With more processing power, efficient power utilization and aggressive pricing, dual-core processors should drive enterprise servers for years to come.
It’s no secret to business professionals — IT and non-technologists alike — that the demand on corporate computing facilities is on a sharp growth curve. There’s more data being gathered and stored all the time.

Transaction-oriented businesses are constantly crunching more data, and the sheer volume of network traffic for applications such as e-mail remains on an upward path as networked applications grow ever more entwined in the fabric of business.

All these factors lead to one requirement: more computing power. There are two potential solutions: Throw more hardware at the problem — call it working harder — or throw more efficient hardware at the problem — think of it as working smarter. An emerging class of systems based on dual-core processors is fast becoming the way most companies will work smarter in the future.

There are always those businesses that will opt to work harder — in the sense of just buying more hardware — but that approach is neither as cost-effective nor as space- or energy-efficient an approach as working smarter with dual-core processors, experts say.

At a conceptual level, dual-core processors allow the computer or server they power to execute multiple tasks simultaneously, in parallel. The single-core processors they replace, by contrast, jump from one task to the next in sequence until they work through an entire queue’s worth of tasks.

Because of their underlying design, dual-core CPUs (central processing units) pull off this technical feat while making economical use of power — a critical consideration in big data centers — and without introducing major price increases relative to the amount of computing power they represent.

For these reasons, dual-core CPUs are being used in support of critical business initiatives including server consolidation, ultimately fueling a firm’s ability to deliver more computing power at lower overall cost. What’s not to like?

Defining Dual-Core

Each CPU — the best known being those based on Intel Corp.’s x86 architecture — has one or two logic units, or cores. Those with two logic units are called dual-core.

When compared with single-core systems, dual-core means greater computing performance and scalability because the additional core provides added raw processing power. With two cores, a business customer can run multiple applications, multiple operating systems, multiple sessions of a single application or even run multiple tasks from a single application, all at the same time.

The primary suppliers of dual-core chips are the big two microprocessor manufacturers, Intel and Advanced Micro Devices. See the related sidebar (page 22) for more details on the most recent developments and planned enhancements impacting the two companies’ dual-core strategies.

There are two different dual-core implementations: one with both cores on a single silicon die and one with the two cores in a dual-die configuration. In a dual-die configuration, the two cores must communicate on processing tasks over a separate.
entity, in this case a bus. The single-die configuration facilitates fast interprocessor communications.

Dual-core systems shouldn’t be confused with dual processor systems, which had been available for several years when dual-core systems hit the market. Dual processor servers represent less sophisticated technology (though they remain very effective in their own right). A dual-processor system has two distinct single-core CPUs.

Dual-Cores and Databases

A simple example is perhaps the best way to illustrate how dual-core technology works and how it benefits businesses. If a company has an Oracle database recording transactions, one core can be processing orders while the other core is updating a transaction activity report and performing related functions. In this instance, multiple streams of execution or “threads” of the application can be executed at the same time for the fastest possible completion of tasks.

Contrast that with single-core processors. “If you’re multi-tasking with a single-core processor, if the system has five tasks to do, it divides its time, does a little of this, a little of that and cycles through the tasks so it can do them all together,” says John Fruehe, worldwide market development manager for server/workstation products at AMD. With two cores, by contrast, the cores won’t need to contend with each other for the same pool of CPU cycles.

AMD’s Fruehe says all sizes of businesses can benefit from having two cores in one microprocessor. Some businesses often will have only one or, at most, two servers to run all of their applications. If they are running multiple applications at the same time on a single server, they should see significantly greater efficiency.

In addition, some businesses have limited IT resources. “They don’t have the IT budget to add hardware whenever they need it,” Fruehe says. So dual-core processors are an economical way to boost productivity.

Larger companies will typically have the budget to run a single application on a single server but will have lots of users accessing that server. They will see greater efficiencies down to the level of individual users. In addition, a large company may start another line of business and instantly have large volumes of processing to manage. Dual-core gives them scalability, a growth path without upgrading servers.

AMD’s Fruehe says that since his company’s cores are identical across all its processor lines, any application that’s optimized for one AMD processor is optimized across the company’s product line. “If everything’s on a single platform, customers can really learn the intricacies of a processor,” he says.

Going Hyper for Performance

Dual-core processors enable businesses to more fully exploit other performance-enhancing technologies including virtualization. Virtual software lets one server function as multiple “virtual” servers, each capable of hosting a different application or piece of an application. The application or applications operating in virtual mode aren’t aware they

Upgrading the Upgrades

Dual-core CPUs are at the leading edge of the microprocessor technology curve, and the two major suppliers of the technology are truly pushing the envelope with new technology advances.

The latest series of announcements from microprocessor giants AMD and Intel indicate that both companies are working diligently to advance their dual-core processor architectures.

Intel recently introduced processor Core 2 Duo, a dual-core processor that it says can reduce power consumption by 40 percent while delivering greater than 40 percent improvements in performance. The Intel Core 2 Duo line comes with improved power management and virtualization technology features. The company plans to ship a series of other dual-core processors as well. In the spring of this year, a company official demonstrated a quad-core processor that’s expected to ship in 2007.

Core 2 Duo is also noteworthy because it was built to be dual core from the ground up, with both cores sharing a single silicon die for the fastest possible communications between cores.

AMD, meanwhile, began delivering its first 64-bit dual-core processors for thin and light notebook PCs in the spring. The company’s AMD Turion 64 X2 line also includes power management and virtualization technology features. In late June, HP became the first vendor to launch a notebook PC with a dual-core 64-bit processor, using AMD’s Turion 64 X2.

Continuing its focus on energy efficiency, AMD also says its small form factor Athlon 64 X2 dual-core processors can provide up to 154 percent greater performance per watt than standard power AMD desktop processors.
Maximize staff resources by having CDW configure your computers prior to delivery.