Intel® Parallel Studio XE 2015

Product Brief

Create faster code faster with this comprehensive parallel software development suite.

- **Faster code:** Boost applications performance that scales on today's and next-gen processors
- **Create code faster:** Utilize a toolset that simplifies creating fast, reliable parallel code

What's New

- Performance boost using explicit vectorization and optimization reports
- Expanded standards support for OpenMP 4.0, MPI 3.0, Full C++ 2011, Full Fortran 2003 support and Fortran 2008 BLOCK support
- Faster thread debugging and expanded performance profiling

Deliver top application performance and reliability with Intel® Parallel Studio XE. This C++ and Fortran tool suite simplifies the development, debug, and tuning of code that helps you utilize parallel processing to boost application performance. Get more performance with less effort on compatible Intel® processors and coprocessors.

Intel® Parallel Studio XE comes in three editions based on your development needs.

- **Composer Edition** includes compilers, performance libraries, and parallel models optimized to build fast parallel code.
- **Professional Edition** includes everything in the Composer edition. It adds performance profiler, threading design/prototyping, and memory & thread debugger to design, build, debug and tune fast parallel code.
- **Cluster Edition** includes everything in the Professional edition. It adds a MPI cluster communications library, along with MPI error checking and tuning to design, build, debug and tune fast parallel code that includes MPI.

	Intel® Parallel Studio XE Composer Edition[1]	Intel® Parallel Studio XE Professional Edition[1]	Intel® Parallel Studio XE Cluster Edition
Intel® C++ Compiler	√	√	√
Intel® Fortran Compiler	√	√	√
Intel® Threading Building Blocks (C++ only)	√	√	√
Intel® Integrated Performance Primitives (C++ only)	√	√	√
Intel® Math Kernel Library	√	√	√
Intel® Cilk™ Plus (C++ only)	√	√	√
Intel® OpenMP*	√	√	√
Rogue Wave IMSL* Library[2] (Fortran only)	Bundled and Add-on	Add-on	Add-on
Intel® Advisor XE		√	√
Intel® Inspector XE		√	√
Intel® VTune™ Amplifier XE[3]		√	√
Intel® MPI Library[3]			√
Intel® Trace Analyzer and Collector			√
Operating System (Development Environment)	Windows* (Visual Studio*) Linux* (GNU) OS X*[4] (XCode*)	Windows (Visual Studio) Linux (GNU)	Windows (Visual Studio) Linux (GNU)

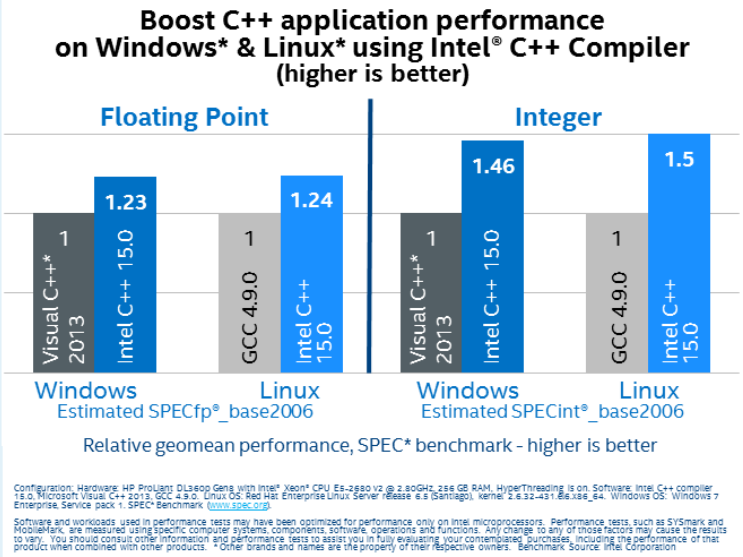
Notes:
1. Available with a single language (C++ or Fortran) or both languages.
2. Available as an add-on to any Windows Fortran* suite or bundled with a version of the Composer Edition.
3. Available bundled in a suite or standalone
4. Available as single language suites on OS X.

Intel® Parallel Studio XE

Composer Edition

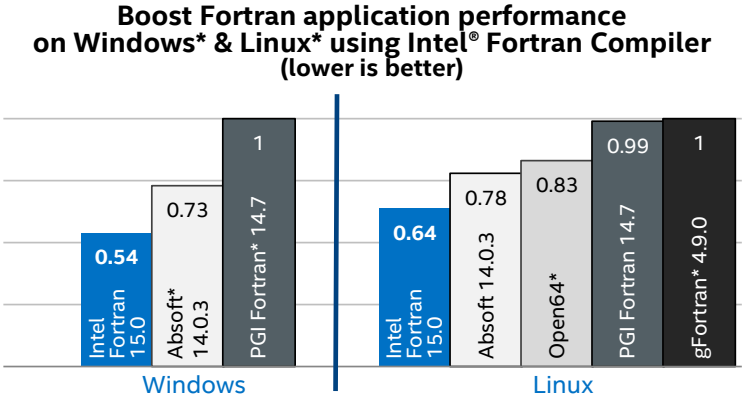
- Industry-leading C++ and Fortran compilers can yield better performance with a simple recompile
- Simplify adding parallelism with built-in, intuitive parallel models and vectorization support
- Advanced libraries are optimized for the latest hardware and drop right into your code

Ingredients	Details
C/C++ Compiler Intel® C++ Compiler	▪ Industry-leading C and C++ application performance ▪ Advanced parallel models built in with Intel® Cilk™ Plus and OpenMP* support
Fortran Compiler Intel® Fortran Compiler	▪ Industry-leading Fortran application performance ▪ Extensive support for Fortran standards, OpenMP*, and more



Configuration: Hardware: HP ProLiant DL380p Gen8 with Intel® Xeon® CPU E5-2680 v2 @ 2.80GHz, 256 GB RAM. HyperThreading is on. Software: Intel C++ compiler 15.0, Microsoft Visual C++ 2013, GCC 4.9.0. Linux OS: Red Hat Enterprise Linux Server release 6.5 (Santiago), kernel 2.6.32-431.el6.x86_64. Windows OS: Windows 7 Enterprise, Service pack 1. SPEC® Benchmark (www.spec.org).

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. * Other brands and names are the property of their respective owners. Benchmark Source: Intel Corporation



Configuration: Hardware: Intel® Core™ i7-4770K CPU @ 3.50GHz, HyperThreading is off, 16 GB RAM. . Software: Intel Fortran compiler 15.0, Absoft*14.0.3,, PGI Fortran* 14.7, Open64*, gFortran* 4.9.0. Linux OS: Red Hat Enterprise Linux Server release 6.4 (Santiago), kernel 2.6.32-358.el6.x86_64. Windows OS: Windows 7 Enterprise, Service pack 1. Polyhedron Fortran Benchmark (www.polyhedron.com). Windows compiler switches: Absoft: -m64 -O5 -speed_math=10 -fast_math -march=core -xINTEGER -stack:0x80000000. Intel* Fortran compiler: /fast /Qparallel /link /stack:64000000. PGI Fortran: -fastsse -Munroll=n:4 -Mipa=fast,inline -Mconcur=numa. Linux compiler switches: Absoft -m64 -mavx -O5 -speed_math=10 -march=core -xINTEGER. Gfortran: -Ofast -mfpmath=sse -flto -march=native -funroll-loops -ftree-parallelize-loops=4. Intel Fortran compiler: -fast –parallel. PGI Fortran: -fast -Mipa=fast,inline -Msmartalloc -Mfprelaxed -Mstack_arrays -Mconcur=bind. Open64: -march=bdver1 -mavx -mno-fma4 -Ofast -mso –apo.

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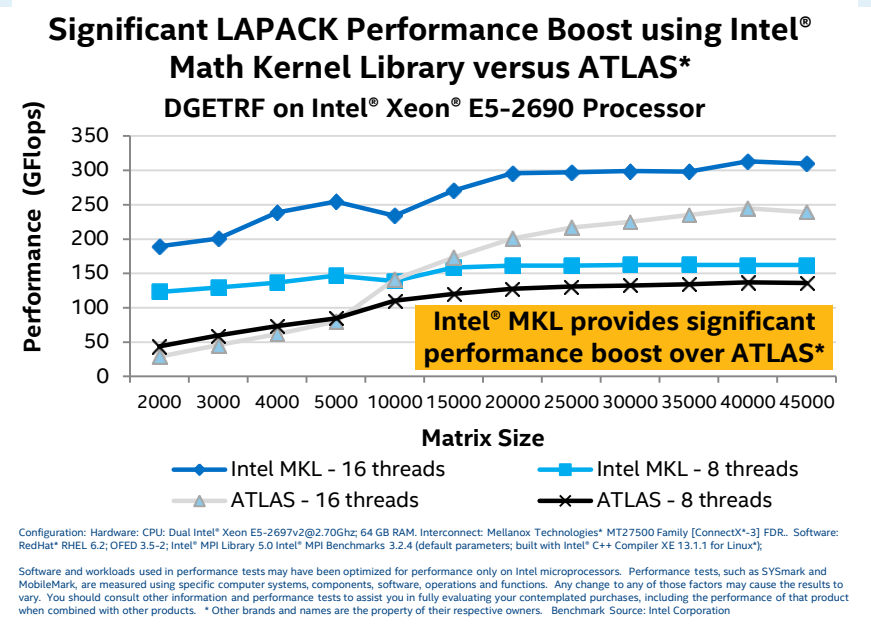
Intel® Parallel Studio XE

Composer Edition

Ingredients continued	Details
Standards-based Parallel Model Intel® OpenMP	▪ Implement scalable vector and task parallelism using OpenMP 4.0 standard. ▪ Compatible with all C, C++, and Fortran compilers using standard APIs for simple code integration
Simplified Parallel Model Intel® Cilk™ Plus	▪ The simplest way to add scalable vector and task parallelism—using only three keywords ▪ The runtime system scales smoothly on systems with hundreds of cores
Math Library Intel® Math Kernel Library	▪ C, C++, and Fortran compatible math library that uses standard APIs for drop-in code integration ▪ Highly vectorized and threaded linear algebra, Fast Fourier Transforms (FFT), vector math, and statistics functions
Threading library Intel® Threading Building Blocks	▪ Widely used C++ template library for task parallelism to efficiently implement higher-level, task-based parallelism ▪ Compatible with multiple compilers and portable to various operating systems
Data and media library Intel® Integrated Performance Primitives	▪ C++ library of software functions for multimedia processing, data processing, and communications applications ▪ Supports Windows*, Linux*, Android*, and OS X* environments
Numerical analysis Rogue Wave IMSL* Library	▪ Numerical analysis functions for Fortran applications with a comprehensive set of 1000+ mathematics and statistics algorithms ▪ Available as an add-on for any Fortran suite or included with a Composer Edition



Configuration: Hardware: CPU: Dual Intel® Xeon E5-2697v2@2.70Ghz; 64 GB RAM. Interconnect: Mellanox Technologies* MT27500 Family [ConnectX*-3] FDR.. Software: RedHat* RHEL 6.2; OFED 3.5-2; Intel® MPI Library 5.0 Intel® MPI Benchmarks 3.2.4 (default parameters; built with Intel® C++ Compiler XE 13.1.1 for Linux*);

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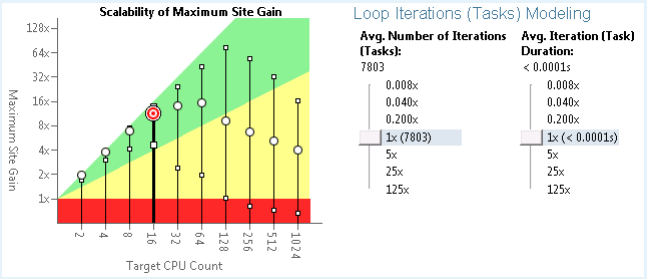
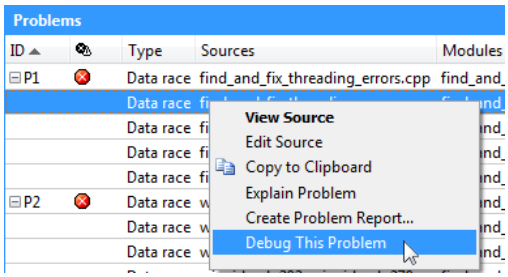
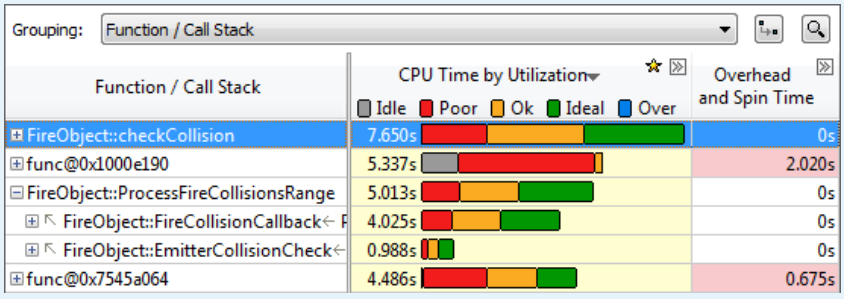
Intel® Parallel Studio XE

Professional Edition

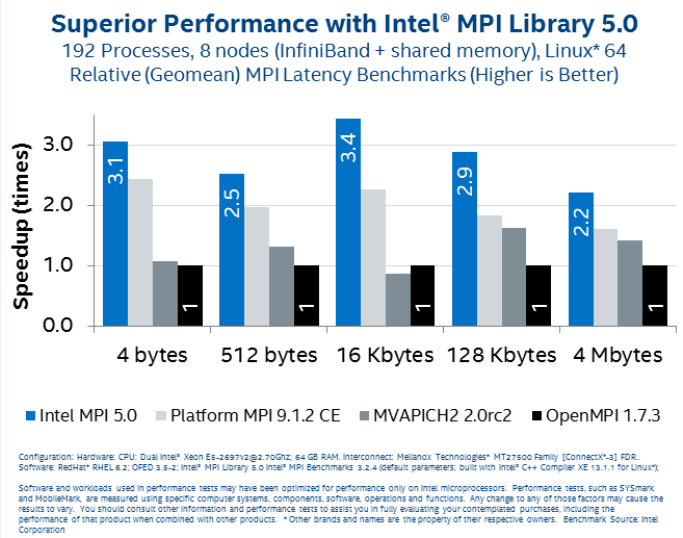
- Includes everything that's in the Composer edition
- It adds advanced tuning capability, threading design/prototyping and memory and thread debugging.
- Design, build, debug and tune fast, scalable parallel code using threading and vectorization.

Ingredients	Details
Composer Edition, plus:	
Threading Design & Prototyping Intel® Advisor XE	▪ Analyze, design, tune, and check your threading design before implementation ▪ Explore and test threading options without disrupting normal development ▪ Predict thread errors and performance scaling on systems with more cores like Intel® Xeon and Xeon Phi™ architecture. 
Memory & Thread Debugger Intel® Inspector XE	▪ Quickly find memory leaks and memory allocation errors ▪ Locate difficult-to-find threading errors like data races and deadlocks ▪ Detect out of bounds accesses and dangling pointers 
Performance Profiler Intel® VTune™ Amplifier XE	▪ Premier performance profiler for C, C++, C#, Fortran, Assembly, and Java* ▪ Low-overhead CPU, GPU, and thread profiling ▪ Profiles Windows* and Linux* applications 

Intel® Parallel Studio XE

Cluster Edition

- Includes everything that's in the Professional edition
- It adds multi-fabric MPI library and advanced MPI error checking and profiling
- Design, build, debug and tune fast, scalable parallel code using threading, vectorization and MPI.

Ingredients	Details
	Professional Edition, plus:
Message Passing Interface Library Intel® MPI Library	▪ Makes applications perform better on Intel® architecture-based clusters with multiple fabric flexibility ▪ Full hybrid support for multicore and many-core systems ▪ Sustained scalability: low latencies, higher bandwidth, and increased processes 
MPI Debug and Tune Intel® Trace Analyzer and Collector	▪ Profile MPI applications to quickly find bottlenecks, and achieve high-performance for parallel cluster applications ▪ Powerful MPI communications profiling and analysis ▪ Scalable: low overhead and effective visualization

Specs at a Glance

Processors	Supports multiple generations of Intel® and compatible processors including, but not limited to, Intel® Core™ processors, Intel® Xeon™ processors, and Intel® Xeon Phi™ coprocessors
Languages	Compatible with compilers from Microsoft, GCC, Intel. C, C++, C#, Fortran, Java*, ASM
Operating Systems	Windows*, Linux* and OS X*[1]
Development Environment	Windows: Integrates into Microsoft Visual Studio* 2010, 2012, and 2013 Linux*: Compatible with GNU tools OS X*: XCode*
System Requirements	Find hardware and software requirements at: www.intel.com/software/products/systemrequirements/

1. OS X developers can choose between the C++ or Fortran version of the Composer edition

Optimization Notice

Notice revision #20110804

Intel's compilers may or may not optimize to the same degree for non-Intel microprocessors for optimizations that are not unique to Intel microprocessors. These optimizations include SSE2, SSE3, and SSSE3 instruction sets and other optimizations. Intel does not guarantee the availability, functionality, or effectiveness of any optimization on microprocessors not manufactured by Intel. Microprocessor-dependent optimizations in this product are intended for use with Intel microprocessors. Certain optimizations not specific to Intel microarchitecture are reserved for Intel microprocessors. Please refer to the applicable product User and Reference Guides for more information regarding the specific instruction sets covered by this notice.

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