What to Expect With Virtualization
This content was adapted from Internet.com's ServerWatch, InternetNews and Small Business Computing Web site. Contributors: Drew Robb, Paul Rubens, Amy Newman, Larry Barrett, and David Strom.

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It would be hard to argue that 2007 was a watershed for virtualization technology. From chipmakers to ISVs, every IT demographic felt a virtual tug as the technology made its way into the mainstream.

Virtualization is even starting to impact which servers are leaving the factory. According to research firm IDC, third-quarter factory revenue in the worldwide server market grew 0.5 percent year-over-year, while the number of server units shipped grew 1.5 percent less than it did for the previous period in 2006. Is this an indicator of a bigger trend, as companies soup-up hardware to scale out and go virtual?

Perhaps. But there's little doubt that going virtual will bring sweeping changes to IT organizations and the data centers they support. Here are some trends to keep an eye on:

1. Security Will Loom Large

Despite data breaches, spam, and viruses under pretty much any rock you pick up, virtualization remained largely immune so far. This will most likely change. In 2007, Gartner began singing a tune of caution for enterprises in the process of virtualizing their infrastructures, noting "that security issues are endemic to virtualization. They begin at the architecture level. Even the hypervisor itself represents a threat that malicious hackers will target."

This is because, as vice president and Gartner fellow, Neil MacDonald said, "You have 10 workloads and you merge them onto one, that's a very attractive target for a bad guy. Now, if I compromise just one thin layer I get all 10 machines... And this layer will be targeted."

Such a breach did not occur in 2007. However, deployments are increasing, and enterprises remain complacent about security. The advice here is obvious: Be proactive and tighten up your virtual machines because a breach is inevitable.

MacDonald noted that managing the security in a virtualized environment is a lot like managing yet another operating system. Therefore be sure to keep the

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hypervisor patched, correctly configured and up to date.

2. Easy Money Won’t Be Quite So Easy Anymore
In 2007, any vendor that put “virtual” in front of its name or its product’s name was able to pretty much write its own ticket. This will most likely change. With the economy tightening and virtualization offerings exceeding deployment and deployment plans, it’s doubtful the venture capital firms that have been funding this whole exercise will continue to be so generous. Ideas will need to be more solid to receive funding, and venture capital firms may be ready to cash out, whether through a sale or IPO.

3. Value-Add Will Be Critical
What the virtualization vendors offer beyond the hypervisor will be the deciding factor for their success.

In early 2007, “it’s all about the management,” was the mantra. By now, user enterprises and ISVs have drunk the Kool-Aid. Management options are out there — whether they’re being used properly is unclear, but they are available. In the latter half of 2007, attention moved to performance, integration and usability. In some cases enterprises are growing their own options. In other cases they are partnering. VMware, which traditionally has been a go-it-alone type of company, announced a partnership with SAP. Expect to see much more of such deal between the virtualization vendors and ISVs, as its less expensive and more efficient for all parties to do it this way.

4. Vendor Consolidation Will Continue
EMC may have given VMware a longer leash, but other vendors that played in the virtual playground were swallowed up. HP acquired Opsware; Citrix swallowed Xen. Virtual Iron and SWsoft (recently refreshed Parallels) remain independent. With Microsoft coming on the scene, the competition will tighten. Virtual Iron plays the partnership card well, and where that will take it is anyone’s guess.

As for who might be acquiring — watch the hardware side carefully. Theories about Intel, Sun Microsystems, and IBM going on shopping sprees have surfaced in the blogosphere in recent months.

5. Microsoft Will Make Waves
Microsoft may be easy to mock, and the oft-described Redmond behemoth hardly ever comes out with anything new, technology-wise. It didn’t become what it did by being stupid, however, and it has acknowledged that virtualization is here and it’s here to stay. Therefore, a cannon bigger than Microsoft Virtual Server will be needed. Enter Hyper-V, the hypervisor formerly known as Viridian, which Microsoft introduced with Windows Server 2008.

Hyper-V will have an enormous and direct impact on the virtualization landscape once it ships. But does that even matter in user communities that have largely accepted beta to be nearly as good as gold — especially from Microsoft, known for its constant patching and release packs?

More organizations deploy Microsoft than any other operating system. With Hyper-V a standard component, enterprises still on the virtual fence will be able to dip a toe in the water, easily and inexpensively. This will make VMware and its ilk a tougher sell, especially if Microsoft truly plays nice with other operating systems. The value VMware and other competitors add will need to be enough to justify their price.

6. Storage and Servers Will Converge
Convergence has been a buzzword in the dot-com era. Sometimes it holds true, sometimes not. The storage and server infrastructures have been skirting each other for years, and storage has a legacy of its own with virtualization. RAID arrays really aren’t that different from virtual machines, after all.

VMware unwrapped a new version of Virtual Infrastructure, and Virtual Iron took a new version of its software out of the bag. Both vendors emphasized storage, and the evidence of melding is pretty clear.

7. I/O and Automation Will Become Increasingly Critical
Not that they weren’t before. When you’re moving workloads around and planning out deployments, it’s important to have an understanding of your needs and limitations. As more workloads are moved around virtually, it’s even more paramount.

A recent survey from Xsigo Systems highlighted I/O problems that have been surfacing. As for automation, consider the price HP paid for Opsware and how quickly it integrated it into the organization.
Although the technology required to virtualize data centers has been around for more than 40 years, 2007 will go down in history as the end of the beginning — the year the technology vaulted into mainstream consciousness and hurtled to the top of every CIO’s "must-do" list.

Now that everyone has caught on to the benefits this technology can deliver, chiefly, the ability to reduce an organization’s data center footprint by a factor of six, eight or 12, the focus is turning to making sure all these efficiencies and cost savings don’t come at the expense of data availability and security.

“We’ve jumped over the chasm without even looking down below," Don Norbeck, director of product development at SunGard, told InternetNews.com. "Luckily, we’ll probably land on the other side. But there’s still plenty of risk."

These risks, from an organizational standpoint, start long before the first virtualization application is downloaded.

Just like any other software installation, committing to a virtualization project requires not only an appreciation for the technological vulnerabilities inherent in any operating system — like bugs, malware, and access control — but also a fundamental understanding of exactly which applications and systems are used the most, which are the most critical to operations, when they’re used, and how to orchestrate the workload of all these applications running on both physical and virtual servers.

For those charged with the responsibility of managing and maintaining one data center or multiple data centers, the temptation to simply initiate a straight-line consolidation — take the workloads running on 100 servers and cram them on to 10 or 15 servers — is alluring. Every company wants to get greener, lower energy consumption, reduce the size of their data centers and have the ability to shift workloads with a simple click of a button.

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"Now that everything is in the pool, people just have to push a button," Norbeck said. "And they'll keep pushing the button until the button doesn't work anymore. Without proper planning and provisioning, you're back to where you were before. How do you audit it? You push a button and then wait to see who starts complaining."

In other words, just as all servers are not created equal, neither are the applications running in a corporate data center.

And the stakes are increasing.

In December, SAP announced it will now begin supporting its virtualized enterprise resource planning (ERP) software running on VMware and 64-bit Windows, Linux, and Solaris platforms. It's a sign of the virtualized times.

After all, it's one thing to have the corporate e-mail system or some back-end storage system running on a virtualized machine, but companies are now virtualizing their most critical applications. Workloads can spike unpredictably. Power outages occur. One malicious bit of code has the potential to infiltrate multiple applications. Patching, more than ever, becomes a preoccupation.

And no data center is an island unto itself. It's dependent on multiple vendors to make it all work: security, storage, applications, operating systems, and networking equipment.

"Virtualization, as with any emerging technology, will be the target of new security threats," Neil MacDonald, an analyst at Gartner, said in a research report published earlier this year. "Many organizations mistakenly assume that their approach for securing virtual machines will be the same as securing any OS and thus plan to apply their existing configuration guidelines, standards and tools. While this is start, simply applying the technologies and best practices for securing physical servers won't provide sufficient protections for VMs."

MacDonald said that through 2009, 60 percent of production virtual machines will be less secure than their physical counterparts.

At the architecture level, it starts with the hypervisor, which is basically a stripped down version of the Windows or Linux or Solaris operating system.

You have 10 workloads and you merge them onto one," MacDonald said. "That's a very attractive target for a bad guy. Now, if I compromise just one thin layer, I get all 10 machines."

Nand Mulchandani, senior director of security product management and marketing at VMware, deals with the security implications of his company's industry-leading software all day long. Not surprisingly, he thinks most of the security concerns raised by the media and some security experts are overblown.

"Virtualization in some sense looks like a titanic shift in computing," he said in an interview with InternetNews.com. "But frankly, from a security and technology standpoint, it's not as radical as it's been portrayed.

"It's a temporal issue," he said. "The thinking is that anything new and different is going to have problems. Everyone is looking for a big Achilles' heel that no one is talking about. We have to roll with the punches. Tomorrow there will be another new thing in the industry that everyone will call insecure. That's life."

For VMware, Microsoft, Virtual Iron, XenSource and now Oracle, the focus will shift from functionality to security as the virtualization software industry matures.

Misconfiguration and mismanagement — the propensity to set up default passwords insecurely — has been the scourge of operating systems since their inception. And while virtualization vendors continue to strip down the core operating system in the hypervisor, there's no such thing as a foolproof virtualization project.

"From a threat profile, the most important thing customers should worry about is hardening their platforms," Mulchandani said. "Locking down your platform is something most people in the Windows or Linux world are used to doing. Securing the system and the code is purely and primarily on us."

Because all large corporations — and most small- and midsize firms — didn't have the benefit of a crystal ball, applications and the operating systems running
those applications grew in a staggered, chaotic fashion and can’t always be configured, provisioned, or moved around in a tidy, virtualization-friendly box.

But that probably won’t dissuade companies from eventually embracing virtualization in their data centers.

"Where money is involved and efficiency is involved, people tend to overlook whatever minor queasiness they might have," Mulchandini said.
Virtualization is catching on like never before. Just about every server vendor is advocating it heavily, and IT departments worldwide are buying into the technology in ever-increasing numbers.

"The use of virtualization in the mainstream is now relatively commonplace, rather than just in development and test," said Clive Longbottom, an analyst at U.K.-based Quocirca. "In addition, business continuity based on long-distance virtualization is being seen more often."

As a result, the time has come to more closely align hardware purchasing with virtualization deployment. So what are some of the important do’s and don’ts of buying servers and other hardware for a virtual data center infrastructure? What questions should IT managers ask before they make selection decisions on servers? And how should storage virtualization gear be integrated into the data center?

**Do’s and Don’ts**

There are, of course, plenty of ways to virtualize, depending on the applications being addressed. This article will focus on a typical case where infrastructure and business logic applications are the main targets.

With that in mind, one obvious target is memory. It is a smart policy to buy larger servers that hold more memory to get the best return on investment. While single- and dual-processor systems can host multiple applications under normal circumstances, problems arise when two or more hit peak usage periods.

"Our field experience has shown that you can host more VMs [virtual machines] per processor and drive higher overall utilization on the server if there are more resources within the physical system," said Jay Bretzmann, worldwide marketing manager, System x at IBM. "VMware’s code permits dynamic load balancing across the unused processor resources allocated to separate virtual machines."

He advised buying servers with more reliability features, especially those that predict pending failures and send alerts to move the workloads before the system experiences a hard failure. Despite the added cost, organizations should bear in mind that such
servers are the cornerstone of any virtualization solution. Therefore, they deserve the lion's share of investment.

“Businesses will lose significant productivity if the consolidation server fails,” said Bretzmann. “A hard crash can lead to hours of downtime depending upon what failed.”

Longbottom, however, made the point that an organization need not spend an arm and a leg for virtualization hardware — as long as it doesn’t go too low end.

“Cost of items should be low — these items may need swapping in and out as time goes on,” said Longbottom. “But don’t just go for cheapest kit around — make sure that you get what is needed.”

This is best achieved by looking for highly dense systems. Think either stackable within a 19-inch rack or usable as a blade chassis system. By focusing on such systems, overall cooling and power budgets can be better contained. Remember, too, not every server is capable of being managed in a virtual environment. Therefore, all assets should be recognizable by standard systems management tools.

Just as there are things you must do, several key don’ts should be observed as well. One that is often violated is that servers should not be configured with lots of internal storage.

“Servers that load VMs from local storage don’t have the ability to use technologies like VMotion to move workloads from one server to another,” cautioned Bretzmann.

What about virtualizing everything? That’s a no-no, too. Although many applications benefit from this

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**Will Hyper-V 'Netscape' VMware?**

By Paul Rubens

Microsoft’s hypervisor-based virtualization technology will hit the streets in its final version some time this summer. Hyper-V, formerly known as Viridian, will be rolled into the Data Center and Enterprise Editions of Windows Server 2008.

Although much hyped, this is not Microsoft’s first venture into virtualization. Its Virtual Server product holds that distinction. Hyper-V, however, is its first product to use the same hypervisor-based technology as market leader VMware and Citrix with its open source Xen.

What is significant about Microsoft’s move is that although hypervisor technology makes hardware-assisted virtualization extremely efficient and servers virtualized in this way suffer very little performance penalty, the market is relatively immature. VMware currently has the largest market share by far, but the percentage of servers actually virtualized remains small.

“In the virtualization space, there is still everything left to play for,” said Barb Goldworm, president and chief analyst at Boulder, Colo.-based Focus Consulting. “If you look at the virtualization market today, 75 percent of large companies have implemented some form of virtualization, but probably only 10 percent to 15 percent of the servers in the world are virtualized. So the market is only 10 percent saturated,” she added.

This suggests that Microsoft has timed its entry into the serious virtualization world just about right. Awareness of the benefits of virtualization is high — thanks in no small part to the ongoing marketing efforts of VMware — but plenty of companies have yet to commit to the EMC-owned company.

So although there’s little reason for enterprises that have chosen to go with VMware to switch to Microsoft’s Hyper-V, those that have yet to embrace virtualization technology have every reason to consider Hyper-V — especially if it comes bundled with Windows Server 2008.

“We are certainly not getting the idea that there is any dissatisfaction with VMware,” said Chris Ingle, a
technology, in some cases, it actually makes things worse. For example, database servers should not be virtualized for performance reasons.

Support is another important issue to consider. “Find out if the adoption of virtualization will cause any application support problems,” said Bretzmann. “Not all ISVs have tested their applications with VMware.”

Storage Virtualization

Most of the provisos covered above also apply to purchasing gear for storage virtualization.

“Most of the same rules for classic physical environments still apply to virtual environments — it’s really a question of providing a robust environment for the application and its data,” said John Lallier, vice president of technology at FalconStor Software.

While virtual environments can shield users from hardware specific dependencies, they can also introduce other issues. One concern when consolidating applications on a single virtualization server, for example, is that you may be over-consolidating to the detriment of performance and re-introducing a single-point-of-failure. When one physical server fails, multiple virtual application servers are affected.

“Customers should look for systems that can provide the same level of data protection that they already enjoy in their physical environments,” said Lallier.

He believes, therefore, that storage purchasers should opt for resilient and highly available gear that will keep vital services active no matter what hardware problems arise. In addition, Lallier suggests investing in several layers of protection for large distributed applications that may span multiple application servers. This should include disaster recovery (DR) technology so operations can quickly resume at remote sites. To keep costs down, he said users should select DR solutions that do not require an enormous investment in bandwidth.

As a cost-cutting measure, Lallier advocates doubling up virtual environments. If the user is deploying a virtual environment to better manage application servers, for example, why not use the same virtualiza-
tion environment to better manage the data protection servers? As an example, FalconStor has created virtual appliances for VMware Virtual Infrastructure that enable users to make use of its continuous data protection (CDP) or virtual tape library (VTL) systems that can be installed and managed as easily as application servers in this environment.

Of course, every vendor has a different take. Network Appliance, aka NetApp, provides an alternative to FalconStor using the snapshot technology available in its StoreVault S500. This storage array handles instant backups and restores without disrupting the established IT environment.

“Useful products are able to host VMs over multiple protocols, and the StoreVault can do it via NFS, iSCSI or FCP — whatever your environment needs,” said Andrew Meyer StoreVault Product Marketing Manager at NetApp.

“Don’t get trapped into buying numerous products for each individual solution. One product that is flexible with multiple options (can handle VMs, create a SAN, handle NAS needs, provide snapshots and replication) may be a smarter investment as a piece of infrastructure.”

Will Hyper-V 'Netscape' VMware?

At the moment, Microsoft doesn’t have anything that can match the feature set of VMotion. For management software, Microsoft will hitch its wagon to the System Center family of products. Most significant will be the Virtual Machine Manger module. When integrated with the rest of System Center, it promises the ability to manage an entire Microsoft infrastructure regardless of whether individual machines are virtual. In a mixed physical and virtual server environment managed by System Center, Virtual Machine Manager provides features for provisioning and other VM-specific tasks. For example, Operations Manager provides the unified health monitoring, while Data Protection Manager provides the continuous data protection for all of the servers — both physical and virtual.

Of course, Hyper-V users will not be restricted to Microsoft-only management products, and it’s likely the company will encourage plug-ins to System Center to enable specific vendors to work with it. Barb Goldworm said she believes things could go even further, "The Xen product has been architected as a base hypervisor, then services are built on top of that, and then a management layer over that. So it may end up that people use Hyper-V, services from Citrix, and management from System Center.”

Whatever emerges, it’s likely that this will spur VMware to make even more advanced management products for its products, resulting in an increased sophistication and attraction of the whole virtualization market.

The thing about Microsoft, however, is that it almost always gets what it wants. Come late 2008, Hyper-V is bound to be widely adopted by Microsoft shops that have yet to commit to virtualization. What will make the difference between a widely adopted product and one that can seriously challenge VMware in the long term are price, performance, and supporting tools and infrastructure.

Microsoft knows this, but don't expect VMware to sit there and do nothing to meet the challenge.
While server virtualization rolls onward with seemingly unstoppable momentum, storage virtualization lags behind. That may be changing, as storage virtualization moves forward on two distinct fronts — block-level and file-level virtualization.

The demand to eliminate disruption from IT operations is driving block-level virtualization. Taking the SAN down on weekends to perform maintenance or move data is no longer acceptable.

"Some might be surprised that a key driver of this is planned downtime," said Doc D’Errico, vice president and general manager of the infrastructure software group at EMC. "While most people understand unplanned events such as natural and man-made disasters, planned downtime — like schedule maintenance, data migrations, lease roll-overs, or technology refreshes — account for 60 percent to 75 percent of all downtime."

To complicate this, most enterprise-class infrastructures typically include multi-vendor server environments, diverse connectivity technologies, and multi-vendor tiered storage environments. Organizations must be able to allocate any storage to any application based on the needs of the business, and they must be able to do so non-disruptively. Enter storage virtualization — to deliver the right information at the right performance level with the right functionality to the business at the lowest total cost.

"Without storage virtualization, host servers must be individually mapped to physical arrays in a many-to-many or server-to-array configuration," said D’Errico. "Administrators are forced to tier their infrastructure manually."

If a company’s financial data, for example, must be kept on Tier 1 storage and e-mail on Tier 2, then the servers running these applications must be manually mapped to an appropriate physical array. With storage virtualization, administrators can instead map all servers to a single endpoint like the EMC Invista virtualization application for SANs; no need to manually touch each physical array. The result is much simpler SAN administration and easier interoperability between the multiple data center components.

Organizations must be able to allocate any storage to any application based on the needs of the business, and they must be able to do so non-disruptively.
Other vendors offering block-level virtualization include IBM SVC from IBM, TagmaStore USP from Hitachi Data Systems, and SANmelody from DataCore Software.

DataCore has developed a series of what it calls Feature-Packaged Virtual Storage Solutions. These run on virtualization platforms, such as VMware, Microsoft VS, Oracle VM, Sun xVM, Virtual Iron and Citrix XenServer. They support anywhere from 2 TB to 32 TB. Pricing starts at $4,500.

“They can thin-provision storage capacity, migrate data, accelerate storage performance and create high-speed disk copies for fast disk backup and recovery,” said George Teixeira, president and CEO of DataCore.

File Virtualization Gains More FANs

File virtualization deals mainly with the virtualization of the files stored on NAS boxes, storage servers, and file servers. File virtualization is also known under the term “file-area network” or FAN. A FAN is a way to aggregate file systems so they can be moved easier and managed centrally via a logical layer known as a global namespace. The benefits are easier server administration, file reorganization, and consolidation. Files can be moved without the user being aware that they may now physically reside in a completely different location.

“A file area network consists of a collection of network-attached storage appliances and file servers that are virtualized and for which the data on them can be managed under a single file system,” said Deni Connor, an analyst with Storage Strategies Now. “As NAS appliances proliferate, the management of them becomes more complex. Rather than managing each NAS device by itself, combining them into a FAN, allows them to be managed collectively.”

Some vendors, such as Acopia (acquired by F5 Networks), implement FANs as hardware. Others take a software approach (although they are sometimes delivered within an appliance), such as StorageX by Brocade Communications Systems. StorageX works in conjunction with the Microsoft Distributed File System (DFS) protocol, which maps logical physical devices to logical storage and replicates data across WAN links.

StorageX extends the functionality of DFS by adding global namespace capabilities and simplifying data management at remote locations.

“Without virtualization, you can have one server being fully utilized while others sit idle, and it is cumbersome to move files, reconfigure file systems or make them available elsewhere in the event of a disaster,” said Philippe Nicolas, technology evangelist for FAN solutions at Brocade. “Such issues are solved by adding a logical layer (via a global namespace) between clients and file systems.”

According to a recent study by New York City-based analyst firm TheInfoPro, however, EMC Rainfinity is the No. 1 file virtualization technology. Rainfinity virtualizes unstructured data environments and moves data (including active, open files) without disruption. It can be deployed as either software or an appliance.

“Rainfinity continues to accelerate its penetration into enterprises globally on the strength of its file virtualization capabilities for multi-vendor NAS environments and is currently being used to virtualize petabytes of customer information in a wide range of industries and operating environments,” said D’Errico.

Virtual Problems

Like everything else, however, you can get too much of a good thing. With so much server virtualization happening, and now two different categories of storage virtualization being deployed in storage environments, it stands to reason that integration must be addressed.

“Virtualization will become increasingly important both for storage and servers,” said Mike Karp, an analyst at Enterprise Management Associates. “The challenge here will be managing across the virtual interfaces — the abstraction layers that separate the physical devices from the management. It is necessary to manage storage within the context of its connection with application servers.”

Interestingly, there is a developing field that addresses the management of multiple virtualization technologies. Known as enterprise virtualization, it encompasses servers and storage.
“IT managers are increasingly considering the prospect of a fully virtualized data center infrastructure,” said Emulex’s McIntyre. “There is a high degree of affinity between SANs and server virtualization because the connectivity offered by a SAN simplifies the deployment and migration of virtual machines.”
What a difference a year makes with the whirlwind of the server virtualization world. New cross-platform management tools, embedded hypervisors, wider acceptance of open source methods, protocols, standards, and simplified pricing have all made virtualization much more popular with IT managers.

While the market is growing, it still represents a minor portion of the entire server marketplace – less than 10 percent, according to Microsoft representatives. What is new is that virtual machine (VM) server technology is now available and more attractive to mid-tier users for four reasons:

- The free versions are more capable.
- Prices are coming down.
- Ease of setup and management is increasing.
- The technology can help reduce power and cooling requirements just as being green is gaining traction.

Nevertheless, virtual servers are just one part of the entire virtualization market, which is growing to include all kinds of computing, from storage virtualization to streaming applications installation, to virtual desktops.

But in the past year, four trends are obvious:

1) Growth of the hypervisor: The hypervisor is now found in more places, both exploited in the latest processor chips from Intel’s Virtualization Technology vPro and AMD-V, and as a standard package with most of the popular Linux distributions and soon for Solaris too. The hypervisors, or virtual machine control programs, for the three major vendors (Microsoft, Citrix and VMware) now support this embedded hardware, which makes for simplified installation and nearly one-button booting of virtual servers. And VMware has begun selling ESXi, a specialized embedded version that will begin shipping on servers imminently. HP’s ProLiant servers now offer built-in support for Citrix’ XenServer; older ProLiants can be upgraded too.

2) Interoperability: Interoperability has taken root, and we have seen in the past year a series of initia-
atives to make managing multiple VM vendors more palatable. Novell’s ZenWorks VM Manager and Orchestrator products are just from one of many products that will offer a way to manage more than one vendor’s hypervisor. Microsoft’s SystemCenter, CA and others have announced plans to support both Microsoft’s and VMware hypervisors, and Novell will also support Citrix’s solution too. VMware announced several management tools that enable automation of the entire lifecycle of a VM, including staging the migration from a development/test environment into production, according to Bogomil Balkansky, the Senior Director of Product Marketing for the company.

“Our customers tend to want to do more with virtual servers once they get it into their shops.”

Another dimension to the interoperability story is a standards effort called the open VM format that is first expected to be finished sometime early summer. “With this format, organizations can use a standard set of VM management metadata to manage VMs running on different hypervisors. This architecture is fully extensible, allowing VMs to advertise custom configuration information, such as a virtual barcode, security requirements, or service level requirements,” says Chris Wolf, a senior analyst with the Burton Group.

“While work remains, the eventual goal of these standards is to provide hypervisor interoperability, such as by taking a VM image built on the Microsoft Hyper-V hypervisor and running it on a Citrix XenServer hypervisor without having to modify the VM’s configuration.”

And as another example of increased manageability, inventory and asset management vendors such as BDNA have tools that can account for individual VMs that are hosted on virtual servers when they discover server resources across an enterprise. “This is a strong sign that the market is maturing and that customers have a choice,” says Simon Crosby, the co-founder of XenSource and now the CTO of the division for Citrix.

3) Falling Prices and Improved Functionality: Prices are coming down and functionality for even the free versions is improving. The free products – and indeed, all of Microsoft’s virtual server line – continue to be a great way for enterprises to become familiar with VM technology and to do any evaluations before deploying them into production. Most noticeably Microsoft has announced they will expand their product line with Hyper-V, which will be included in all 64-bit versions of its Windows Server 2008, expected in August. Hyper-V ups the ante considerably, with support for symmetrical multi-processors and larger memory support.

On the paid products, XenServer continues to be the lower-priced spread, offering single-CPU versions and better value when compared to VMware. The latter’s prices are now almost comprehensible, an improvement from their obscure complexity of last year. VMware also introduced support for 10 gigabit Ethernet networks and larger memory and disk support with its latest version, and now has more than 700 pre-built virtual "appliances" or virtual disk images that are available as well.

Citrix hasn’t stood still either, and boosted the performance of XenServer since acquiring the company last year, especially when it comes to XenServer working with the company’s flagship Presentation Server product line. “We recognize that our customers want to run both products to solve dynamic data center problems,” says Crosby.

4) Widening Channels: The virtual server channel continues to widen, with more partnerships, agreements, and expertise than ever before. As smaller, specialty companies enter this market, they are looking to cement relationships, expand distribution, and make just about every component in the data center virtualized. “All of the services that do hardware and applications failover, disaster recovery, chargeback, and security will be built into hypervisors and run on VMs,” says Susan Davis, the VP of marketing for Egenera, one of the newer specialty virtual software vendors.

“This year is shaping up to be one of the most interesting years ever in enterprise IT infrastructure,” says Crosby.
## Virtual Server Product Comparison

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<td>Management tools</td>
<td>Lifecycle Manager, VMotion, Storage VMotion</td>
<td>System Center VM Manager</td>
<td>XenCenter Management Console</td>
</tr>
<tr>
<td>Embedded hypervisor product</td>
<td>ESXi supports both AMD and Intel chipsets</td>
<td>None*</td>
<td>Yes</td>
</tr>
</tbody>
</table>
| Advantages            | • Over 700 pre-built appliances  
                        | • Widest selection of guest OS support  
                        | • Wizards galore for install aids | • Can run on any IE browser with Internet access  
                        | • Less expensive option  
                        | • Easy cloning of VM images  
                        | • Familiar UI | • Open source solution that doesn’t require any host OS  
                        | • Lower cost |
| Disadvantages         | Confusing array of pricing and configuration options (2 CPU minimum pricing) | Limited pre-built VHD appliances and just of MS server products | Limited Windows guest OS support |

*While Microsoft’s offering doesn’t have an embedded hypervisor, it does recognize and take advantage of computers with either the AMD or Intel virtualization chipsets.*
Virtualization is the latest buzzword steamrolling across the IT landscape, influencing every computer room in its path. Everyone is doing it, according to analysts. Everybody needs it, say the vendors. But does it really add any value to the small business? As usual the answer varies from company to company.

If you own or manage a small shop with a handful of servers and a bookkeeper that doubles as your IT guy two hours per day, don’t even bother reading the rest of this article. For those of you with more substantial computing needs, who seem to have way too many servers or skyrocketing IT costs, virtualization may offer some relief.

“Companies with IT teams of one to four people or firms with 60 or fewer employees often don’t have the level of sophistication required to make virtualization pay,” said Chip Nickolett, president of Comprehensive Consulting Solutions that has helped several small businesses take their first steps into the virtual world. "In these environments, the benefit of virtualization would be marginal at best."

These are not hard-and-fast numbers, of course. Tiny firms in financial services, law and other sectors sometimes have both significant IT requirements, the budget and the staff required to make virtualization pay big dividends.

Understanding the V Word

But let’s start with a statement to clarify what virtualization is in simple terms — not as easy a task as it sounds. You have to speak to the geeks in order to get a definition and it’s not in their DNA to use laymen’s terms. So what does the V word mean?

"Virtualization enables one server or computer to act as many," said Dan Chu, vice president of emerging products and markets at VMware. "Instead of keeping your important programs on separate servers so that if one application or server fails, the other applications aren’t affected, virtualization software lets you run many applications on the same server."

In such a scenario, you actually have one server sitting on the floor, but it acts as though it were several servers. Virtualization software enables that server to be split up into different partitions.
Forexample, one server could act as three virtual servers with each virtual server running an application (e.g., file server, Web server, and e-mail server). Each virtual server acts completely independently from one another, so if one crashes, the others are not affected. The net result is that you have to buy only one server and pay for its power consumption. You get the benefit of three servers for the cost of one.

“The way that I explain it to people is that virtualization is a way to make an environment portable,” said Nickolett.

This means software can be easily relocated to a larger or smaller machine or even moved from one operating system to another. This is accomplished by splitting one physical server into numerous virtual servers or virtual machines (VM). Each VM hosts a specific application or set of software. As everything is virtual, it is easy to move the VMs around and make changes in the IT environment.

Some small businesses embark on the virtualization journey as a way to simplify disaster recovery. Typically, they just went through their first disaster and recovering their systems was a nightmare. Finding the right back up tapes, hooking them up to new hardware, and finding all sorts problems — like not having a record of their software licenses and not being able to find the original CDs for their operating systems and programs. They have to go through the laborious task of re-installing and re-configuring everything and making it work on the new hardware and then figuring out how to get the data from the tapes back into the systems. This process can take many days if you’re not familiar with it.

Virtualization, on the other hand, makes it relatively easy to capture everything onto a single system image, which makes recovery a snap. “A virtual image makes recovery or failover faster, easier and more foolproof,” said Nickolett. “Like anything, it requires planning and testing, but it can be an attractive alternative for some businesses.”

**Blossoming Trend**

There is no doubt that virtualization is catching on like wildfire. Just about every large and midsize firm is already doing it extensively, and now it is percolating down into the small business strata.

“Virtualization is exploding in popularity,” said Jim Smith, a performance specialist at TeamQuest Corp. “Virtual machine deployments are expected to grow from 540,000 in 2006 to more than four million 2009.”

He cautions, though, that although the benefits are widely advertised, the complexities have not been comprehensively discussed. VMs add a whole new layer of administration to IT. If you’re already well schooled in IT complexity, fine. But for companies still coming to terms with internal networking or hooking up servers to storage arrays, virtualization is going to mean the addition of a highly paid specialist into the fold. So it’s by no means a must-have technology for many smaller organizations.

Smith makes the point that a good reason to use virtualization is to improve the utilization rate of hardware — i.e., how much processing power your server uses to run the application. Many companies, for example, buy a server for every application they run. But you can end up with dozens of servers on the floor, most of which are very poorly utilized.

What this adds up to is that you have a hefty power and cooling bill but aren’t getting much return on the money. Low utilization means computers aren’t being used to their limits, and that represents an awful lot of inefficiency.

“When people look, they are often shocked to find that many servers are running at utilization levels of less than 12 percent,” said Smith. “Since 9/11, however, the tide has been turning and the ongoing trend is to maximize utilization rates. And server virtualization certainly plays a big part in solving this problem.”

This brings many other advantages to the IT world. Servers can now be deployed faster. Instead of hours or days, it can be done with a virtual machine within the hour. Other benefits include a reduction in the amount of space required for computers. That in turn leads to lower costs for ventilation, electricity and cooling.

Each vendor, of course, advocates its own virtualization schemes, and the various approaches can be quite confusing. For the purposes of this article, we will discuss...
only the options that small businesses would likely encounter.

**VMware**

VMware is the darling of the marketplace. Just about every company of any size engages some form of VMware deployment. VMware ESX Server is software-based virtualization solution that facilitates hardware sharing. It makes it possible to have a powerful processor shared by multiple virtual machines behaving as though they were completely separate servers.

**Microsoft Windows Virtual Server**

Windows Virtual Server (WVS) is also software-based, and like VMware, it lets you share hardware resources such as memory and CPUs.

Let’s move this over into one possible scenario. HP offers a product for small businesses named the HP c3000 (also known by its nickname, Shorty). This is, in essence, just a chassis or enclosure to hold blade servers (thin, streamlined servers).

You can buy a c3000 enclosure for with power supplies, fans, and management software for less than $5,000. It can hold two-to-eight server blades, which range between $2,100 and $5,000 each, depending on processor, memory and configuration. There are some additional costs for storage and networking. Depending on the mix of devices, a Shorty enclosure may cost between $7,000 and $45,000.

This hardware from HP supports VMware, WVS and other virtualization solutions. By consolidating all of IT into a couple of these boxes, it is possible to establish a powerful virtual world composed of scores of virtual servers. Now set up another such box at a remote location and disaster recovery and you simplify backup tremendously.

"We have customers using the c3000 for virtualization projects," said Barry Sinclair, product manager for HP c3000. "One small business customer has four enclosures (two in each of two sites in a virtualized environment, and it is handling disaster recovery scenarios between sites."

**Virtualization in the Real World**

Let’s end by looking at how one small business benefits from virtualization. The Los Angeles Universal Preschool (LAUP) is non-profit with a goal to make voluntary, high-quality preschool available to every four year old in Los Angeles County. It has several physical servers running VMware. Each physical server represents 15 to 20 virtual machines.

"The cost of purchasing physical servers would have easily run over $100,000," said Robert Lazo, director of systems and operations at LAUP. "VMware technology allowed us to avoid that expense."

Other benefits reported by Lazo include being able to set up a new server in less than five minutes. Such a task would have taken many hours previously.

LAUP, however, has a well-established IT staff of seven to service 150 employees. And that’s probably the make-break point of virtualization — it’s great if you have clued-in people who are coping with IT headaches on a daily basis. But if your business is coping fine without high-level computing expertise, it’s probably safe to give virtualization a pass.

This content was adapted from Internet.com’s ServerWatch, InternetNews and Small Business ComputingWeb site. Contributors: Drew Robb, Paul Rubens, Amy Newman, Larry Barrett, and David Strom.