Breakthrough Performance for Your Highly-Parallel Applications

Extracting extreme performance from highly-parallel applications just got easier—much easier. The Intel® Xeon Phi™ coprocessor 5110P, based on Intel® Many Integrated Core (MIC) architecture, complements the industry-leading performance and energy-efficiency of the Intel® Xeon® processor E5 family to enable dramatic performance gains for some of today’s most demanding applications. You can now achieve optimized performance for even your most highly-parallel technical computing workloads, while maintaining a unified hardware and software environment.¹

Intel® Xeon Phi™ Coprocessor 5110P

Key Specifications:
- Up to 1 teraflops double-precision performance¹,³
- Exceptional performance-per-watt for highly parallel workloads
- Single programming model for all your code
- Flexible usage models to maximize your investment

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—Dan Stanzione, Deputy Director at Texas Advanced Computing Center

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A Single Programming Model for All Your Code

A wide assortment of programming languages, models, and tools support Intel architecture and all of them can be used with both Intel Xeon processors and Intel Xeon Phi coprocessors. Applications that run on one processor family will run on the other. This uniformity can greatly reduce the complexity of developing, optimizing, and maintaining your software code. Existing applications will need to be tuned and recompiled for parallelism to maximize throughput, but your developers won’t need to rethink the entire problem and they won’t need to master new tools and proprietary programming models. Instead, they can reuse existing code and maintain a common code base using familiar tools and methods.

Code can be optimized just once for both Intel Xeon processors and Intel Xeon Phi coprocessors. The same techniques—such as scaling applications to many cores and threads, blocking data for hierarchical memory and caches, and effective use of SIMD—deliver optimal performance for both processor and coprocessor families. The investment you make in parallelizing your code will deliver benefits across the full range of computing environments.

Even Higher Efficiency for Parallel Processing

While the Intel Xeon processor E5 family remains the preferred choice for the majority of applications, Intel Xeon Phi coprocessors provide more efficient performance for highly-parallel applications. They include many more and smaller cores, many more threads, and wider vector units. The high degree of parallelism compensates for the lower speed of each individual core to deliver higher aggregate performance for workloads that can be subdivided into a sufficiently large number of simultaneous tasks. You can use Intel Xeon processors and Intel Xeon Phi coprocessors together to optimize performance for almost any workload. Because both processor and coprocessor support the same software code and programming models, your developers won’t have to reinvent the wheel to deliver optimized performance.
Flexible Execution Models
Optimized performance for all workloads

Flexible Usage Models to Maximize Your Investment

The Intel Xeon Phi coprocessor is designed to provide the highest level of flexibility in conjunction with Intel Xeon processor-based systems and clusters. It can operate under the host server’s operating system (OS), in which case the OS and application run on the Intel Xeon processors and highly-parallel code segments are off-loaded to the Intel Xeon Phi coprocessor to accelerate performance. However, unlike a basic accelerator, the Intel Xeon Phi coprocessor can also function as an independent server node with its own Linux OS and IP address. In this scenario, it can run applications independently and it can off-load serial code segments (or moderately parallel code segments) to the host system so they perform more quickly and efficiently. The flexibility provided by these new and exclusive usage models is illustrated in Figure 1.

A single Intel Xeon Phi coprocessor provides up to 60 cores and 240 threads and can deliver up to a teraflop of double-precision performance for targeted applications. These coprocessors are manufactured using Intel’s industry-leading 22 nm technology to provide exceptional compute density and energy efficiency and they feature the world’s first 3-D Tri-Gate transistors. The Intel Xeon Phi coprocessor 5110P comes in a standard PCIe x16 form factor that can be added to a supported Intel® Xeon® processor-based server. Up to eight cards can be used with a single two-socket host server to scale parallel processing capability.

Figure 1. Computing model comparison.
Driving Supercomputing to New Heights
Some of today’s most successful high-performance computing centers are already using Intel Xeon Phi coprocessors to deliver massive new parallel computing capability.

- The Texas Advanced Computing Center will soon launch a 10 petaflop supercomputer that will include thousands of Intel Xeon Phi coprocessors.

- The DEEP project is using the Intel Xeon processor E5 family and Intel Xeon Phi coprocessors as the foundation for “an exascale-enabling supercomputing platform.”

- Intel built a small prototype cluster using Intel Xeon Phi coprocessors that ranked as the 150th largest supercomputer in the world.

Is Intel® Xeon Phi™ Coprocessor Right for Me?
While a majority of applications will achieve maximum performance running on Intel Xeon processors, certain highly-parallel applications will benefit dramatically by using Intel Xeon Phi coprocessors. To qualify as highly-parallel, an application must scale well to over one-hundred threads, and either make extensive use of vectors or efficiently use more local memory bandwidth than is available on an Intel Xeon processor. Intel has many software tools to help optimize your code and determine whether your application is best suited for Intel Xeon Phi coprocessors. Learn more at intel.com/software/products.

Learn more at intel.com/xeonphi

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