VMware Best Practices

Server virtualization can be one of the most cost-effective and strategic decisions a company makes. At a basic level, virtualization abstracts physical hardware from its operating systems. When you remove the ties between your operating systems and physical servers, you can run several virtual machines with different operating systems, at the same time, on the same physical machine.

That's precisely what makes virtualization so cost effective—it offers better utilization of resources, so you require fewer physical servers to accomplish the same amount of work. And when you have fewer physical servers, you have lower power and energy costs.

In addition to its cost effectiveness, virtualization provides the framework for high availability, without the complication and expense of clustering. Plus, virtualization offers you the option to add resources dynamically, so you can quickly deploy and allocate CPU memory and networking resources to new virtual servers as needed.

VMware, the global virtualization leader, offers a wide range of robust and comprehensive virtualization solutions. Like all new technology, though, virtualization can impose steep learning curves, introducing unexpected complications long after deployment.

Here are six best practices to help you successfully migrate your servers and applications from physical servers to virtual servers—while establishing the most efficient, long-term implementation of your VMware infrastructure possible.

Top Six VMware Best Practices:

1. Create operating system templates.
2. Create single processor images.
3. Minimize the resources allocated to virtual servers.
5. Keep operating system and application data sets on the same volume.
6. Keep at least one physical active directory server.

Create Operating System Templates

The Physical to Virtual (P2V) migration capability from VMware automates and simplifies physical to virtual machine conversions. Although P2V certainly eases the initial migration from physical servers, it can ultimately waste your virtual resources. With P2V, physical servers' devices (e.g. serial bus) and associated drivers are replicated to the virtual server—even though many of them may be unnecessary or unavailable. Additionally, P2V creates virtual server images with the same physical attributes as the physical servers, often resulting in an over-allocation of resources. Instead, use the VMware capability to create image templates of different operating systems. Later, you can use these templates to deploy a new virtual server in a matter of minutes.

Create Single Processor Images

As you create operating system templates, make sure they’re single processor images. Guest operating system images share physical processors, so in most cases, virtualized single processor guest operating systems perform much better than multi-processor guest operating systems. For example, a multi-processor guest operating system will be scheduled for time slices on multiple physical processors, increasing scheduling time and resources utilized—which adversely affects the resource pool available to the other guest operating systems.
3 Minimize the Resources Allocated to Virtual Servers

Typically, virtual instances of a server require less processor and memory resources than their physical counterparts. That’s because physical servers are often over-configured with memory and processor—you can’t dynamically expand physical resources, as you can with virtual servers.

To achieve the maximum performance levels, minimize the resources allocated to virtual servers. Deliberately set the processor and memory resources low. Then closely monitor the guest operating system resource utilization over an initial evaluation period. Increase the processor and memory resources only when necessary, preventing allocation of unneeded memory and processor capacity to a virtual server. This also prevents unneeded consumption of resources that you could make available to other virtual servers.

4 Beware of SCSI Reservations

SCSI reservations are used for specific operations when metadata changes are made, and they prevent multiple hosts from concurrently writing to the metadata. You might see this situation when you:
- Create or delete a VMFS datastore
- Expand a VMFS datastore onto additional extents
- Power on or off a Virtual Machine (VM)
- Create a new VM
- Migrate a VM with vMotion
- Grow a snapshot file or a thin-provisioned Virtual Disk

While SCSI Reservations are necessary to avoid data corruption, they also degrade the performance of virtual servers. To help minimize SCSI reservations, you can:
- Only use vMotion to migrate a single guest operating system per LUN at any one time
- Only cold migrate a single guest operating system per LUN at any one time
- Avoid powering on/off too many VMs simultaneously
- Limit template creations and deployments to a single creation per LUN at any one time
- Limit the number of running snapshots—snapshots grow in 16MB increments, and each time they grow, they cause SCSI reservations

5 Keep Operating System and Application Data Sets on the Same Volume

With physical servers, you want to separate the operating system and the application disks. However, in a virtual server environment, you should keep both the operating system and application on the same volume. Since all of the disk space in the virtual server environment is in the storage array, RAID protection is provided and multiple physical disks are available to the storage volume for performance. A single volume also eliminates the need for consistency groups across multiple volumes, ensuring that the operating system and application snapshots are performed at the same instant. And keeping both the operating system and application on the same volume simplifies the snapshot and recovery process.

If your data center experiences a disruption that might bring down the entire ESX infrastructure, a physical Active Directory server can be brought up before the virtual servers.
Keep At Least One Physical Active Directory Server

Be sure to keep at least one physical active directory server. If your data center experiences a disruption that could disrupt the entire ESX infrastructure, you can bring this server up before the virtual servers. This way, you’ll avoid the manual process of managing the order in which you start the virtual servers, and you’ll ensure your virtual servers are able to complete their boot process.

Maximize Your Existing Resources

Virtualization can dramatically improve the efficiency and availability of resources and applications in your organization, helping you maintain your company’s competitive edge—this makes your decision to implement a virtualized infrastructure both cost-effective and strategic. Ideally, your virtualization implementation should maximize your existing resources and provide an infrastructure that is scalable, available, and reliable for all your company’s applications. Use these best practices to ensure successful VMware deployments that will optimize performance and utilization.

About the Author

Throughout more than 15 years of experience in technical, consultative, pre- and post-sales positions, Layne Hellickson has specialized in designing and architecting solutions to transform challenging environments. In his current role as Senior Healthcare Solutions Architect at Advanced Systems Group, Layne applies his broad expertise in storage, network, and other IT problem/solutions. Most recently, Layne joined the Health Information Technology (HIT) Vendor Advisory Committee, advising the Colorado Regional Health Information Organization (CORHIO) with best practices and policies regarding health information projects in Colorado.

About Advanced Systems Group

Advanced Systems Group (ASG) is a Denver-based IT consulting, integration, and project management firm—fully equipped with a high-end computing facility that provides testing, benchmarks, demonstrations and an executive briefing center. Acknowledged by Computer Reseller News as one of the Top Ten Storage Solution Providers, ASG pursues active involvement in the industry, maintaining the highest level of engineering certifications with partners and the vendor community.

“Because we can use templates for the virtual machines, documentation is easier and server certification can be done in less time. We are confident that the production virtual machines will give us at least the same performance as the old physical machines did—perhaps better.”

—Askin Karatepe, Server and Database Administrator, AstraZeneca