



Citrix and Intel deliver client virtualization

Citrix and Intel work together to deliver local virtual machine desktops, aiming to make virtualization ubiquitous on client devices.

In January 2009, Citrix announced a formal agreement to develop a Xen®-based bare-metal client hypervisor technology in conjunction with Intel.¹ The result of the collaboration is Citrix® XenClient™, a local desktop virtualization platform that provides new levels of security and user flexibility for enterprise desktops.

XenClient enables IT administrators to deliver each employee's corporate desktop as a secure virtual machine (VM) that runs directly on that user's computer. XenClient ensures that corporate applications and data are completely isolated from personal data, greatly increasing security and simplifying regulatory compliance. New desktop deployments, hardware upgrades, and employee moves are less of a problem—IT administrators can quickly deliver a new desktop or move an existing one to any XenClient-enabled device. And because the desktop and applications execute locally, users are free to work online or offline with all the rich performance and experience of a traditional computing environment.

¹ <http://www.citrix.com/English/ne/news/news.asp?newsID=1685761>



Introducing Citrix XenClient

The goal of client virtualization is to provide secure desktops with the flexibility and freedom users demand to carry out their business and personal computing needs. XenClient enables this vision by taking advantage of Intel® vPro™ technology—a collection of powerful manageability solutions found on select Intel® Core™ i5 and Core i7 processors.

Intel vPro technology provides enhanced security and manageability, and it improves remote maintenance both inside and outside the firewall through Intel Active Management Technology (Intel AMT), a component of Intel vPro technology. Intel AMT enhances PC manageability with hardware-based capabilities that let administrators better discover, heal, and secure their networked computing assets. Administrators can diagnose software and hardware problems more accurately—all regardless of the PC's power state. These capabilities enable dramatic cost and energy savings through out-of-band management, remote troubleshooting, asset tracking, power on/off, and more. With XenClient, devices, desktops, applications, and people can operate more independently while retaining the security and other benefits of centralized management.

What's new in Intel vPro technology?

Intel® Core™ i5 and Core i7 processors power the newest Intel® vPro™ technology platform. Together, the platform and processors deliver:

- Next-generation processor and graphics architecture
- Intel® Hyper-Threading Technology
- New levels of energy-efficient performance
- Enhanced Intel® Rapid Storage Technology
- Encryption acceleration
- Increased graphics performance
- Intel® Anti-Theft Technology
- Intel Remote PC Assist technology
- Intel® Active Management Technology 6.0
- Intel® Turbo Boost Technology

Outstanding performance with the XenClient hypervisor

At the heart of this vision is the XenClient hypervisor—a bare-metal hypervisor that runs directly on device hardware by using hardware-assisted virtualization called Intel® Virtualization Technology (Intel® VT), which is a component of Intel vPro technology.

Intel VT is foundational to the Xen approach—the same mature Xen approach that is used in the Citrix® XenServer™ server virtualization platform. Two distinct Intel vPro technologies play important roles:

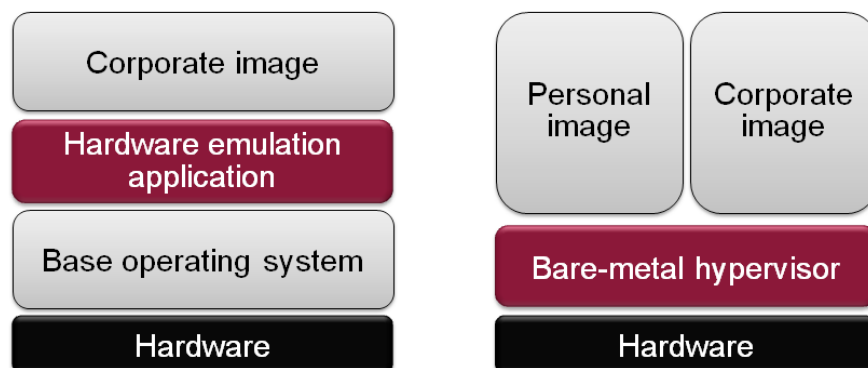
- Intel VT-x provides CPU virtualization support and is required by Xen to run VMs running the Windows®* operating system.
- Intel VT-d (Virtualization Technology for Directed I/O) allows for direct and secure assignment of devices to VMs, reducing overhead and increasing the overall reliability of the platform.

XenClient leverages additional capabilities of Intel vPro technology to improve the user experience with their virtualized desktop. Intel® Hyper-Threading Technology makes higher throughput possible on multi-threaded software running on the virtual desktop, and Intel® Turbo Boost Technology allows processor cores to run faster when workload demands it. Furthermore, the integrated memory controller in Intel Core i5 and Core i7 vPro processors offers stunning memory read/write performance. With these and other features, users get the performance and freedom they expect from a desktop while the organization reduces desktop-related energy costs.

The use of Intel vPro technology with XenClient lets local VMs run at maximum performance and gives users the rich desktop experience they demand. While client virtualization solutions have existed for years, they have primarily used emulation software—a hardware emulation application that is installed on top of a base operating system to enable the hosting of the guest VMs. Virtualization based on hardware emulation generally results in degraded performance of guest VMs and a poorer user experience.

Tight security with XenClient

In addition to superior performance, XenClient bare-metal virtualization provides higher levels of security through isolation of guest VM resources. The assurance of security through isolation lets organizations give users the choice of running both business and personal environments on the same device, in complete isolation, without fear that personal applications and data are putting business environments at risk. The business VM could be locked down and tightly managed, with users unable to install applications. The personal VM could allow local administration while disallowing access to corporate networks or data. The user can easily and securely switch between these VMs.



“We are seeing a fundamental shift happening in desktop computing. Issues such as the rising costs of desktop management and the increasing computer savvy of enterprise users are forcing IT organizations to consider a new service model for the desktop.

Andi Mann
 Research Director,
 Enterprise Management
 Associates

Figure 1. The Citrix XenClient hypervisor runs directly on device hardware, as shown in the image above.

XenClient will further enhance VM security by leveraging Intel Trusted Execution Technology (Intel TXT). Intel TXT lets the hardware verify the integrity of the hypervisor and its support components on every boot so that the hypervisor becomes part of the trusted compute base. Intel TXT forges a chain of trust from the hardware up to the virtualization layer, helping to ensure that the hypervisor has not been compromised.

With emulation-based virtualization solutions, if the base operating system is compromised, the VMs running on top of it are subject to compromise. This will not happen with XenClient. With Intel TXT, the guest VMs running on XenClient will become part of a trusted execution environment and remain totally isolated from each other—performance or security issues within one environment will not affect the other desktop environments on the system.

Yet another benefit of Citrix and Intel collaboration on XenClient local desktop virtualization is hardware-independent desktop images. The XenClient hypervisor creates an abstraction layer between the device hardware and the guest virtual machines. Consequently, a single disk image can be used on different types of devices. IT administrators can supply users with local VM-based desktops, regardless of the hardware on which the device is running. This creates truly hardware-independent VMs that can be moved between different versions of laptops from one vendor or that can be moved between laptops from different vendors, drastically reducing the burden of managing multiple operating system images to cover heterogeneous hardware.

Better together: Citrix XenClient and Intel vPro technology

XenClient with integrated Intel vPro technology also enables out-of-band management and policy enforcement. For example, a user can apply updates at the hypervisor level, outside of the operating system, which is more secure and more efficient. In the future, some functions that have traditionally been performed inside the operating system, such as malware detection, backup, and VPN, can be handled at the hypervisor level in a more robust and secure fashion. For example, running a VPN outside of the operating system avoids exposing the cryptogram key (which is necessary for a VPN) to the guest operating system, enhancing security.

Users can also map devices, such as graphics cards, directly into the VM in a process called hardware passthrough. This process enables a full, high-definition user experience within the VM.

With maximum flexibility and performance, XenClient provides a new way to deliver desktops through a mix of total isolation and sophisticated device passthrough. The technology enables new use cases for rich client execution while applying client virtualization—delivering all the benefits of centralized management and delivery of desktop workloads and applications to users.

“We have chosen Intel vPro technology as the development and delivery platform of choice for XenClient. We are excited about the continued advancements not just in the Core i5 and i7 raw performance and power efficiency gains, but also in the security and manageability advancements in the new Intel vPro technology platforms Intel is bringing to market. We believe this will serve to provide enterprise IT with even greater ROI as they deploy client virtualization broadly to rich and mobile devices.”

Peter Blum
 Director of Product
 Management and Marketing,
 Citrix Systems

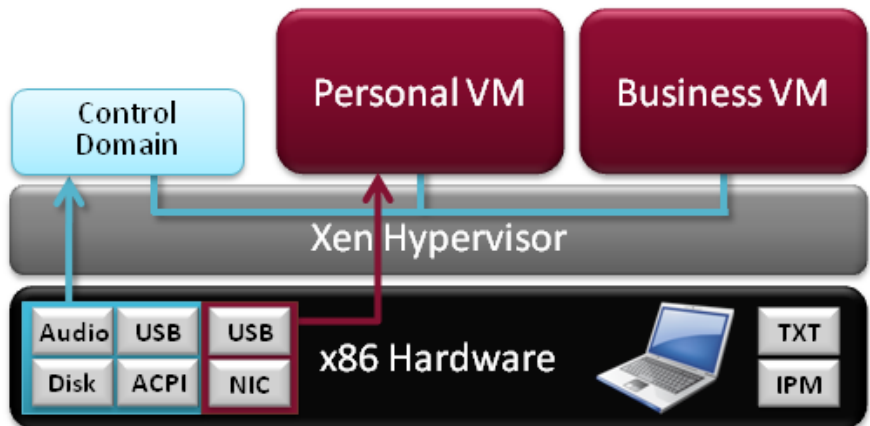


Figure 2. Citrix XenClient makes use of Intel hardware-assisted virtualization and Intel vPro technology for improved desktop performance, security, and manageability.

XenClient benefits

- Run virtual desktops anywhere.
- Separate business from personal computer use while running both on the same device.
- Deliver virtual desktops with a high-definition user experience, with bare-metal virtualization performance.
- Simplify laptop deployment and reduce the burden of managing multiple operating system images.
- Quickly recover from field laptop failures or from loss or theft.
- Easily move existing users to new laptop hardware with hardware-agnostic images.

Links for further information

To learn more about XenClient, visit:

www.citrix.com/xenclient

For more information about Intel vPro technology, powered by the newest Intel Core i5 and Intel Core i7 processor models, visit:

www.intel.com/technology/vpro/index.htm

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Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

Intel® VT-x supports both 32-bit and 64-bit Intel® Xeon® processor-based solutions (Intel® 64 and IA-32).

Intel® VT-x is included in Intel® Xeon® processors.

Intel® Active Management Technology requires the platform to have an Intel® AMT-enabled chipset, network hardware and software. The platform must also be connected to a power source and an active LAN port.

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