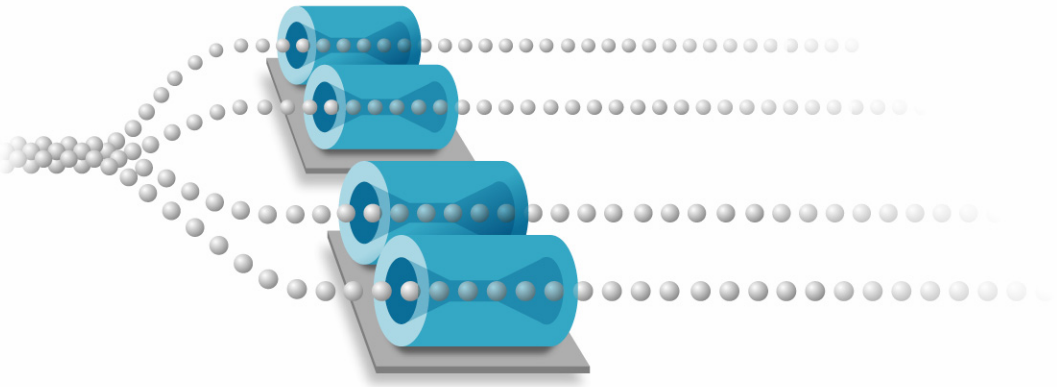
HP white paper: Dual-Processor Workstation Productivity in MCAD/AEC Environments

This white paper describes multi-core, multi-processor computing and the performance advantages of dual-processor, Xeon-based workstations. Dual-processor equipped xw6400 and xw8400 workstations provide better performance in typical MCAD/AEC environments than the single-processor xw4400. Tests have shown performance gains of up to 17% for typical MCAD/AEC application scenarios.

Audience

This white paper is a technical document designed to be read by MCAD/AEC professionals, their IT managers, and senior managers.



Multi-processing Performance

Today's compute-intensive environments demand more performance. While many factors influence system performance, the heart of a workstation is its central processing unit (CPU) or processor. Due to size, complexity, and heat limitations in processor design, it has become increasingly difficult to make processors faster. The latest advances in processor development have come from multiplying the number of processors.

Workstations with multiple processors provide significant performance gains over single-processor systems. And as applications become better tuned for multithreaded environments, those performance gains will continue to increase. HP workstations with dual processors help you render complex designs faster, analyze and display more data, and make decisions more quickly—adding up to new levels of productivity.

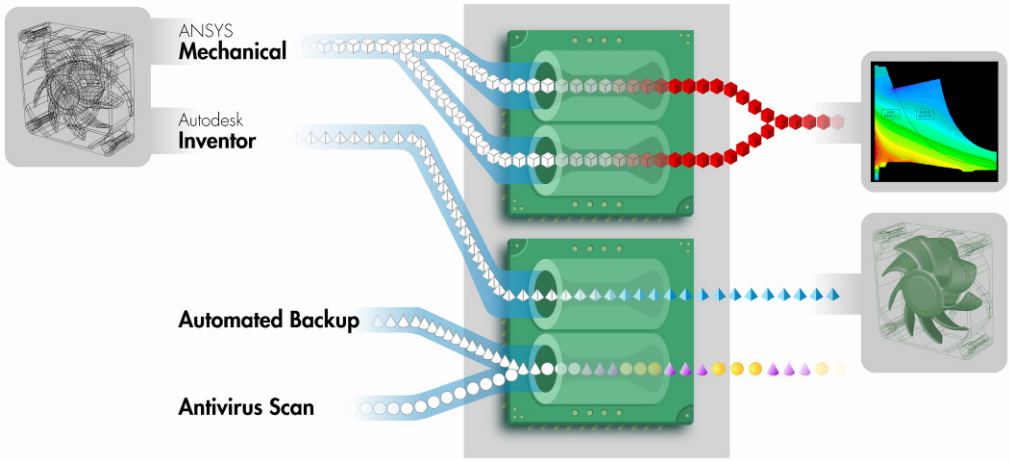
What is Multithreading?

Multithreading is the simultaneous operation of two or more execution threads for a single application. Operating systems and applications that are multithreaded support simultaneous processing and accomplish tasks more quickly. Multi-core and multiple processor systems enable multithreading, speed up application processes, and improve productivity.

What is Multi-core Processing?

A multi-core processor contains two or more independent processing units on a single circuit or die. The processing units share the system bus interface and Level 2 cache. Multi-core processors are available currently in dual-core[1] and quad-core configurations. When a workstation has two dual-core processors, it is almost like having four computers in one.[2]

Figure 1. Application threading with a dual-core, dual processor system

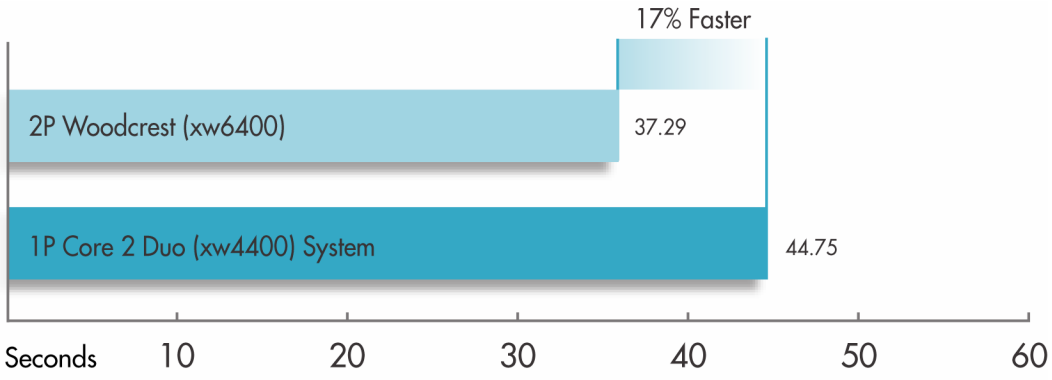


The data analysis process is divided into two threads and executed simultaneously by two cores on one of the processors. At the same time, the rendering process is executed by one of the cores on the other processor. The second core on the second processor handles routine background operations such as automated backup and antivirus scanning. Operations are completed simultaneously, for faster application response.

Productive Results

Using typical MCAD/AEC application scenarios, HP tested the change in throughput and breadth of multi-tasking applications with a second dual-core processor. When performing typical AutoCAD tasks, the 5100-series Xeon outperformed the Core 2 Duo by 17%.[3]

Figure 2. AutoCAD (2D) architectural application performance for section-cut completed and closed



5100-series Xeon Advantages

In addition to significant performance gains from second processors, the xw6400 and xw8400 workstations offer the following technical advantages of the 5100-series Intel® Xeon® architecture over the Intel® Core™ 2 Duo processor in the xw4400:

	Core 2 Duo	5100-series Xeon
bus speed	up to 1066 MHz FSB	up to 1333 MHz FSB
memory	up to 4 GB DDR2-667 ECC	up to 32 GB DDR2-667 ECC FBD
acceleration technology	no	yes
number of processors	1	1 or 2[4]

The 5100-series Xeon architecture provides the following benefits for productivity:

- New, dual-independent buses between processors and chipset at up to 1333MHz accelerate throughput and response.
- Up to 32 GB of memory capacity allows you to process larger data sets for faster solutions to complex problems.
- Fully buffered DIMM technology enhances system throughput for faster access and more reliable memory performance.
- Intel I/O Acceleration Technology can improve network throughput by up to 30% and deliver data faster.

Quad-Core Considerations

After reading this white paper, you may be wondering how the new quad-core processors compare to dual-core processors. Certainly, four cores would seem to better than two. While preliminary tests have shown quad-core performance gains for highly multithreaded applications (like CAE), some CAD (such as MCAD) applications are single-threaded and do not take advantage of the multiple cores. Because the fastest current quad-core processor is 10% slower than the fastest dual-core processor, users with primarily single-threaded applications will notice better performance with dual-core processors. HP recommends you check with your software vendors or HP to find the best configuration for your environment.

Summary

If you are deciding between HP workstation platforms for your MCAD/AEC workplace, consider the performance advantages that a second processor can offer. The xw6400 and xw8400 platforms provide dual-processor capabilities based on the Intel 5100-series Xeon architecture. In preliminary tests using typical MCAD/AEC application operations, HP found performance gains of 17% over single-processor xw4400 systems. With a dual-processor workstation from HP, your productivity is future-proof.

For more information, visit www.hp.com/go/workstations/

Notes

[1] Dual Core is a new technology designed to improve performance of multithreaded software products and hardware-aware multitasking operation systems and may require appropriate operating system software for full benefit. Check with software providers to determine suitability. Not all customers or software applications will necessarily benefit from the use of this technology.

[2] While dual-core processors technically have the same computing power as two equivalent single-core processors, some of the processing power of dual-core processors is reserved for managing communications between the two cores.

[3] The xw4400 test configuration consisted of (1) Core™ 2 Duo 2.67 GHz processor with a 15 K SAS hard drive. The xw6400 test configuration consisted of (2) 5100-series Xeon® 3.0 GHz processors with a 10 K SATA hard drive. The test case involved exiting from a section cut view in Autodesk® Architectural Desktop while performing typical operations in Microsoft® Office applications. Test results were scaled to best-in-class processor speeds.

[4] The xw6400 and xw8400 workstations can be configured with one or two processors, allowing you to move up to a dual-processor configuration at a later date without having to replace the workstation.

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March 2007

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