

Server Virtualization Best Practices

Virtualization, by definition, is using one piece of hardware to supply the resources needed by multiple “virtual” machines. Each virtual machine is setup and configured as if it were running on its own hardware. The virtual machines are each allotted a slice of the physical server’s resources and use those resources exclusively. The division of resources is important and must be taken carefully into consideration when setting up the server and the virtual machines it will host.

In the IT field today managers and CTOs are constantly being required to get more work accomplished with less money, resources, and people. In the past such accomplishments, if possible, came with tradeoffs such as increased production time and delivery delays. However, as many IT departments have already discovered, the use of virtualization can allow a company to move forward and accomplish more while using less computing hardware and financial resources. In order to accomplish this through the use of virtualization there are several things one must do to ensure a smooth transition to this technology.

Planning:

Have patience. Designing and implementing a virtualized environment requires time and a thorough understanding of your needs and available resources. Rushing through the planning phase can lead to more expensive measures later and reduce the efficiency of your virtualization project. If not done properly the move to virtualization can reduce current productivity and decrease availability of critical servers and resources.

Set performance goals. It is reasonable to expect near total host server resource utilization when spread across multiple virtual machines. But keep in mind that all servers, virtual and physical, must have enough resources to perform their assigned tasks. An underpowered virtual machine or host server undercuts the benefits of virtualizing your environment.

Pay attention to hardware compatibility with the software you intend to virtualize. Your software for virtualization, the virtual servers, and the host server all must have hardware compatible with the software you intend to use. Many virtualization packages will emulate a standard set of hardware regardless of that on which it resides. This will allow you to have a standard hardware setup for each virtual machine and reduce time and difficulty in managing driver versions across your virtual environment.

Ensure you have enough resources to accomplish your goal. Virtualization increases the hardware requirements for your solution. You must have enough processing power, storage, and RAM for your virtual machines, software, and virtualization overhead. This means your host servers must first have enough resources to support your virtualization software of choice, plus the operating system and software used within the virtual machines.

Know when not to virtualize. Part of ensuring your company’s virtualization initiative is successful is knowing what to and what not to virtualize. Applications that make use of large amounts of a single

server's available resources frequently are not good candidates for this technology. Their performance and reliability is typically better suited to their own hardware.

Understand why you want to virtualize your systems. The benefits of virtualizing are numerous and understanding which ones are best for your environment will ensure you choose the best software, hardware, and which systems to implement with this technology.

Selection of Virtualization Software:

Once you have all of these items fully understood and ready for your initiative, it is time to move forward and decide which virtualization engine to use and prepare your plan. Failure to take all possible aspects of the plan and the risks into consideration can lead to more work and greater expense after the project is under way.

The list of virtualization software is extensive and continuing to grow as companies create new products for the available operating systems. Each one has its own utilities, advantages, and disadvantages for use. Evaluate each one carefully before deciding which one to use.

- VMware (www.vmware.com)
- Microsoft (www.microsoft.com)
- Citrix Systems (www.citrix.com)
- Oracle (www.oracle.com)
- Virtual Iron (www.virtualiron.com)
- Parallels (www.parallels.com)
- Sun Microsystems (www.sun.com)
- InnoTek (www.virtualbox.org)
- Amazon EC2 (aws.amazon.com/ec2)

Setup and Creation:

Clearly and uniquely identify all virtual machines. In a virtual environment it is easy to have numerous machines doing similar tasks. It is also easy to move a virtual machine from one physical server to another, sometimes transparently. Due to this ease of movement and manipulation it is important to define and adhere to a set of identification standards that denote what the server does, what resources it supplies, and who has access to it. This identifier must be one that can move with the virtual machine regardless of hardware or network configuration as MAC addresses, IP addresses, and even server names can change during a server move. Keeping the identification of the virtual machine is important to prevent loss of access or location confusion.

Do not accept default file naming conventions as decided by the software as you install it. In order to keep control of your data and know what types of files each virtual machine uses create a standard naming scheme that all virtual machines will use. This will allow you to know which virtual machines access which files, and who has access to those files.

Remember the command line interface. Your virtualization software of choice should have a strong set of command line tools to allow scripting, scheduled tasks, and other maintenance utilities that will make activities such as rebooting and backing up simple and up to date.

Build a virtual machine library. Rather than create, install, and configure each virtual machine from scratch, create a set of virtual machine templates for each server type you will need. For instance, if you have a standard setup for database servers, web servers, and file servers, create a base image for all of these types of servers. Install your typical server-specific software in your image templates and store this securely. When you need to create a new virtual database server, you can retrieve the base server image and configure it to your current needs. This will decrease the time it will take to set up the machine properly, and ensure your new virtual machine meets your minimum standards of security and software configuration for its type of machine.

Maintenance:

Once you have made your decision on which virtualization platform is best for your environment and have made your plan on how to virtualize it, you should begin researching the available automatic monitoring packages for virtual environments. Maintenance and monitoring are as important in the world of virtualization as the services they provide. Without the means of monitoring and reporting on your servers, you run the risk of losing control of your environment. The servers, both physical and virtual, are there to serve you and ensure your business needs are met on time, every time. Monitoring and reporting on them consistently and with a reliable system ensures they are available when you need them.

Monitor your entire environment, physical and virtual. All of your servers are going to constantly need resources spread throughout your infrastructure. Put automatic monitoring systems in place to ensure none of your systems lose access or need resources that are suddenly unavailable. Pay close attention to your system's health. Network paths, storage locations, and data sources need to be constantly monitored to keep them online and free from errors that could interrupt your business flow. Also, policy compliance settings need to be monitored to ensure no users or virtual machines take up more resources than they are allowed. Using automatic monitoring methods will ensure your data center team is alerted to any anomalies when they occur and enable them to take action before such situations become critical.

Schedule and perform regular system audits. Virtual machines are in a constant state of flux. They can be easily moved, renamed, or relocated to different host systems. Perform system audits to ensure each machine meets company security policies, but also ensure the work load is being spread evenly across the virtual servers. It is possible, through standard day-to-day operations as business needs grow and change, that one virtual server can be using all of its resources while another is nearly unused. These audits will help you identify points in your infrastructure that need more resources and those that can use less. You will also be giving yourself a much needed opportunity to balance server usage and ensure resource availability to all the services your business needs.

Automate system audits. It is possible that you may be managing more than a few virtual machines. In this case it is impractical to try to manually perform system audits for all of them. This is where automated tools become a necessity. These tools will monitor your virtual machines' performance and workload, recording statistics and reporting on situations where servers are performing less than ideally or being over-utilized. These tools can also make suggestions on what will be needed to alleviate strain or improve the performance of a given virtual machine.

Track each virtual machine's life in your data center. Virtual machines can have nomadic lives as physical servers are upgraded or replaced. Also, virtual machines can be renamed, assigned new tasks, storage servers, and data locations with ease. This can cause loss of data access or loss of resources if care isn't taken. Each virtual machine needs to be tracked and all changes within it recorded including where it was created, when it was created, where it moved from, where it was moved to, and where it now resides. This information can help ensure each virtual machine is understood in its context and can ease the difficulty of understanding server needs when changes must be made.

Manage virtual servers in groups rather than all as individuals. Not all servers will be able to follow the same rules for access and configuration. However, machines with similar job duties and user access can be managed as a group allowing for simpler management tasks that will be applied across multiple machines.

Manage ownership. Each virtual machine should have a person or group responsible for its upkeep and maintenance once it is up and running. This will ensure the virtual machines are performing their required tasks correctly, and will also ensure that no machine is overlooked or neglected as business continues.

Know what's in your environment when it arrives. Automatic discovery of new servers and new virtual machines is an expected ability of monitoring packages. IT managers cannot manage or control what they don't know about and these tools will ensure all new machines are detected, scanned, and audited for compliance with your standards. This will ensure that no virtual machine is overlooked during a maintenance cycle because no one knew it existed.

Know when to retire a virtual machine. Like physical machines, virtual machines can outlive their usefulness or simply become obsolete. In many cases virtual machines were created to meet temporary needs for specific situations that have passed and the machines are no longer needed. In other cases the business has moved on and the reason for a machine's existence has disappeared. Regular audits can ensure these unneeded machines are taken out of service and archived. Once this is done, resources can be freed up for other services that need them or new virtual machines can be put online to meet a current and immediate business need.

Real-time monitoring is the key to maintaining success in your virtual environment. Many changes can happen very quickly and your support team must be aware as soon as problems arise to be able to respond and resolve without those changes affecting your data, business, or customers. These monitoring packages can help you identify under- and over-utilized systems, recognize virtual machines that have fallen out of compliance with your configuration requirements, identify and alert you of new virtual machines, prevent unauthorized virtual machines from coming online, tracking changes within virtual machines and within the servers on which they reside, and in general give you the ability to know and control your environment without the cost of a large IT team. Your business requires a high level of resource availability and will allow no excuses for extended outages. Real-time monitoring and reporting on all of your virtual servers allows you to meet this challenge on time and within your budget.

Summary

Choosing to virtualize your data center is a big step in improving your server utilization and throughput while reducing support costs and overhead. It will require time, dedication, and an understanding of your company's needs as well as the resources available to accomplish your goals and keep those goals in sight throughout the use of those servers. The choice of monitoring packages is as important as the choice of virtualization systems. The choice to use both together is not an option, so planning to virtualize requires deciding on a monitoring package in the beginning. The path to virtualization is not easy and should not be taken lightly, but its benefits are quickly visible once the endeavor is complete.

How Can Virtual & Server Profiler Help You?

Virtual & Server Profiler provides cross-domain, end-to-end visibility, management, and intelligence from applications through servers, network, and storage. Virtual & Server Profiler allows organizations to reclaim the visibility into their IT environments that was lost when OSs were decoupled from physical servers via virtualization. Profiler enables users to visualize and manage both physical and virtual systems from a single console, using a unified view of the entire environment, to track and respond to utilization of physical resources and offer predictive alerting.



For additional information, please contact SolarWinds at 866.530.8100 or e-mail sales@solarwinds.com.
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