our engineers tell us that it is even faster than a real desktop,” continues Jim. It’s the best of both worlds. Jim first tried with Terminal Services, but found that it didn’t play well with AutoCAD so he bought a big server, loaded it with Red Hat Linux and used VMware’s free VMware Server to create virtual desktops. Now everyone is happy. “And we have the added advantage that our drawings no longer have to leave the office,” states Jim.

How did he deal with the added management layer? “It was no problem,” continues Jim, “The KBOX doesn’t care if the machine is virtual or physical. As far as it is concerned, a machine is a machine and that’s something it can handle.” Before the KBOX, Jim managed everything manually, through multiple third-party tools or through homemade scripts. He continually faced issues where machines weren’t updated because he could never know if they were connected or not or even if they were turned on. “With the KBOX, I can control changes, any change, on a timed basis,” he continues. “I don’t need to know the status of any machine because it just works.”

Conclusion

Virtualization offers a very strong value proposition to organizations of all sizes, but it also brings an additional layer of management. KACE can help by providing one single layer of management for both physical and virtual machines. As Jim Krochmal says, “Managing everything through the KBOX just makes the IT administrator’s life so much easier. You know the status of all things at any time and you only need to use one single point of management to do it.”

Go ahead, take advantage of virtualization technologies, but don’t complicate your management efforts with the addition of this layer to your IT infrastructures. Use a simple, sensible management approach.

For more on KACE’s integrated approach to physical and virtual management, visit this link.

<http://www.kace.com/products/virtualization.php>

To view a demo of the KBOX Family of appliances, visit this link.

<http://www.kace.com/demo>



Corporate Background

KACE™ is the leading systems management appliance company. The award-winning KBOX™ family of appliances delivers easy-to-use, comprehensive systems management capabilities. KACE customers usually install in one day at one third the cost of software alternatives.

KACE is headquartered in Mountain View, California. To learn more about KACE and its product offerings, please visit <http://www.kace.com> or call 1-888-MGMT-DONE.

Helpful Links:

- [KBOX 1000 Series Systems Management Appliances](#)
- [KBOX 2000 Series Systems Deployment Appliances](#)

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