

# *Virtuozzo*

TOP TEN CONSIDERATIONS FOR CHOOSING A SERVER  
VIRTUALIZATION TECHNOLOGY



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## **1. INTRODUCTION**

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The playing field for server virtualization has become much more crowded over the last few years. Competition is always good for a market as more choices always push vendors into providing better products at more competitive prices. It can be very time consuming to digest each vendor's marketing materials to come to the right solution for your organization. This checklist provides a list of the main considerations and basic differences between the technologies to provide a starting point for technology evaluation. The three main technologies discussed in this analysis are: hardware virtualization, para-virtualization and OS virtualization.



## **2. TECHNOLOGY OVERVIEW**

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### **HARDWARE VIRTUALIZATION**

Hardware virtualization is probably the most commonly known technology, including products from VMware and Microsoft's Virtual Server. The technologies are designed to support multiple types of OSs on a single server and are characterized by technology that virtualizes hardware resources in order to manage and dedicate them to Virtual Machines on the server.

### **PARA-VIRTUALIZATION**

Para-virtualization is similar to hardware emulation because in concept it is designed to support multiple OSs on a single server. The only implementation of this technology today is the Xen open source project, soon to be followed by an actual product from XenSource. Xen is unique in that it customizes the operating system to provide more efficient processing and lower overhead than hardware virtualization.

### **OS VIRTUALIZATION**

OS virtualization is a third approach to virtualization and has been implemented by SWsoft's Virtuozzo and Sun's Solaris Containers. The concept is based on a common OS which provides a leaner architecture without extra layers of processing. The main limitation is that it does not support multiple OSs on the same server so it is intended for organizations that are consolidating or deploying multiple virtual servers on a single Linux, Windows or Sun physical server; Solaris Containers obviously supports Solaris while Virtuozzo supports both Linux and Windows. SWsoft Virtuozzo for Linux product does support multiple Linux distributions in the guest virtual servers.



## **3. TEN CONSIDERATIONS**

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### **#1. PERFORMANCE**

Why is processing overhead important? It affects the performance of the application, and ultimately the end-user's satisfaction. Only non-production or non-critical applications should be loaded in a virtualization infrastructure that is high in processing overhead. The processing overhead of virtualization solutions ranges from 1% to as much as 60% between the different product offerings; the virtualized application could perform at near native performance or so slowly it is unacceptable by the end-user. The products in each virtualization technology category vary largely for performance, but generally, the hardware virtualization has the most performance degradation, and the OS virtualization has the closest to native performance.

### **#2. MANAGEMENT TOOLS**

Many organizations undertake virtualization projects because they can quantify the hard costs of hardware sitting in data centers at 15-20% average utilization rates. While hardware and environmental costs are considerable, the administrative costs remain the largest cost component for managing servers. Administrative tasks include OS and application updates and patches, backups, installations and provisioning and IT staff has to upgrade, patch, back up and fix hardware and software, and provision new servers and applications. Managing a virtualized server makes tools even more critical because resource management and monitoring is absolutely critical for effectively utilizing a virtual server infrastructure.

The management tools available for each solution vary widely. Some solutions have very few tools available and may be extremely limited. There are many excellent toolsets available with certain solutions, with some coming packaged in a single cost-effective bundle and other tools being quite extensive and are priced on a more componentized basis.

The process of moving a physical server to a virtual server can be a daunting task, particularly if the server is critical to the business. Most of the vendors have tools that help in the migration process, and there are some external vendors that have provided tools for moving not only from physical to virtual, but between virtual environments and even from virtual back to physical. The ability to evaluate a physical server for resource utilization trends to predict and configure an adequate virtual server is rated as the most important component for physical to virtual transition, even above the simple requirement of moving data reliably to a virtualized server. The resource trending capability is only available in a few select P2V tools.

### **#3. PLATFORM SUPPORT**

Virtualization technologies abstract the virtual servers from the underlying hardware. However, that does not mean that any hardware is supported by the virtual infrastructure. Hardware virtualization and para-virtualization in particular have to support each piece of hardware, from straightforward CPU chips to obscure video cards. OS virtualization technologies by definition are built on top of standard OSs and therefore automatically support all of the hardware that the OS supports making them easier to deploy with fewer conflicts. In addition to baseline hardware support, some technologies are able to leverage full hardware technology capabilities inside of virtual machines including full SMP support, 64 bit processing, up to 16 CPUs and up to 64 GB of RAM.

#### **#4. MIGRATION**

One of the largest benefits of virtualizing a server is abstracting it from the hardware layer and enabling it to move between servers. Migration capabilities allow cloning or moving a virtualized server from one physical server to another. The benefits of migration include:

- **Eliminating downtime for hardware upgrades or issues**
- **Avoiding downtime as a result of software changes**
- **Moving virtualized server to a more or less powerful server as requirements change**

Many virtualization solutions have cloning or migration capabilities but they vary considerably in capabilities, restrictions and cost structures. A very high-end solution that allows zero-downtime migration is extremely costly and requires a SAN, while another available solution provides near-zero downtime on any networked server as a part of the basic software package. Assess the importance of migration and how it will be used to determine the best fit for your environment.

#### **#5. RESOURCE MANAGEMENT**

The three technology categories approach resource allocation in different ways. Hardware virtualization and para-virtualization virtualize hardware resources for dissemination to each of the residing virtual servers. The products have varying levels of flexibility for assigning and changing resources. Some resources are dynamic and able to change in real-time, while others require a server reboot or at least virtual server interruption. These two technologies actually assign a virtualized hardware resource to a virtual server; virtualized resources can have limitations such as limited CPU and memory that can be assigned to a single virtual machine.

OS virtualization has flexible resource management. Resources may be changed in real-time without interrupting the application or the virtual server. SWsoft in particular allows bursting, which allows unclaimed resources on the server to be used by any virtualized server requiring resources.

#### **#6. ISOLATION & SECURITY**

Each of the technologies has a different approach to isolation and security. The most basic component of a virtualization solution is partitioning. Each virtual machine must be completely isolated so that processes, DLLs, and applications do not affect others on the same server.

The technologies change access points and different components of a regular server so attacks are less likely to be a problem for virtualized servers. Along the same lines of isolation, security between the virtual machines on the same server is also critical. Each of the technologies has a different approaches to these areas, and with the exception of XEN and Solaris Containers, have been tested extensively by enough customers to validate effective levels of isolation and security.

#### **#7. SERVER UTILIZATION**

Many customer virtualization projects are a result of examining server utilization rates which typically are as low as 5-15%. Raising server utilization rates can considerably reduce total cost of ownership of data center resources. Obvious cost factors in consolidation projects are data center storage, electricity and yearly hardware maintenance.

When evaluating a virtualization solution on the basis of utilization, determine whether it has limitations of the number of virtualized servers allowed on a single physical server. Typically limiting virtualized servers hasn't been a problem in the past because the same limited solutions have overhead which prevents the support of more virtual servers. All technologies do not have these limitations.

OS virtualization technologies are unique in addressing utilization. There are no limitations on the number of virtualized servers allowed on a single physical server, and the efficient architecture enables many more virtual servers to be supported with adequate processing power on a single physical server which can deliver significantly higher actual "useful" utilization (utilization that does not include overhead as part of it) and associated maximum performance/price ratios and ROI.

## **#8. PROVISIONING EFFICIENCY**

The analyst firm Ideas International completed a study in 2005 regarding server virtualization. The primary driver of the research was to determine whether the reasons for entering into a server virtualization project were in retrospect actually the same as the resulting benefits gained from the project. The biggest surprise from the study revealed that the most unexpected benefit from virtualization was the time savings and efficiency increase of server provisioning.

Each virtualization solution has differing levels of provisioning enablement. Some solutions provide tools such as templates and pre-set or customizable configurations to further decrease provisioning time. The range of provisioning time is quite large for different approaches from approximately 30 seconds to 60 minutes; the provisioning time of a virtualized server is a drastic improvement over a standalone server.

## **#9. INTENDED VIRTUALIZATION DEPLOYMENT**

The top three server virtualization deployments are testing and development, server consolidation, and disaster recovery.

Testing and development organizations were the first to deploy virtualization technologies because the need for developers to use many different operating systems made it quite difficult to manage the associate costs. For development organizations that need different operating systems, one strong option is hardware virtualization. Paravirtualization has plans to support multiple operating systems but hasn't launched that capability. SWsoft's Virtuozzo for Linux does support different Linux distributions on the same server, maintaining Linux on the same server. For testing organizations that need to be able to quickly create many servers for stress testing, most of the technologies would be sufficient although some have much faster provisioning capabilities.

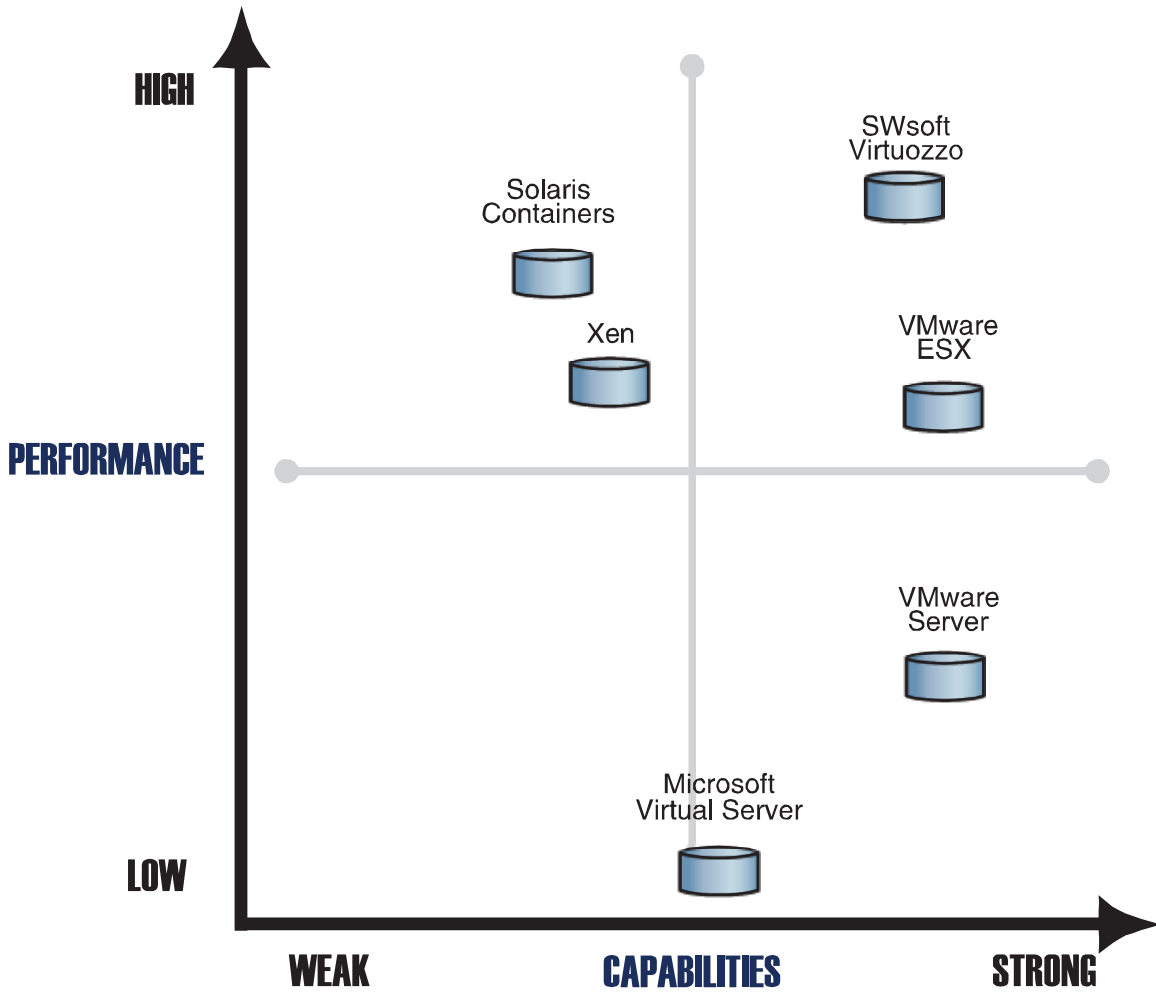
Server consolidation (involving existing applications and/or new applications) is typically done on servers in production supporting live applications and data. The two most important considerations for server consolidation are processing overhead and server utilization. The best technology suited for server consolidation is OS virtualization because it has low overhead and servers it enables has therefore significantly higher utilization.

Disaster recovery solutions are a very common virtualized server deployment. Many organizations find that fully available and redundant systems are too costly for disaster recovery. Virtualized servers that can be activated, booted and made primary servers in a limited amount of time are rapidly becoming the cost-effective and more manageable disaster recovery solutions of choice. There are differences in the technologies regarding boot time and there are other tools and components that may be purchased to supplement server availability.

## **#10. CAPABILITIES AND PERFORMANCE COMPARISON**

Finally, the last consideration is comparing the performance and capabilities. Many of the solutions have trade-offs within the technology and the comparison chart on the next page highlights those differences.

# CAPABILITIES/PERFORMANCE MATRIX (ILLUSTRATIVE)



## SERVER VIRTUALIZATION EVALUATION WORKSHEET

Consideration	Virtualization Solutions					
	SWsoft Virtuozzo	Solaris Containers	VMware Server	VMware ESX	Virtual Server (Microsoft)	Xen
#1 Performance						
#2 Management Tools						
#3 Platform Support						
#4 Migration						
#5 Resource Management						
#6 Isolation & Security						
#7 Utilization						
#8 Provisioning Efficiency						
#9 Intended Virtualization Deployment						
#10 Capabilities & Performance Trade-off						

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### 4. CONCLUSION

There are three main server virtualization technologies, each with some inherent strengths and limitations based upon their architectures. Each technology is suited best for a particular type of virtualized server scenario. Within each category, the solutions and tools from each vendor vary dramatically. Hopefully this checklist will assist in an evaluation of a server virtualization technology and help find the most appropriate solution for your requirements.

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or contact us at [sales@virtuozzo.com](mailto:sales@virtuozzo.com).