

Comparing Virtualization Technologies & Products

Datasheet

Using the Right Virtualization Technology for the Job

As with any IT project, no single solution works for all situations.

This is especially true in the case of virtualization, because technology professionals implement virtualization technologies for different reasons with different goals and in very different environments.

Choosing the correct approach largely depends on the task, goal, and environment. This document will focus on when to use OS virtualization (containers) and when to use hardware virtualization (hypervisor-based virtual machines).

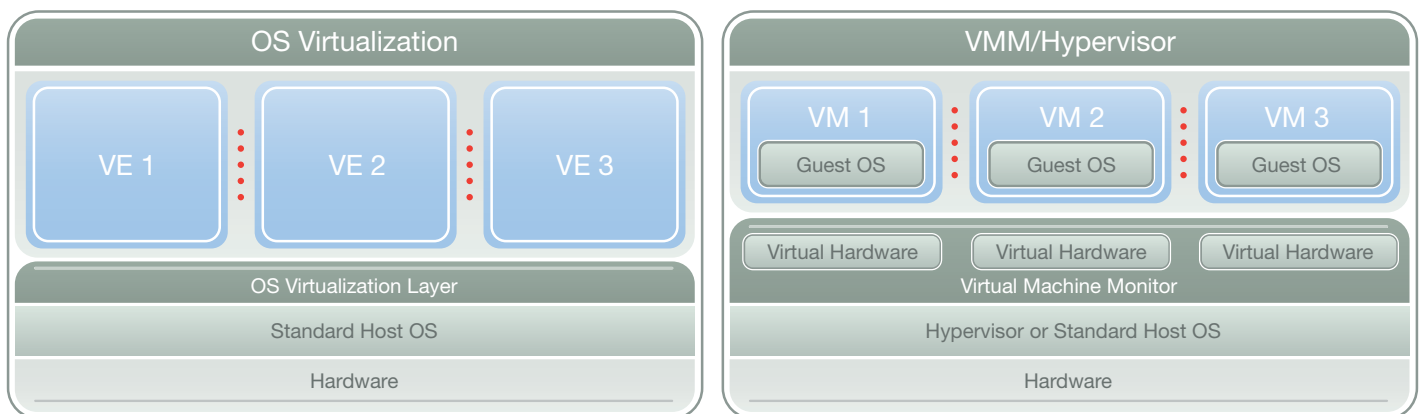
Understanding OS Virtualization and Hypervisor Virtualization

To the right is a side-by-side comparison of OS virtualization (left) and hypervisor-based virtualization (right) architectures.

Three types of virtualization technologies:

1. Hardware Virtualization (Hypervisor)
Virtualizes access to hardware resources
2. OS Virtualization (Containers)
Virtualizes the operating system
3. Application Virtualization
Virtualizes individual applications

Figure 1: Virtualization Architectures



Examples include Parallels Virtuozzo Containers and Sun Solaris Containers

Examples include VMware ESX, Parallels Server, and Microsoft Hyper-V

Table 1: Technology Components

Component	Description	Component	Description
Virtual Environment	Homogenous OS with a defined set of resources	Virtual Machine	Generic computer with a defined set of resources
Virtualization Layer	Emulates host OS	Virtual Machine Monitor	Emulates generic hardware
Standard Host OS	Fully functional OS optimized for application performance	Hypervisor	Lightweight OS optimized for hardware emulation

Important Considerations

The right technology for your situation depends on a range of factors, including your current environment, cost considerations, management goals, and performance requirements. The two tables below outline important considerations for each technology and highlight scenarios in which each technology is more suitable.

Table 2: Important Considerations

	OS Virtualization	Hypervisor Virtualization
Performance	Native use of performance acceleration technologies and Operating Systems optimization algorithms, including file system and CPU caches, across virtual environments	Optimized for performance of the virtual computer, but application performance is slower due to emulated device drivers and a lack of cross-OS coordination
Manageability	Drastically reduces the number of OSes and related management costs	Does not reduce the number of OSes and increases the risk of OS Sprawl, thus higher management costs
OS Updates & Upgrades	Single update or upgrade across all virtual environments	Requires separate update or upgrade of each individual virtual machine
Consolidation Ratio	(average) 20:1 consolidation ratio VE contains only the subset of the OS needed for isolation and control, does not experience any performance overhead, and safely shares all common objects across all VEs	(average) 20:1 consolidation ratio VE contains only the subset of the OS needed for isolation and control, does not experience any performance overhead, and safely shares all common objects across all VEs
Single Point of Failure	Standard Host OS	Hypervisor OS

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Table 3: Best Scenario for Each Technology

OS Virtualization	Hypervisor Virtualization
Homogenous Consolidation Better consolidation ratios with lower management and infrastructure cost	Heterogeneous Consolidation Mix multiple OSes on a server
Resource Intensive Workloads Fully uses OS/application optimizations and preserves application performance	Development Environment Mix multiple OSes on a server
Software as a Service (SaaS) Multiple instances of an application can be quickly deployed across isolated virtual environments and upgraded simultaneously	Legacy OS Consolidation Support for legacy OSes
Virtual Desktop Infrastructure Substantially more clients per server and easier deployment of updates and upgrades	
Green Computing Less hardware, resulting in less space, power, and people costs through higher consolidation ratios	

Comparing the Leading Vendors

The previous sections only address the broad technologies without going into details of specific products. As with all technologies, the solution's specific design and implementation make a significant difference on whether or not the technology works as promised. Therefore, it is important to compare the leading vendors representing each type of technology. Additionally, there are a number of features, such as backup and management, that must be taken into consideration when comparing specific products. Parallels Virtuozzo Containers and VMware Virtual Infrastructure are the leading OS Virtualization and Hypervisor Virtualization solutions (respectively) on the market today. Below is a high level feature comparison.

Table 4: Feature Comparison – Parallels Virtuozzo Containers 4.0 vs. VMware VI3 Enterprise

		Parallels Virtuozzo Containers 4.0	VMware VI3 Enterprise
Scalability	Consolidation Ratio	20:1	7:1
	VM/Container Scalability	Scales to full resources of server	Limits: 4 CPU SMP & 16 GB RAM
Performance	Dynamic Resource Management	Yes Dynamic Allocation of CPU, Memory, & I/O	Partial Disk space and memory change requires reboot
	CPU Architectures	x86, x64, Itanium	x86, x64
	Performance Overhead	1-3%	up to 50% ¹
Management	Live Migration	Yes ²	Yes
	Time Required to Provision One Virtual Server	30 sec-1 minute	5-10 minutes
	Global Patching of VEs or VMs	Yes	No
	Support for SAN, iSCSI, etc.	Yes	Yes
	Physical to Virtual (P2V)	Yes	Yes
	Shared Storage Required for Live Migration	No	Yes
High Availability	Cluster Support	Yes ³	Yes
	Virtual Server Backup	Yes	No ⁴
		Price \$2,500/Dual CPU	\$5,750/Dual CPU

¹ Customers report up to 50% overhead depending on the number and types of applications running inside the virtual machine and the total number of virtual machines. Each additional virtual machine's OS and application(s) have a cumulative effect on the total overhead and resulting server performance.

² Only available on Linux. Windows Live Migration will be available in a future release.

³ Virtuozzo requires Microsoft Clustering Services or Red Hat Cluster Service.

⁴ Requires VMware's Consolidated Backup module. Allows backups to be offloaded, but does not provide a backup utility.



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