



HP ProLiant servers with  
AMD Opteron™ processor technology



Higher performance.  
Lower power consumption.  
A server platform for today's  
business needs.

HP is the leading vendor of AMD Opteron™ processor–based servers

Vendor	AMD Opteron™ processor–based server units	Market share
HP	14,497	19.7 (no. 1)
Sun	12,251	16.7%
IBM	6,341	8.6%

Source: IDC Quarterly Server Tracker, May 2005.

## HP systems based on AMD Opteron™ processors

HP ProLiant servers are the most trusted and best-selling industry-standard servers in the world. Businesses worldwide have purchased more than 10 million ProLiant servers since their introduction. And HP ProLiant servers continue to be the development platform of choice for leading business applications, including Oracle®, PeopleSoft, SAP, and Siebel and for Linux® and Microsoft® Windows® environments.

## The best-selling, industry-standard servers in the world just got a world of new capabilities designed for demanding environments.

You can count on HP for a broad range of choices, so you can find the right product at the right price to fit your precise business requirements and put complete control into your hands. From the growing small business and remote office to the largest data center, businesses of all sizes rely on ProLiant servers and server blades for the HP BladeSystem to deliver the consistent manageability, high performance, and superb reliability that is expected from the ProLiant brand.

Consistently first with customer-useful innovation delivered with a demonstrated commitment to standards and engineering excellence, HP knows a thing or two about great innovations built on industry standards.

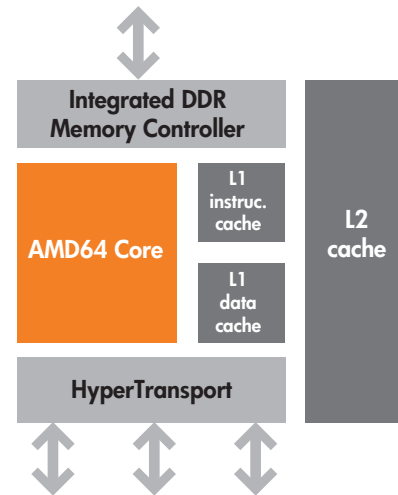
That's why HP has added the AMD Opteron™ processor to the ProLiant server and server blade family. With this addition, HP now delivers the broadest range of servers and server blades using AMD Opteron™ processors. AMD Opteron™ processor technology is a significant extension to the current x86 architecture, providing improved price/performance required by the many businesses that use x86-based platforms.

The AMD Opteron™ processor features the Direct Connect Architecture to provide HP ProLiant customers with

- 100 percent compatibility with the existing x86 architecture for Linux and Windows applications
- Exceptional price/performance and scalability with lower power consumption
- Maximum 32-bit performance and excellent 64-bit performance through larger memory addressability
- Dual-core processing capacity for increased power-efficient performance

**Figure 1**  
AMD Opteron™ processor with Direct Connect Architecture.

- Increases application performance by dramatically reducing memory latency
- Enables simultaneous 32- and 64-bit computing
- Eliminates 4 GB memory barrier imposed by 32-bit-only systems
- Provides up to 24 GB/s peak bandwidth per processor, reducing I/O bottlenecks
- HyperTransport Technology directly connects CPUs, enabling scalability



## HP and AMD: a productive partnership

The HP and AMD partnership offers technologies that provide a computing foundation for customers of all sizes—delivering exceptional performance, scalability, and reliability. From enterprise data centers to small businesses, from 32- to 64-bit Linux and Windows applications, HP and AMD have joined to provide the next generation of innovative computing technologies to meet your IT needs.

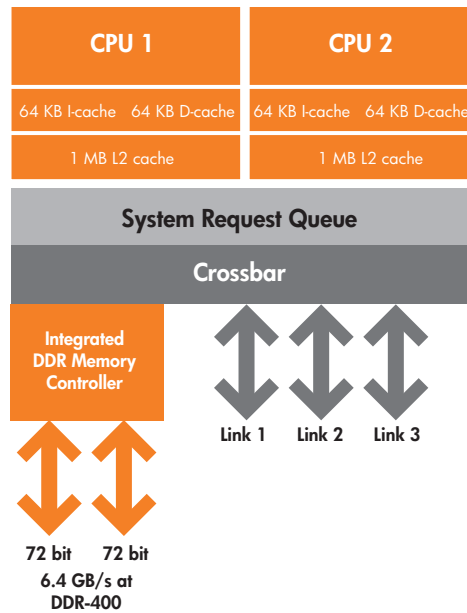
Together, HP and AMD are expanding the potential of industry-standard technologies. In addition, HP and AMD are increasing ProLiant and HP BladeSystem performance, delivering leading management tools, and reducing the cost of ownership—so our combined AMD Opteron™ processor-based systems offer you a faster return on your investment, along with HP's trusted reliability.

## High-performance AMD Opteron™ processor architecture

With its Direct Connect Architecture, the AMD Opteron™ processor helps eliminate bottlenecks by connecting essential system components directly to the central processing unit. This approach dramatically improves system performance and scalability.

Two of the most important factors for the scalability of the architecture are the integrated memory controllers and the point-to-point HyperTransport links of the AMD Opteron™ processor. In addition to the CPU core, AMD Opteron™ processors contain an integrated memory controller, a crossbar switch to process requests from other processors, and three HyperTransport links (see figure 1). Each Opteron™ processor operates at CPU core frequencies and works independently from the others. For example, when processor 2 accesses the memory connected to processor 1, the CPU core for processor 1 is not involved. This means that no processor overhead is expended to move data from one processor to another.

**Figure 2**  
Dual-core AMD Opteron™ processor design.



HyperTransport Technology links provide up to 24 Gb/s peak bandwidth per processor.

### Integrated memory controller

Because the integrated memory controller operates at the core speed of the processor, the result is a very low-latency connection, even when accessing the memory of a remote processor. Operating at the core speed of the processor also means that as processor speed increases, the speed of the memory accesses will increase as well. Further, the integrated memory controller eliminates the need for a front-side bus to access memory DIMMs.

Moreover, because of the integrated memory controller, customers can add memory controllers any time they add processors. Therefore, the available memory bandwidth scales linearly with the number of processors.

### HyperTransport

AMD Opteron™ processors use fast point-to-point HyperTransport links to connect to other processors or I/O within the system. Compared to a shared or bidirectional bus, a point-to-point interconnect has the advantage of no overhead for bus arbitration and easier maintenance of signal integrity. The HyperTransport links currently operate at 1 GHz and provide 8 GB/s of throughput between processors for increased performance and scalability.

AMD has also expanded the features of its AMD Opteron™ processors with two technologies: PowerNow, for increased power efficiency and the ability to balance the demands for performance versus power efficiency; and dual-core processors, which deliver greater scalability and performance with lower power consumption. When combined with HP engineering and proven HP ProLiant platforms, these technologies extend the potential and versatility of HP systems.

## Extending AMD Opteron™ processor computing power with dual-core technology

In today's digital world, the demands of complex 3D simulations, streaming media files, increasing numbers of online users, and larger databases are beginning to exceed single-core processor capabilities. With dual-core technology, HP servers featuring AMD Opteron™ processors can deliver more performance without increasing your cost or significantly increasing power consumption, when compared to single-core technology. Corporate IT systems currently optimized for symmetric multiprocessing (SMP) multi-threaded applications should see significant performance increases by adopting AMD Opteron™ processor-based HP systems incorporating dual-core technology.

Here are other examples of how AMD is extending its evolutionary Direct Connect Architecture leadership by connecting two CPUs on one die:

- The dual-core AMD Opteron™ processor design enables customers to increase their computing capacity without increasing power requirements, providing the best performance per watt.
- Compute-intensive applications can leverage the increased memory bandwidth and additional computing power of the dual-core design to deliver higher performance and greater throughput.
- Rack-dense and blade server designs often face a tradeoff between balancing performance demands and meeting power requirements. HP and AMD's dual-core designs provide the optimum balance between performance and density.

The dual-core AMD Opteron™ processor design is shown in figure 2.

This logical performance boost can take place within current, available hardware and socket designs—meaning all of the latest HP ProLiant servers that feature AMD Opteron™ processors are “dual-core ready.” This enables corporate IT managers to add more sophisticated system layers—such as virtualization and security—without significant disruption to legacy systems.

To learn more about the dual-core design of AMD Opteron™ processors, visit <http://multicore.amd.com>.

## Choosing the right HP ProLiant platform

Feature-rich, reliable, and standards-based, the HP portfolio of ProLiant servers and server blades with AMD Opteron™ processors offers a perfect platform for your needs. The portfolio delivers powerful 32-bit computing performance, extends the performance of memory-constrained applications, and drives 64-bit capabilities and benefits to x86-based environments. Ideal for a variety of single server and clustered servers solutions, HP ProLiant servers using the AMD Opteron™ processor-based architecture deliver superior manageability, and are highly available, flexible, and extensible.

HP ProLiant servers featuring AMD Opteron™ processors and server blades with AMD Opteron™ technology substantially increase the options for HP customers that are seeking higher performance, lower power consumption, and a clear upgrade path to 64-bit computing, in terms of both software and hardware. Simply put, customers want the best choice for their applications and they want a partner that can help them choose the right technology to suit their needs.

# HP ProLiant servers with AMD Opteron™ processor technology

## ProLiant server portfolio featuring AMD Opteron processors

Server	Key benefits with AMD Opteron™ processors	Workload	Best for...
ProLiant DL145 Server 1–2P AMD Opteron™ processor	Improved 1U or server blade density	Front- and mid-tier infrastructure applications	<ul style="list-style-type: none"> <li>• Web applications</li> <li>• Compute-intensive applications</li> <li>• Memory latency advantaged applications</li> <li>• Networking, shared Internet access, file and print sharing</li> <li>• Simple HPC clustered environments</li> </ul>
ProLiant BL35p Server Blade 1–2P AMD Opteron™ processor	Price/performance, low \$ per transaction	Lowest-cost clusters	
Server blade density: 96 servers, 192 processors	Some 2P performance advantage	Lower power consumption and superior performance per watt	
ProLiant DL385 Server 1–2P AMD Opteron™ processor	Price/performance, low \$ per transaction	Front- and mid-tier infrastructure applications	<ul style="list-style-type: none"> <li>• Compute-intensive applications</li> <li>• Web applications</li> <li>• Memory latency advantaged applications</li> <li>• Small mail and messaging, databases and applications</li> <li>• Directory, DNS, security, firewall file/print, domain servers, Web services, caching, proxy, media streaming</li> <li>• Advanced HPC clustered environments</li> </ul>
ProLiant BL25p Server Blade 1–2P AMD Opteron™ processor	Some 2P performance advantage	Distributed workgroup application server	
Server blade density: 48 servers, 96 processors	Lower power consumption	SMB and remote/branch office usage	
		Enhanced for external storage	
		Most flexible clusters	
ProLiant DL585 Server 1–4P single- or dual-core AMD Opteron™ processor	Price/performance and improved scalability	Large mail and messaging, e-commerce databases, data warehouse and mining	<ul style="list-style-type: none"> <li>• Largest memory footprint, leading performance needs</li> <li>• Compute-intensive applications</li> <li>• Memory latency advantaged applications</li> <li>• Compute clusters</li> <li>• High-bandwidth/low-latency applications</li> <li>• Mid-tier database and OLTP performance</li> <li>• Server consolidation</li> </ul>
ProLiant BL45p Server Blade 1–4P AMD Opteron™ processor	Enhanced performance on most 4P applications	OLTP, ERP, and e-commerce	
Server blade density: 24 servers, 96 processors	Low power consumption and high performance per watt	Highest-performance clusters	

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The HP ProLiant server architecture is designed for easy serviceability and flexibility, enabling you to reconfigure and redeploy servers as your needs change—so you consume fewer resources and reduce your long-term costs. And flexible storage options help you attain the highest levels of data availability and protection, with the capacity and scalability to support a broad range of your business's IT needs.

To meet your high-availability requirements, ProLiant servers and HP storage can also be deployed in cluster solutions, providing processing power and business data continuity that are always there when you need them. And HP offers a full complement of intelligent management tools, so computing and storage resources can be managed more reliably, efficiently, and cost-effectively.

Whatever the size of your business, HP ProLiant density-optimized servers and server blades provide the technology and solutions that fit.

## ProLiant server blades for the HP BladeSystem

An HP BladeSystem improves and advances the principles of a rack server environment. It repackages the entire infrastructure beyond the server, and integrates it with network, storage, and power for greater convenience, simplicity, and efficiency within a dynamic environment. The other key improvement delivered by HP BladeSystem solutions is the integration and consolidation of management tools. System management is connected and built in across all infrastructure elements and controlled from one console, with features such as automation and virtualization designed to simplify common tasks.

Delivering best-in-class performance, choice, and reliability on AMD Opteron™ processors for Windows or Linux, the HP portfolio of ProLiant server blades supports an array of application requirements. HP offers your choice of one-, two-, and four-processor blades, including the widest range of performance, highest processing density, and greatest variety of form factors.



## Effective management tools

At HP, we understand that you don't buy servers simply to admire the hardware. You buy servers to solve business problems—to capitalize on change for your business advantage. That's why we offer HP Systems Insight Manager, HP ProLiant Essentials, and HP OpenView Software. Designed to automate and simplify the process of provisioning, deploying, and managing multiple server and storage environments, HP management software gives you the control that leads to an Adaptive Enterprise—to efficiently integrate people, processes, and technology so you can continually measure, assess, and improve IT's contribution to the business.

By automating the dynamic link between business processes and IT, you can run IT as a business—and free your IT professionals to focus on fulfilling business needs, instead of handling day-to-day server management issues. HP offers a full portfolio of software to enable management of your entire IT infrastructure.

HP Systems Insight Manager forms the foundation of HP's server management offerings and is the only unified server management software that can manage servers running Windows, Linux, and UNIX® systems. It controls, manages, and monitors all HP ProLiant, Integrity, and HP 9000 servers, as well as supports value-added plug-ins for improved rapid deployment, vulnerability and patch management, and virtual machine management and control.

## Flexible storage solutions

HP provides a wide range of storage systems to help maintain that data is available when and where you need it. Starting with HP Smart Array RAID controllers, you get the highest levels of data protection with an innovative modular design and RAID 6 Advanced Data Guarding technology. Our newest enhancements—including iSCSI and SAS technology—push throughput, efficiency, and performance even higher.

Next, HP universal hot plug disk drives offer the highest level of data integrity and reliability. Plus, these universal drives can seamlessly migrate from direct-attached storage to HP StorageWorks network attached storage (NAS) or SAN solutions, enabling you to take advantage of advanced HP storage virtualization technology. Virtualization technology enables you to pool and share resources to simplify management and dramatically improve utilization. It's the ideal way to adapt your infrastructure to meet changing needs, while preserving your investments.

Versatile and efficient HP StorageWorks storage systems provide you with industry-leading data performance, availability, capacity, and upgradability to meet demanding and growing storage needs. From entry-level drives to high-capacity arrays ideal for storage consolidation, the StorageWorks family has what it takes to deliver superior data protection and increased uptime. HP ProLiant servers and HP BladeSystem solutions work seamlessly with HP SAN, NAS, backup, tape storage systems, and active archiving solutions to provide complete information lifecycle management as well as support EMC, Hitachi, and IBM SAN technology.

## Expert services and support to increase your success

The world of information technology is vast and in constant flux. That's why it's so important to have a knowledgeable and experienced services partner to stand by you—to help you make the right choices and keep your complex, multi-technology environment flexible and stable even in the face of change.

With our global network of approximately 65,000 service professionals and 70,000 service partner organizations covering 170 countries around the world, HP has the resources and expertise to meet the full range of your consulting and service needs. Whether you need help migrating a legacy application, designing and implementing a complete solution, gaining instant access to technical support, or outsourcing the management of your entire IT infrastructure, HP offers services for the entire life cycle of your IT project.

HP Services professionals take a collaborative approach to help you reduce IT complexity and better control the impact of change on your business. Our expertise and flexible services increase the availability of your evolving environment. Further, our support services—based on extensive industry-standard technology partnerships—address your essential needs for responsive support escalation processes that provide fast, effective resolution of your toughest problems. Innovative, automated e-support options also open fast, easy, and flexible access to HP Services' expertise.

HP offers a full portfolio of consulting, support, and management services to increase the value of your IT investments. From proactive on-site services to online technical support or strategic long-term planning, HP provides a single point of accountability and a well-defined escalation process to achieve prompt problem analysis and resolution.

When you finance your new HP solution from HP Financial Services, you avoid making a large, up-front investment; facilitate add-ons and upgrades; remove the risks of ownership; and eliminate costs and risks associated with equipment disposition when the equipment no longer meets your needs. Our flexible approach to financing enables you to wrap your equipment (including third-party components), services, and software into one convenient payment, and get it all from HP. Leasing helps you capitalize on change, making it the smartest way to invest in IT.

## Find out more today

For more information on how HP ProLiant servers and HP BladeSystem systems featuring AMD Opteron™ processors can help you master change and drive long-term success for your business, contact your HP representative or reseller today, or visit

**[www.hp.com/go/ProLiant](http://www.hp.com/go/ProLiant)**



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For more information, visit [www.hp.com/go/proliant](http://www.hp.com/go/proliant).

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