

# Virtualization

## What are AMD Virtualization™ (AMD-V™) technology and AMD Power Efficiency (AMD-P) technology?

AMD Virtualization™ (AMD-V™) technology and AMD Power Efficiency (AMD-P) technology are suites of features that propel virtualization and power saving innovations of the AMD Opteron™ processor. In each generation of the AMD Opteron processor, features are engineered and designed into the product that help boost performance in these two critical areas.

## Fully featured at every price point

The really important thing about the AMD-V and AMD-P technology suites of product features is that you get each feature in every model of AMD Opteron processor, regardless of the power band. For example, the energy-efficient AMD Opteron EE processor with very low power draw has all of the AMD-V and AMD-P technology features, as does the high-performance AMD Opteron SE processor. AMD Opteron processors are fully featured at every price point.

No other processor vendor can match AMD's capabilities for x86 virtualization:

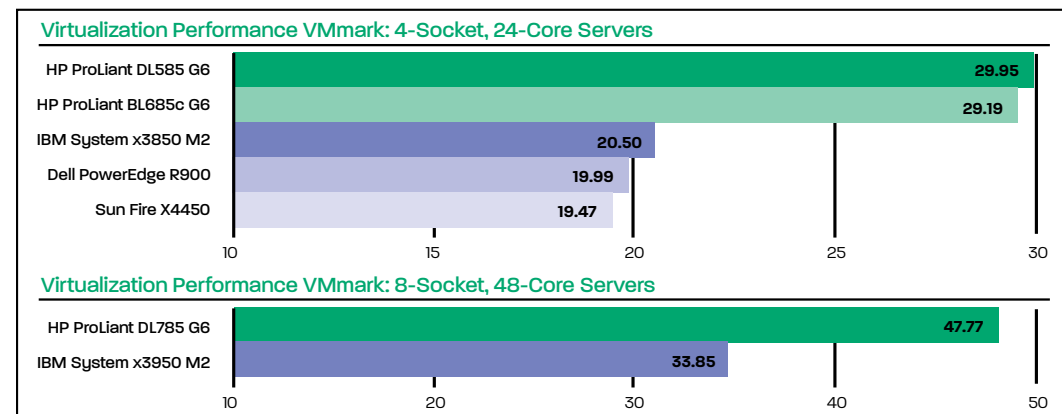
- **Direct Connect Architecture** – offers superior memory bandwidth and scalability allowing more virtual machines (VMs) to be hosted per server and more users and transactions per virtual machines
- **Enhanced Power Management** – intelligently manages power consumption so that you don't waste energy during low utilization cycles
- **Rapid Virtualization Indexing** – helps accelerate the performance of virtualized applications by enabling hardware-based VM memory management
- **Tagged TLB** – hardware features that facilitate efficient switching amongst VMs for better application responsiveness
- **Extended Migration** – hardware feature that helps virtualization software achieve live migration of virtual machines across the entire range of AMD Opteron processors

**AMD-V™ Technology Suite**

- Rapid Virtualization Indexing
- Tagged TLB
- Extended Migration

**AMD-P Technology Suite**

- AMD Smart Fetch Technology
- AMD PowerCap Manager
- AMD CoolCore™ Technology



The results stated above reflect results published on [www.vmware.com](http://www.vmware.com) as of August 19, 2009. The comparisons presented above are based on the best performing HP DL585 G6, HP BL685c G6, IBM x3850 M2, Dell R900, Sun X4450, HP DL785 G6, and IBM x3950 M2 servers. For the latest results, visit [www.vmware.com](http://www.vmware.com).

**Four-Socket VMmark**  
 29.95 using 4 x Six-Core AMD Opteron processors ("Istanbul") Model 8439 SE in HP ProLiant DL585 G6 server, 128GB (16x8GB) memory, VMware ESX 4.0, VMmark V1.1.1  
<http://www.vmware.com/files/pdf/vmmark/VMmark-HP-2009-07-14-dl585g6.pdf>  
 29.19 using 4 x Six-Core AMD Opteron processors ("Istanbul") Model 8435 in HP ProLiant BL685c G6 server, 128GB (16x8GB) memory, VMware ESX 4.0, VMmark V1.1.1  
<http://www.vmware.com/files/pdf/vmmark/VMmark-HP-2009-07-14-bl685cg6.pdf>  
 20.50 using 4 x Hex-Core Intel Xeon processors ("Dunnington") Model X7460 in IBM System x3850 M2 server, 128GB (32x4GB) memory, VMware ESX 3.5 U3, VMmark V1.1  
<http://www.vmware.com/files/pdf/vmmark/VMmark-IBM-2009-03-24-x3850M2.pdf>  
 19.99 using 4 x Hex-Core Intel Xeon processors ("Dunnington") Model X7460 in Dell PowerEdge R900 server, 96GB (12x8GB) memory, VMware ESX 3.5 U3, VMmark V1.1  
<http://www.vmware.com/files/pdf/vmmark/VMmark-Dell-2009-02-10-R900.pdf>  
 19.47 using 4 x Hex-Core Intel Xeon processors ("Dunnington") Model X7460 in Sun Fire X4450 server, 80GB (20x4GB) memory, VMware ESX 3.5 U2, VMmark V1.1  
<http://www.vmware.com/files/pdf/vmmark/VMmark-Dell-2009-02-10-R900.pdf>

**Eight-Socket VMmark**  
 47.77 using 8 x Six-Core AMD Opteron processors ("Istanbul") Model 8439 SE in HP ProLiant DL785 G6 server, 256GB (32x8GB) memory, VMware ESX 4.0, VMmark V1.1.1  
<http://www.vmware.com/files/pdf/vmmark/VMmark-HP-2009-08-11-dl785g6.pdf>  
 33.85 using 8 x Hex-Core Intel Xeon processors ("Dunnington") Model X7460 in IBM System x3950 M2 server, 256GB (64x4GB) memory, VMware ESX 4.0, VMmark V1.1  
<http://www.vmware.com/files/pdf/vmmark/VMmark-IBM-2009-03-24-x3950M2.pdf>

**About AMD**  
 AMD is the customer-centric innovation company, a processing powerhouse that offers smarter choices for its customers and makes technology more accessible to the world. AMD is focused on best meeting the needs of leading computing, wireless, and consumer electronics companies to help them deliver high-performance, energy-efficient, and visually realistic solutions.

©2009 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, AMD Opteron, AMD PowerNow!, AMD Virtualization, AMD-V, Dual Dynamic Power Management, AMD CoolCore, and combinations thereof, are trademarks of Advanced Micro Devices, Inc. HyperTransport is a licensed trademark of the HyperTransport Consortium. Other names are for informational purposes only and may be trademarks of their respective owners. 4718D



AMD and HP are proven in business.

A decade of industry-leading technology innovation



## The Six-Core AMD Opteron™ Processor

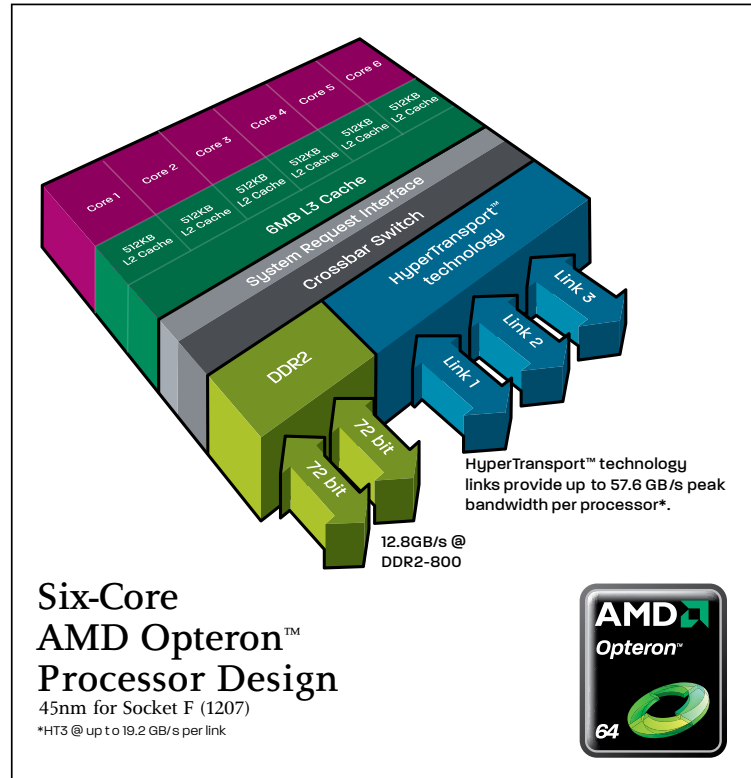
For more than a decade, AMD and HP have collaborated to deliver an outstanding technology portfolio – from the desktop to the datacenter – that continues to grow more robust every year. Today, HP is a leading provider of servers based on AMD Opteron™ processors. Its product line now features an ever-broadening portfolio of proven systems based on the entire family of AMD processors, including rack-mount servers and blades, workstations, desktops, notebooks and thin clients. Together, we're delivering forward-thinking computing solutions for businesses of all sizes.

Using AMD Opteron processors, HP has delivered server designs that offer high performance, while at the same time helping to reduce power and cooling requirements. AMD innovations like Direct Connect Architecture, hardware-based AMD Virtualization™ (AMD-V™) technology and AMD Power Efficiency (AMD-P) technology make it possible to design rack-mount servers and server blades that provide solid performance and help HP further its goals of creating high-performing, highly dense, and highly manageable servers. Together, HP and AMD deliver technology solutions to help businesses address the ever-changing demands and challenges in the datacenter.

## Top-line performance that's bottom-line efficient.

Building on the strengths of the original Quad-Core AMD Opteron™ processor, the 45nm Six-Core AMD Opteron processor represents the most thermally efficient, highest performing server and workstation processor that AMD has ever produced – while further enhancing AMD's leading-edge capabilities for efficient server virtualization.

Thanks to this evolutionary technology, your business can now seamlessly upgrade from previous generations of AMD Opteron processors without sacrificing your existing investments in hardware, software and personnel. And the Six-Core AMD Opteron processor advances AMD's excellence in performance-per-watt. Features like Enhanced AMD PowerNow!™ technology, energy-efficient DDR2 memory, and hardware-assisted AMD-V™ technology with Rapid Virtualization Indexing can all help your systems consume less power, emit less heat, take up less space, and ultimately, save money.



## HP ProLiant G6 Servers

### FEATURING SIX-CORE AMD OPTERON™ PROCESSORS

HP ProLiant servers running on AMD Opteron™ processors provide outstanding performance, deliver datacenter efficiency, and can help lower power and cooling costs.



#### HP ProLiant DL165 G6

*High performance, low-cost, ultra-dense rack mount server*

- Form factor: 2P, 1U rack optimized
- Up to 64GB DDR2 memory
- Ideal for compute and I/O intensive environments, Web serving and mid-market server deployments



#### HP ProLiant DL385 G6

*High performance, low-cost, ultra-dense rack mount server*

- Form factor: 2P, 2U rack optimized
- Up to 128GB DDR2 memory
- Designed with virtualization in mind yet flexible to support business needs in many environments from corporate data centers to sophisticated SMBs



#### HP ProLiant DL585 G6

*Leading performance 4P multi-core rack mount server for heavy workloads*

- Form factor: 4P, 4U rack optimized
- Up to 256GB DDR2 memory
- Highly manageable, rack optimized, four-socket server designed for maximum performance and value for compute-hungry database, virtualization and consolidation applications



#### HP ProLiant DL785 G6

*Built to help improve utilization and help reduce resource sprawl*

- Form factor: 8P, 7U rack optimized
- Up to 512GB DDR2 memory
- Highly expandable 8P x86 server available making it the ideal choice for the growing enterprise class database, consolidation and virtualization environments seeking to improve server utilization and reduce server and virtualization sprawl

## HP ProLiant G6 Servers & Server Blades

Since 1996, HP and AMD have been delivering superior quality, variety and value in computing technology. This collaboration provides end customers with technology innovation and performance-per-watt competitiveness while helping to drive a balanced computing market. The addition of HP ProLiant G6 Servers powered by AMD Opteron™ processor technology extends this collaboration with affordable, energy-efficient solutions designed to give businesses of all sizes a competitive advantage.

### HP ProLiant G6 Servers Featuring Six-Core AMD Opteron™ Processors

With the introduction of this next generation of AMD technology-based HP ProLiant G6 servers, HP is taking advantage of the unique capabilities of these new Six-Core AMD Opteron™ processors to provide you with enhanced performance.

- 50% more cores vs. G5 servers which gives the ability to handle bigger workloads while offering better performance
- Up to 21% reduction in processor power consumption with AMD Smart Fetch technology
- Superior virtualization performance with Six-Core AMD Opteron processors: highest VMmark scores in 48-core, 24-core, and 12-core servers.\*

Key innovations in these new HP ProLiant servers include:

- **Thermal Logic Technologies** such as HP Dynamic Power Capping and Sea of Sensors
- **Common Power Supplies** that offer up to 92% power efficiency\*\*
- **Smart Arrays** that deliver up to 200% increased performance\*\*\*
- **HP ProLiant Onboard Administrator** which orchestrates all critical embedded management aspects of your server including setup, health monitoring, power optimization, thermal control, and iLO remote administration

**HP ProLiant G6 servers with AMD Opteron processors give you an outstanding return for your budget. So isn't it time to upgrade to HP ProLiant G6 servers featuring the latest technologies like Six-Core AMD Opteron™ processors, and start seeing the benefits to your business?**

\* Based on VMmark scores as of August 24, 2009. For the latest results, visit <http://www.vmware.com/products/vmmark/results.html>.

\*\* Depending on server configuration. See <http://h10010.www1.hp.com/wwpc/uk/en/sm/WF06a/15351-15351-3328412-241475-241475-3949986.html>.

\*\*\* Based on HP testing comparing sequential read/write performance between Smart Array controller SA-P41, and the previous generation SA-P800. Testing performed on a ProLiant G5 DL380 server in a RAID 5 environment using the default 64KB stripe size. <http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00687518/c00687518.pdf>.

## HP ProLiant G6 Server Blades

HP ProLiant BladeSystem G6 servers support the latest Six-Core AMD Opteron™ processors, a wide variety of I/O options, the innovative Virtual Connect technology, numerous network interconnect alternatives, Integrated Lights Out, multiple redundant features, embedded RAID controllers, and much more. And these powerful, reliable server blades have the same trusted features as award-winning HP rack and tower servers. HP has a ProLiant server blade that will meet your needs – whether a small business or the largest enterprise firm.



#### HP ProLiant BL685c G6

*Built for performance-intensive applications and virtual environments*

- Form factor: 4P blade
- Up to 256GB DDR2 memory
- Large memory footprint and I/O capacity
- Delivers outstanding processing power and expansion capabilities, enterprise-class availability features, and leading-edge management tools that make it easy to deploy and maintain



#### HP ProLiant BL495c G6

*Half-height 2P server blade ideal for virtualization*

- Form factor: 2P blade
- Up to 128GB DDR2 memory
- Offers enhanced memory and network throughput
- Optimized for performance as a virtual machine host, with the features and options needed for enterprise data center environments



#### HP ProLiant BL465c G6

*Enterprise-class features for high performance and reliability without compromising energy efficiency or density*

- Form factor: 2P blade
- Up to 64GB DDR2 memory
- Delivers uncompromising performance and expandability, leading-edge management tools, and the latest technologies for dense compute environments