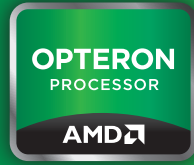




Optimal Virtualization with AMD Opteron™ 6000 Series Platform

Real-world performance for demanding workloads



- > More cores per virtual machine – closer to native performance¹
- > Scale to meet application demands and greater VM density
- > Outstanding performance through superior memory management

Virtualization is now mainstream technology in today's enterprise data centers. According to Gartner² analysts, half of all server workloads worldwide will be virtualized by 2012, and by 2016, 80 percent of all x86 based workloads will be running on virtual machines.

Selecting the right hardware infrastructure is critical in order to maximize all the benefits that virtualization provides. A hardware platform that delivers high core density, robust memory scalability, and powerful I/O throughput is essential to meet the demands of virtualization and ensure you are getting the best value and performance from your virtualized systems.

The world's first integrated CPU and chipset to offer up to 16 cores and four memory channels per physical processor, the AMD Opteron™ 6000 Series platform is uniquely designed to support more virtual machines, more transactions and more robust, resource-intensive workloads per processor – all helping you to achieve better value and utilization in your virtual environment.

The AMD Opteron 6000 Series platform features AMD Virtualization™ (AMD-V™) 2.0 technology – a suite of processor extensions designed to help simplify virtualization solutions, enabling a more satisfying user experience and near native application performance.

AMD Virtualization™ (AMD-V™) 2.0 Technology	
AMD-V™ Extensions	Enables multiple operating systems and applications to run simultaneously on the same computer
Tagged TLB	Facilitates efficient switching between virtual machines for better responsiveness of many virtualized applications
Rapid Virtualization Indexing (RVI)	Helps accelerate the performance by enabling hardware-based virtual machine memory management
AMD Extended Migration	Enables live migration of virtual machines between all available AMD Opteron™ processor generations
I/O Virtualization with AMD-Vi	Enables direct device access by a virtual machine, bypassing the hypervisor to enable improved application performance and isolation of virtual machines

Putting AMD Virtualization Technology to Work

Virtualization is designed to help businesses - large and small - increase infrastructure utilization, reduce data center complexity, lower power consumption, and save money. From consolidating servers to running legacy applications to easing desktop image management, AMD Opteron-based servers with AMD-V 2.0 technology can help you to streamline IT management and maximize your investment.

Consolidation
Helps reduce costs and increase utilization

Test and Development
Fast provisioning and deployment

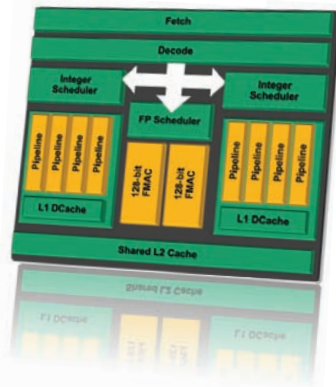
Legacy App Support
Run older applications on new hardware

Business Continuity
Helps decrease downtime to increase productivity

Virtual Desktop Infrastructure
Enables increased security

Tackle virtualization cost effectively with AMD Opteron™ 6200 Series processors

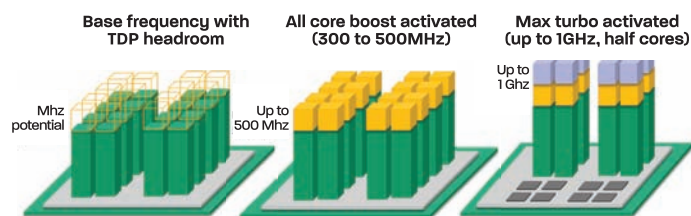
Taking you to the next level of performance and efficiency, the new AMD Opteron™ 6200 Series processors are built on a 32nm design with discrete processor components that minimize die size and power consumption while maximizing throughput for your virtualization environment. Packing up to 16 cores per processor, this new design will deliver up to 35%³ greater throughput than the prior generation and AMD Opteron processors, while maintaining the same power of thermal ranges. The AMD Opteron 6200 Series processors are available in 4-, 8-, 12-, and 16-core options to meet your unique workload and power requirements.



AMD Turbo CORE Technology

Among many of the new features offered, AMD Turbo CORE technology may be one of the most exciting when it comes to enhancing virtualization performance. AMD Turbo CORE technology enables processors to run above their base clock frequency when additional power headroom is available – up to 500MHz higher than the rated base frequency with all cores active and utilized.

The AMD Opteron 6000 Series platform supports both 2P and 4P configurations both at 2P economics⁴, giving you the flexibility to choose the right mix of price and performance for your specific needs.

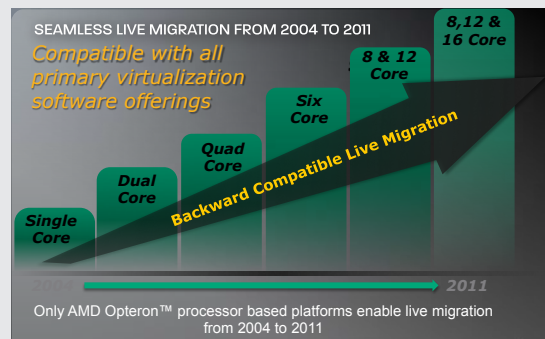


For more information about AMD Opteron, please visit www.amd.com

1 With AMD Opteron 6200 Series processors which have up to 16 cores each virtual machine can be assigned more cores than with AMD Opteron 6100 Series processors which have up to 12 cores.
 2 Thomas J. Bittman and Lydia Leong, "Virtual Machines Will Slow in the Enterprise, Grow in the Cloud," March 2011.
 3 AMD estimate as of 9/2011 comparing performance of top bin AMD Opteron 6200 and 6100 Series processors.
 4 Based on 2P capable Six-Core AMD Opteron™ processor Model 2435 1ku pricing of \$989 as of 10-19-09 vs. 4P capable AMD Opteron™ processor Model 6172 1ku pricing of \$989 as of 4-25-2011. SVR-22.

Consistency of platform enables live migration between all available generations of AMD Opteron processors

AMD Extended Migration is a hardware feature that enables virtualization ISVs to provide live migration capabilities between different generations of AMD Opteron processors.



- > Allows virtualization software to identify processor features and revisions to help ensure the safe migration of virtual machines without downtime.
- > Enables users to create pools of virtual machines that include a broad range of AMD Opteron processor-based systems.
- > AMD Extended Migration capability is a feature of all available AMD Opteron processors.

I/O Virtualization with AMD-Vi

I/O virtualization has often been referred to as the next frontier of virtualization. AMD published the first industry-wide specification for I/O virtualization technology in 2006 which defined a methodology for abstracting devices in a virtual environment. AMD-Vi represents an I/O memory management unit (IOMMU) that is embedded in the chipset of the AMD Opteron 6000 Series platform. AMD-Vi provides device isolation for improved security and enables the direct assignment of an I/O device to a virtual machine to improve performance of workloads with heavy I/O traffic.

- > **Device isolation:** restricts the access of an I/O device to specific areas of memory. Without device isolation, an attack from a peripheral device could more easily corrupt memory and compromise security.
- > **Direct Assignment:** AMD-Vi provides address translation for peripherals like high performance network interface cards (NICs) and graphics cards found in modern computer systems. In a virtualized environment, the hypervisor emulates all device functionality and is therefore responsible for the necessary address translations and access checks. With AMD-Vi, all the translations and checks are performed on-the-fly in hardware where the job can be done efficiently.

