

# Intel® Virtualization Technology

Hardware-Assisted Virtualization for Today's Businesses



## Taking virtualization to a new level

Intel is taking server and workstation virtualization to a new level with Intel® Virtualization Technology – a complementary hardware-assisted technology available on new Intel® platforms that makes virtualization even better. While virtualization has been around for years on desktops and in the data center, it is quickly becoming a more mainstream technology thanks to processor, platform, and virtualization software advancements. Intel Virtualization Technology enhances the proven benefits of virtualization, helping you to make your business more agile and your IT operations more robust and efficient.



## Transform your data center

Virtualization transforms your IT environment into a more powerful, flexible, and robust infrastructure. It helps you achieve maximum utilization from your data center by consolidating multiple environments onto a single server, letting you do more with less. With fewer systems required for the same tasks, virtualization simplifies the IT infrastructure, making it easier to manage resources, while avoiding unnecessary expansion of your data center. This translates to bottom-line savings and allows you to shift your IT budget to build on new and better services. In server provisioning, virtualization decreases disaster recovery time from days to minutes. Additionally, business services become more reliable, with higher availability, reducing corporate risk and real-time losses from downtime.

Virtualization is not just for servers. Virtualization makes it easier for software and OS engineers to streamline test and development with multiple environments on a single workstation. Virtualization builds in agility and responsiveness from the data center to the desktop.

## Change how you think

Virtualization is a paradigm shift; it changes how you think about your resources. With virtualization, you are no longer limited to running only one operating system on a single, underutilized server or workstation. You can easily consolidate multiple platforms running different operating systems and heterogeneous applications onto a single powerful, reliable

platform. This reduces the number of systems you have to manage for the same tasks and operations, which can help cut your real-time power and cooling costs.

Virtualization is a software solution that isolates operating systems and their applications from platform hardware resources and from each other. Each instance of an OS is called a virtual machine (VM) and runs in its own partition. The virtualization software, called a virtual machine monitor (VMM), manages OS requests and activities, shifting control of the hardware to each OS as required.

Separate partitions isolate faults or software attacks to a single VM, maintaining a high level of security and availability in a virtual environment. Virtualization gives you control over each partition, letting you stop and restart any VM without affecting other activities on the platform. You can duplicate VMs on a single server for failover in case one application instance fails, enabling increased business continuity on fewer platforms and for lower cost.

Virtualized workstations enable developers to host successive iterations of a software stack – including the production version – in separate partitions on the same platform. This can improve hardware utilization and simplify lifecycle management. New and upgraded versions of a product can be tested on the same production platform without disrupting the production environment, eliminating the need for costly duplicate environments.

Virtualization changes how you think about populating and managing your data center, giving you more options that can help reduce costs and risk, improve business continuity, and increase IT efficiency and business agility.





# Intel Virtualization Technology overview – making virtualization better

Intel Virtualization Technology makes it even easier to increase server utilization in your data center by consolidating more applications, while improving data center reliability and adding robustness to virtualized systems.

	<b>Without Intel® Virtualization Technology</b>	<b>With Intel Virtualization Technology</b>	<b>Benefit</b>
<b>Software migration</b>	OS and VMM interdependence. Migration limited by hardware, OS modification requirements, or VMM capabilities. Can require close management of OS and application versions plus increased patching and validation.	Greater OS and VMM independence. Achieve higher levels of compatibility among unaltered heterogeneous operating systems.	Can migrate more applications to platforms that offer hardware-assisted virtualization. Fewer patches simplify system management. Virtualize on standardized Intel® processor-based platforms with the latest technologies.
<b>Business agility</b>	No support for 64-bit software	Support mixed 32-bit and 64-bit operating systems and applications. <sup>1</sup>	Enables a more agile environment with new capabilities, increased headroom, and greater scalability.
<b>Reliability</b>	Software-only solution. VMs isolated through software logic only. Sophisticated software-based attacks could propagate through VM and VMM.	Hardware-assisted solution increases isolation of VMs and helps reduce possibility of propagation of attacks.	More reliable platform. Better business continuity.
<b>Robustness</b>	More complex VMM; larger software footprint. Software-only VM management.	Simpler VMM; smaller software footprint. Hardware-assisted VM management.	More robust VMM. Enhanced software reliability. Helps reduce possible software-based conflicts.
<b>Virtualize more environments</b>	Limited choice. Software incompatibilities prevent some software vendors from offering virtualized solutions.	Creates a more compatible environment for more software.	Enables more vendors to offer virtualized data center solutions, providing greater choice for optimized virtual environments.



## Hardware-assistance enhances virtualization

Intel's technology provides specific functionality that helps simplify the implementation and deployment of a VMM and provides new capabilities for a better experience.

### Enabling the OS

Intel Virtualization Technology gives the OS the authority it needs. Operating systems are designed to have direct access to platform resources; they expect to never share control of the hardware. Without hardware assistance, the VMM must emulate the hardware to the OS, while it simultaneously retains control of the platform. Additionally, the OS itself might need to be modified to run in a virtual environment, preventing migration of legacy operating systems that cannot be modified.

Intel Virtualization Technology gives both the VMM and the OS the authority each needs to run – without hardware emulation or OS modification. With hardware-assisted virtualization, Intel Virtualization Technology greatly reduces critical barriers to consolidation, allowing you to move more software onto new Intel platforms.

### Hardware-based tasks

Intel Virtualization Technology simplifies the VMM software and enhances critical processes. Without this new technology, the VMM software manages the task of handing off platform control to an OS, which requires complex, compute-intensive calculations. With Intel Virtualization Technology, hardware takes over this crucial operation, reducing computational burden on VMM software. In addition, without hardware assistance, key CPU and OS state information is stored in unprotected memory; the VMM must prevent contamination of this memory space. With Intel Virtualization Technology, only the VMM has access to a dedicated memory space where it stores CPU and OS state information, protecting the integrity of the handoff process.

### New 64-bit support

Bringing new functionality to virtual environments, Intel Virtualization Technology enables support for 64-bit software – operating systems and applications.<sup>1</sup> Now, companies can build in agility through more capabilities, greater headroom, and scalability in their IT infrastructure, while taking advantage of the benefits offered by a virtual environment.

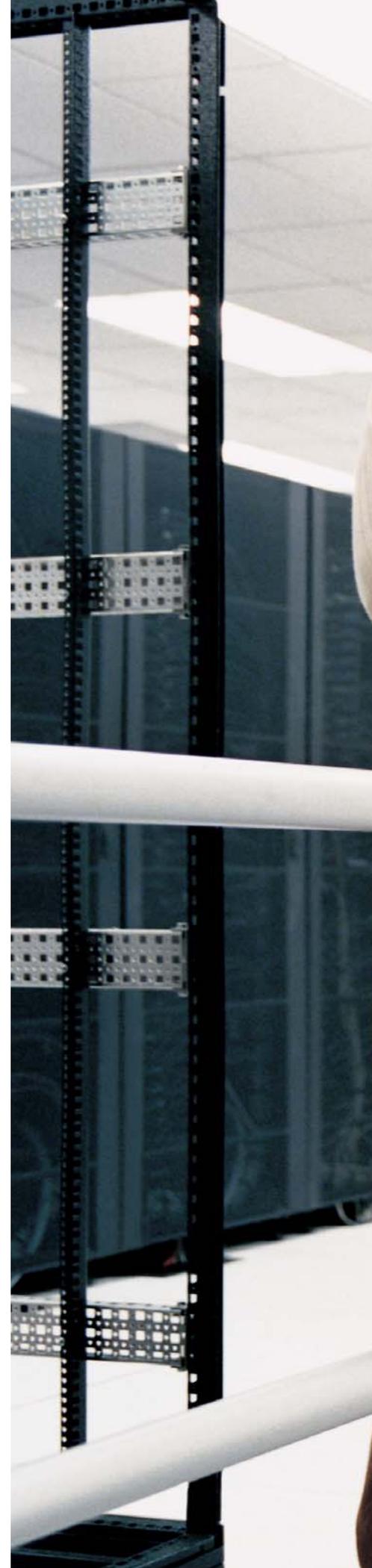
## Standardize your virtual environment on industry-leading Intel balanced platforms

Intel Virtualization Technology builds on Intel's track record of reliable, highly available systems, making Intel platforms the optimal choice for virtualization and consolidation. By standardizing your virtual solutions on Intel server and workstation platforms, you reduce complexity in your IT infrastructure and help increase operational efficiency.

Intel balanced platforms give you the technologies you need to increase consolidation rates and offer improved business services without increasing your data center footprint. Faster I/O and memory, combined with dual-core processor technology and industry-leading RAS features today, followed by multi-core processors, dual-independent processor bus chipsets, and fully buffered DIMM technologies in the near future, provide a firm foundation for building an IT infrastructure ideal for virtualized environments.

## Intel Virtualization Technology: continuing Intel platform leadership

Hardware-assisted virtualization from Intel is another example in a long history of platform innovations that offer superior value for IT professionals. Intel also works with the virtualization software developers like VMware, Microsoft, and XenSource, the open-source Xen community and the operating system developers, to ensure that next-generation Intel platforms provide a stronger foundation for their products and meet or exceed the most critical needs of business customers. Intel will continue to advance hardware-assisted virtualization capabilities with each new platform, giving you better tools for your IT and company operations.







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<sup>1</sup> Limited by VMM's 64-bit support. Check your VMM software specifications.

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