

E-Guide

The Do's and Don'ts of Server Virtualization

Back to basics tips for Australian IT professionals

Contents

Hosted vs. bare-metal hypervisor types

Top 10 hypervisors technologies

4 mistakes that kill VM performance

Additional Resources

Virtualization is a well-established in today's IT environments, but it still remains a top priority among data center managers and admins. *Therefore, our experts have compiled an essential guide that highlights some of the key elements of an effective virtualization strategy from choosing the right hypervisor technology to improving VM performance to keep top of mind.*

Understanding hosted and bare-metal virtualization hypervisor types

By: Eric Siebert

When choosing a virtualization hypervisor, you have to consider both hypervisor types.

A virtualization hypervisor comes in one of two forms: a bare-metal hypervisor, also known as Type 1; or a hosted hypervisor, also known as Type 2. There are important differences between a hosted and bare-metal virtualization hypervisor, and each has pretty specific use cases.

Bare-metal virtualization hypervisors

A bare-metal virtualization hypervisor does not require admins to install a server operating system first. Bare-metal virtualization means the hypervisor has direct access to hardware resources, which results in better performance, scalability and stability. One disadvantage of a bare-metal virtualization hypervisor, however, is that hardware support is typically more limited, because the hypervisor usually has limited device drivers built into it.

Bare-metal virtualization is well suited for enterprise data centers, because it usually comes with advanced features for resource management, high availability and security. Admins can centrally manage this kind of virtualization hypervisor, which is critical when you have many hosts in your virtual infrastructure. The most popular bare-metal virtualization hypervisors are:

Contents

[Hosted vs. bare-metal hypervisor types](#)

[Top 10 hypervisors technologies](#)

[4 mistakes that kill VM performance](#)

[Additional Resources](#)

- VMware ESX and ESXi
- Microsoft Hyper-V
- Citrix Systems XenServer

Hosted virtualization hypervisors

Unlike the bare-metal virtualization hypervisor, a hosted hypervisor requires you to first install an OS. These hypervisors are basically like applications that install on a guest OS. This approach provides better hardware compatibility than bare-metal virtualization, because the OS is responsible for the hardware drivers instead of the hypervisor.

But, as with the bare-metal hypervisor, there are disadvantages. A hosted virtualization hypervisor does not have direct access to hardware and must go through the OS, which increases resource overhead and can degrade virtual machine (VM) performance. Also, because there are typically many services and applications running on the host OS, the hypervisor often steals resources from the VMs running on it.

Hosted hypervisors are common for desktops, because they allow you to run multiple OSes. These virtualization hypervisor types are also popular for developers, to maintain application compatibility on modern OSes. The most popular hosted virtualization hypervisors are:

- VMware Workstation, Server, Player and Fusion
- Oracle VM VirtualBox
- Microsoft Virtual PC
- Parallels Desktop

Once you understand the differences between a hosted and bare-metal virtualization hypervisor -- and the best use cases for each -- it's time to consider hypervisor vendors, cost and features.

Top 10 hypervisors: Choosing the best hypervisor technology

By: Eric Siebert

Contents

[Hosted vs. bare-metal hypervisor types](#)

[Top 10 hypervisors technologies](#)

[4 mistakes that kill VM performance](#)

[Additional Resources](#)

Once you choose the type of hypervisor that fits your needs, you need to choose the best hypervisor technology for your infrastructure. Hypervisor products from the major virtualization vendors have their pros and cons, so consider the features of these hosted and bare-metal virtualization hypervisors before you make your decision.

Bare-metal virtualization hypervisors

VMware ESX and ESXi

VMware has the most mature hypervisor technology by far, offering advanced features and scalability. However, VMware's bare-metal virtualization hypervisor can be expensive to implement because of its higher licensing costs. The vendor does offer a free version of ESXi, but it's very limited and has none of the advanced features of the paid editions. VMware also offers lower-cost bundles that can make hypervisor technology more affordable for small infrastructures.

Microsoft Hyper-V

Microsoft Hyper-V has emerged as a serious competitor to VMware ESX and ESXi. Hyper-V lacks many of the advanced features that VMware's broad product line provides, but with its tight Windows integration, Microsoft's hypervisor technology may be the best hypervisor for organizations that don't require a lot of bells and whistles.

Citrix XenServer

Citrix XenServer is a mature platform that began as an open source project. The core hypervisor technology is free, but like VMware's free ESXi, it has almost no advanced features. Citrix has several paid editions of XenServer that offer advanced management, automation and availability features. But despite offering a stable bare-metal virtualization hypervisor, Citrix struggles to compete with Microsoft and VMware on hypervisor technology.

Contents

[Hosted vs. bare-
metal hypervisor
types](#)

[Top 10 hypervisors
technologies](#)

[4 mistakes that kill VM
performance](#)

[Additional Resources](#)

Oracle VM

Oracle VM is Oracle's homegrown hypervisor technology based on open source Xen. If you want hypervisor support and product updates, though, it will cost you. A simple, no-frills hypervisor, Oracle VM lacks many of the advanced features found in other bare-metal virtualization hypervisors. As with XenServer, the development cycle of Oracle VM is longer and limited, which makes it hard to compete with VMware and Hyper-V. One advantage of Oracle VM, though, is that it's certified with most of Oracle's other products and therefore includes no-hassle support.

Hosted virtualization hypervisors

VMware Workstation/Fusion/Player

VMware Player is a free virtualization hypervisor. This hypervisor technology can only run a single virtual machine (VM) and does not allow you to create VMs. VMware Workstation is a more robust hypervisor with some advanced features, such as record-and-replay and VM snapshot support. VMware Workstation retails for \$189 and has three major use cases: for running multiple different operating systems or versions of one OS on one desktop, for developers that need sandbox environments and snapshots, or for labs and demonstration purposes. VMware Fusion is the Mac version of Workstation, which only costs \$89 but lacks some of the features and abilities of Workstation. This hypervisor technology is better suited for running Windows and Linux on Macs.

VMware Server

VMware Server is a free, hosted virtualization hypervisor that's very similar to VMware Workstation. However, VMware Server lacks some of the features of Workstation and only supports a single snapshot per VM. This hypervisor technology is designed to run headless with a network-based administration utility and is optimized for running more server-like workloads. VMware has halted development on Server since 2009, but it works well as a no-frills hosted hypervisor and is an easy alternative to using the free version of ESXi.

Contents

[Hosted vs. bare-metal hypervisor types](#)

[Top 10 hypervisors technologies](#)

[4 mistakes that kill VM performance](#)

[Additional Resources](#)

Microsoft Virtual PC

Microsoft acquired the Virtual PC technology from Connectix in 2003 and re-branded it as Virtual PC 2004. The latest version of this hypervisor technology, Windows Virtual PC, only runs on Windows 7 and only supports running Windows operating systems on it. A common use case for Virtual PC is running legacy apps on a Windows 7 desktop using older versions of Windows. Virtual PC is free and is also available for users with Windows 7 Professional, Enterprise or Ultimate licenses as a pre-packaged appliance called Windows XP Mode.

Oracle VM VirtualBox

Oracle VM VirtualBox is a mature virtualization hypervisor that's suitable for many needs and use cases. VirtualBox hypervisor technology provides reasonable performance and features if you want to virtualize on a budget. Despite being a free, hosted product with a very small footprint, VirtualBox shares many features with VMware vSphere and Microsoft Hyper-V. Oracle VM VirtualBox provides a decent alternative to more expensive hypervisors for both server and desktop virtualization.

Red Hat Enterprise Virtualization

Red Hat's Kernel-based Virtual Machine (KVM) has qualities of both a hosted and a bare-metal virtualization hypervisor. KVM turns the Linux kernel itself into a hypervisor so VMs have direct access to the physical hardware. KVM in Red Hat Enterprise Virtualization offers many enterprise-level features and comes with a Windows-based management server for managing multiple KVM hosts. This hypervisor technology is not free, however, and while KVM has enterprise features and scalability, it lacks some of the more advanced features and application programming interfaces that VMware and Microsoft offer.

Parallels Desktop

Parallels is known for its popular Parallels Desktop for Mac hypervisor, which is very similar to VMware Fusion. Parallels also has a desktop version of its hypervisor technology that runs on both Windows and Linux. Plus, it has a more powerful edition called Parallels Server for Mac, which has greater

Contents

[Hosted vs. bare-
mental hypervisor
types](#)

[Top 10 hypervisors
technologies](#)

[4 mistakes that kill VM
performance](#)

[Additional Resources](#)

scalability and more advanced features. Parallels' hypervisors are also pretty mature, having been first launched in 2005. They offer a very low-cost, feature-rich hosted hypervisor that can be used for a variety of purposes.

Which product should you choose?

You can evaluate every virtualization hypervisor for free, so spend some time on the ones that appeal to you and make sure they meet your requirements. Don't try to make hypervisor technology do more than it was designed to do. If you run a busy Exchange server on a simple hosted hypervisor, for instance, it's probably going to be very slow. Also remember that VMs are portable and easily convertible, so if you choose what you think is the best hypervisor technology and discover you don't like it, there are tools to convert it to another hypervisor platform.

Four mistakes that can kill virtual machine performance

By: Greg Shields

Ah, how I love the easy ones. In many cases, the easiest mistakes cause some of the biggest performance problems in virtualization environments. In my consulting, I've seen a few major errors that are worth sharing. Some of these may seem obvious, but consider checking your settings. You may be surprised at what you find.

Easy Mistake 1: Virtual machine screensavers

Screensavers are an absolute requirement for desktops in the hallways of our brick-and-mortar offices. They ensure that a user who walks away from his computer returns to one that has been secured against prying eyes. Screensavers can also provide protection in data centers. If screensavers on servers activate and lock the console after a few minutes of inactivity, they can protect that environment from an intruder who gains physical access.

But screensavers are a quiet consumer of processor resources. No matter how insignificant that screensaver seems, the processor power required to draw the pipes crawling across the screen or to scroll your favorite company slogan consume a percentage points of overall processor power. While that

Contents

[Hosted vs. bare-
mental hypervisor
types](#)

[Top 10 hypervisors
technologies](#)

[4 mistakes that kill VM
performance](#)

[Additional Resources](#)

might not seem like much, consolidated virtual environments might have 10 or 15 virtual machines (VMs) running on a single virtual host. These percentage points add up when they are multiplied by the number of VMs. Even worse, if your environment uses hosted desktops through a virtual desktop implementation, this practice likely costs even more.

So turn them off. Remember that many environments enforce screensavers through group policies, which may mean an exclusion from existing group and corporate security policies.

Easy Mistake 2: Managing from the console

This second mistake is one of my favorites, because it is common among IT administrators everywhere. Do you manage your infrastructure components by remoting and logging into their individual servers? Do you run the Exchange Management Console from your Exchange server? Do you check domain name server (DNS) settings from the server's console? Do you manage Active Directory by remoting your domain controllers?

If you are, stop.

As with screensavers, this practice is a big no-no in virtualized environments because of the level of resources required to create and maintain an instance of the Explorer shell. Just logging into a virtual machine is hard on that VM's processor utilization. The process of creating a shell for the console can spike processor utilization during the login and logout process. Actually using any of the consoles on that server further consumes valuable resources. Logging in and accomplishing activity on your VMs' desktops increases the amount of memory they consume.

Microsoft provides the Remote Systems Administration Toolkit, PowerShell and VBScript, as well as many other tools for efficient virtual machine management. All these lightweight tools require much less VM capacity than a traditional login. So use them, and avoid wasting processing power and memory like an amateur.

Contents

[Hosted vs. bare-
metal hypervisor
types](#)

[Top 10 hypervisors
technologies](#)

[4 mistakes that kill VM
performance](#)

[Additional Resources](#)

Easy Mistake 3: Antivirus and anti-malware scanning of VM disk files

Your corporate security policy might not allow for the exclusion of Virtual Hard Disk or Virtual Machine Disk Format (VMDK) files from antivirus and anti-malware scans. But be aware that the real-time scans of such products can substantially reduce the overall performance of these files -- and, thus, their virtual machines. Since a VM's processing is highly dependent on its disk subsystem, any extra activities that slow down that process slow it down as well.

That's not to say that VM disk files shouldn't be subject to security scanning. Scheduled scans of such files can ensure that they don't get infected, without the processing overhead of real-time scans. Also, some of today's more advanced scanning products are beginning to incorporate virtualization awareness to reduce their overall impact. If your security policy will allow it -- or if you can bribe your security officer to look the other way -- definitely consider excluding these files from your real-time scans.

Easy Mistake 4: Windows Server's power options

At conferences around the country, I've encountered the final mistake repeatedly. The default power option of Windows Server 2008 upon installation is set to "Balanced." Of the three options available -- Balanced, Power Saver and High-Performance -- this is the second of the three in terms of overall system performance. You might save a few dollars on energy, but at the cost of wasting some of the server's processing power. Resetting the radio button to the high-performance option has a noticeable effect on how well VMs will perform.

Group policy is probably the easiest way to do so. If you create a new policy and navigate to "Computer Configuration > Policies > Administrative Templates > System > Power Management," look for the policy called "Select an Active Power Plan." Configuring this policy across your server infrastructure ensures that you always run with highest performance.

Additional resources on this topic

Sizing Server Hardware for Virtual Machines

VMware License Guide: vSphere and vCenter Licensing and Pricing Explained

Managing Hyper-V's Security Permissions

Contents

[Hosted vs. bare-
mental hypervisor
types](#)

[Top 10 hypervisors
technologies](#)

[4 mistakes that kill VM
performance](#)

[Additional Resources](#)



Contents

[Hosted vs. bare-
metal hypervisor
types](#)

[Top 10 hypervisors
technologies](#)

[4 mistakes that kill VM
performance](#)

[Additional Resources](#)

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