INTEL® FORTRAN COMPILER PLUS
INTEL® MATH KERNEL LIBRARY

Intel® Fortran Composer XE 2013

Product Brief

Key Features

- Leadership Application Performance
- Powerful Parallelism Models Simplify Multicore Support
- Industry-leading Intel® MKL math library
- Full source compatibility with Compaq Visual Fortran* compiler

"[Intel Fortran] is stable and offers outstanding performance. We are a small company but big proponents of Intel Fortran!"

Warner Weiss, Manager, Sugars, Int'l LLC

"Intel® Fortran performs beautifully..."

Peter Hahn, Adjunct Assoc. Professor, University of Pennsylvania

Intel Fortran Composer XE is also included in the following suites:

- Intel® Parallel Studio XE
- Intel® Fortran Studio XE (Linux)
- Intel® Visual Fortran Studio XE (Windows)
- Intel® Cluster Studio XE

OS Support:

- Windows*
- Linux*
- OS X*

Great Application Performance, Serial and Parallel

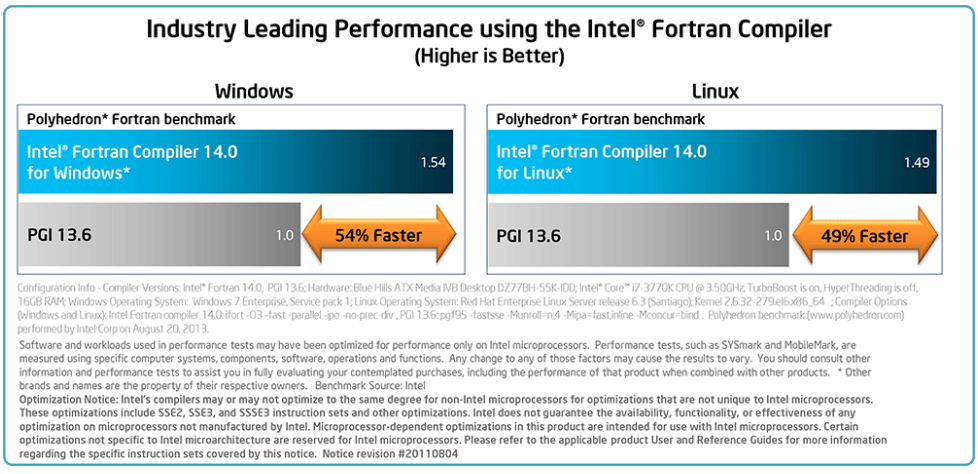
Intel Visual Fortran Composer XE 2013 SP1 (Windows*) and Intel® Fortran Composer XE 2013 SP1 (Linux*, OS X*) include Intel Fortran and Intel® Math Kernel Library (Intel® MKL) to help you deliver outstanding application performance on systems using Intel® Core™ or Xeon® processors, and compatible processors, and Intel® Xeon Phi™ coprocessors.

It features compiler-based innovations in vectorization, parallel programming and standards-support to simplify development of performance-oriented Fortran applications. Among these are added support for Fortran 2003, Fortran 2008 and OpenMP* 4.0. And on Windows, it continues to feature full source code compatibility with Compaq Visual Fortran*. For developers on Windows not already using Visual Studio*, Visual Fortran Composer XE includes the Microsoft* Visual Studio* 2010 Shell* so you have a choice of command-line or IDE-based development.

Intel® Math Kernel Library is also included, offering you highly optimized, threaded, specialized functions that speed development and accelerate application performance. Functions in Intel® MKL support Intel® Advanced Vector Extensions (AVX.) This gives you faster floating point operations in mathematical domains such as linear algebra, vector math and vector statistics.

Performance, compatibility and innovative, easy-to-use parallelism capabilities make Intel Fortran Composer XE a powerful and productive tool. Download an eval today and give it a try!

Attention Fortran developers also using C or C++: Intel® Composer XE includes everything above plus the Intel® C++ Compiler, with Intel® Cilk Plus, Intel® Threading Building Blocks, and Intel® Integrated Performance Primitives. It's a great package for developers who need Fortran and C/C++. Take advantage of significant savings compared to purchasing individual components. It's available on Windows and Linux. On Windows, use of this suite requires that you have Microsoft Visual Studio 2008, 2010, or 2012.



Configuration Info - Compiler Versions: Intel® Fortran 14.0, PGI 13.6; Hardware: Blue Hills ATX Media IVB Desktop DZ77BH-55K-IDD; Intel® Core™ i7-3770K CPU @ 3.50GHz, TurboBoost is on, HyperThreading is off, 16GB RAM; Windows Operating System: Windows 7 Enterprise, Service pack 1; Linux Operating System: Red Hat Enterprise Linux Server release 6.3 (Santiago); Kernel 2.6.32-279.el6.x86_64 ; Compiler Options (Windows and Linux): Intel Fortran compiler 14.0: ifort -O3 -fast -parallel -ipo -no-prec-div , PGI 13.6: pgf95 -fastsse -Munroll=n:4 -Mipa=fast,inline -Mconcur=bind . Polyhedron benchmark (www.polyhedron.com) performed by Intel Corp on August 20, 2013.

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

Optimization Notice: 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. Notice revision #20110804

Top Features

Example of Coarray Fortran

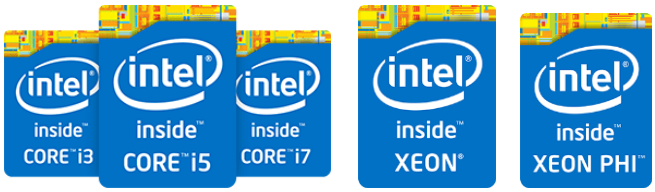
```
real, ALLOCATABLE :: grid(:,:)[:,:]
...
ALLOCATE(grid(0:N+1,0:M+1)[1:P,1:*])   ! with halo
...
SYNC ALL  !...wait for all iterations

grid(   0, 1:M) = grid(   N, 1:M)[north_P,me_Q] ! north
grid( N+1, 1:M) = grid(   1, 1:M)[south_P,me_Q] ! south
grid( 1:N, M+1) = grid( 1:N, 1  )[me_P, east_Q] ! east
grid( 1:N, 0  ) = grid( 1:N, M  )[me_P, west_Q] ! west
```

Intel® Fortran – Great Standards Supports

The compiler in Intel Fortran Composer XE 2013 offers great Fortran standards coverage, now with expanded support for Fortran 2003 and 2008 and full source code compatibility with Compaq Visual Fortran. On Windows and Linux, it includes support for coarray Fortran, providing support for multi-cpu shared-memory nodes. Cluster support is available in Intel® Cluster Studio XE product. The benefit is performance for your Fortran applications as they run on individual computers or clusters.

Intel® Fortran compiler supports Intel® Core® & Xeon® Processors and Intel® Xeon Phi™ Coprocessors



Intel Fortran supports Intel and compatible processors, including application offloading to Intel Xeon Phi coprocessors and the graphics processing units that are part of the Intel Core i3, i5 and i7 processors.

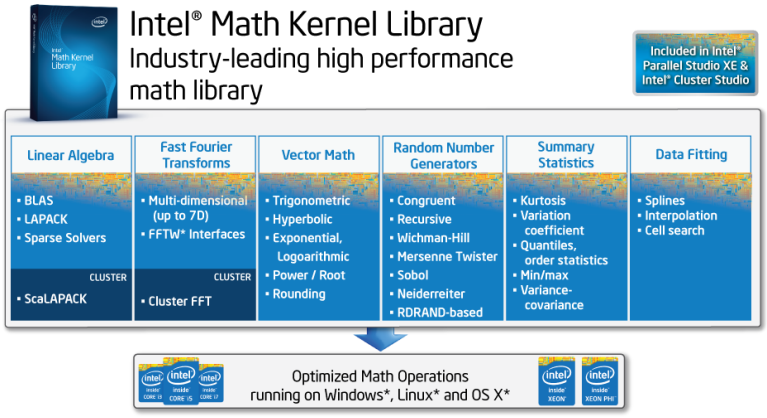
Vectorization, Parallelism Made Powerful

Intel Fortran, like Intel C++, includes support for three industry-leading vectorization and parallelism features associated with Intel Core Processors, Intel Xeon Processors and Intel Xeon Phi coprocessors.

First, the compiler automatically vectorizes and/or automatically parallelizes code for use on systems with Intel® Core™, Intel® Xeon, and compatible processors. These capabilities have been enhanced for broader applicability and improved application performance. And they support the wider vectors in the latest Intel Architecture processors.

Second, when a loop can't be vectorized, GAP – Guided Auto Parallelism can generate a report suggesting source code changes, use of pragmas, or use of compiler options. You remain in control in applying suggestions. In cases where you know your code well, GAP can offer great opportunities for performance improvement.

Third, Intel Fortran supports application development for Intel® Xeon Phi coprocessors using simple directives. Support is extended to Xeon Phi coprocessors hosted on Xeon-based systems using Linux and, new with SP1, Windows. The benefit? Choose your operating environment, maintain your existing programming model, and use of Fortran, to take advantage of outstanding application performance.



Intel® MKL – Optimization Made Even Easier

One of the easiest ways to take advantage of vectorization and threading is to make calls in your applications to the pre-optimized functions in the Intel® MKL. A wealth of routines is included to optimize math-intensive application performance. Applications using Intel® MKL functions automatically scale on previous, current and future processor architectures. Just re-link to the latest library version and your code is ready to take advantage of the latest processor features available.

Intel® MKL offers the highest-performing implementations of LAPaCK and BLAS linear algebra functions and are 100% compatible with these de facto industry standard APIs. Fast Fourier Transforms functions include FFTW*-compatible APIs to ease adoption. Additional routines include vectorized transcendental functions, random number generators for several probability distributions, convolution and correlation routines, and summary statistics functions.

The Rogue Wave* IMSL* Numerical Library for Intel Visual Fortran (Windows only) is also available. This leading library offers the largest collection of commercially-available math and statistical functions for science, technical, and business environments.

Take Comfort – Intel Fortran Composer XE is compatible with the way you work

Intel Visual Fortran Composer XE for Windows integrates into Microsoft Visual Studio* 2008, 2010 and 2012. For those who do not have Visual Studio, it includes the Microsoft Visual Studio 2010 Shell so you have a choice of command-line or IDE-based development. Intel Fortran Composer XE supports the gnu tool chain on leading Linux distributions and Mac OS X. Intel Visual Fortran Composer XE (Windows) and Intel Fortran Composer XE (Linux, OS X) supports all IA-32 and Intel 64 architectures, including the Intel Xeon Phi coprocessor, and includes one year of support. In addition, there's an active community of developers out there sharing their experiences on our Forums.

Take Advantage – Intel Fortran Composer XE supports standards and delivers application performance

Intel Fortran Composer XE 2011 supports performance-oriented industry standards, adding more support for Fortran 2003, Fortran 2008, and OpenMP* 4.0. Coarray support is provided for shared-memory systems and for large-scale compute-clusters with the Intel Fortran included in Intel® Cluster Studio XE 2013. Other Fortran 2008 features include CONTIGUOUS, I/O enhancements, and intrinsic functions, a set of which includes matrix multiply intrinsic functions that support calls into Intel MKL. Fortran 2003 support has also been enhanced, providing complete type-bound procedures such as GENERIC and OPERATOR. Support for Fortran 2003 features such as object-orientation, type-bound procedures and operators, and C++ interoperability continue to make it easier to develop mixed-language applications. Intel Fortran interacts nicely with new C99, C++ 03, and C++11 features that are supported in Intel® C++.

Intel continues to enhance proven compiler features such as the High-Performance Parallel Optimizer (HPO). This powerful capability combines vectorization, parallelization, and loop transformations in a single pass that is faster, more effective, and more reliable than individual, discrete phases. Intel Fortran also automatically vectorizes code for use on systems with conventional Intel® Xeon, Intel® Core, and compatible processors, and includes vectorization tools for applications targeting Intel Xeon Phi coprocessors. When the compiler can't vectorize for use on Intel Xeon and Intel Core processors, you can use Guided Auto-Parallelization (GAP) to get a report suggesting changes so your code will vectorize. Interprocedural optimization and profile-guided optimization continue to provide developers with opportunities to enhance performance by in-lining code and restructuring code based on workload, respectively. Performance is #1 at Intel.

Take it Easy – Intel Math Kernel Library keeps you productive and delivers application performance

With Intel Math Kernel Library, Intel Fortran Composer XE is a lot more than a compiler. It's a library of highly optimized, extensively threaded math routines, including BLAS, LAPACK, ScaLAPACK, sparse solvers, fast Fourier transforms vector math and much more. This library is designed to take full advantage of the wider vector units and growing number of cores on modern processors to deliver maximum scalable performance. Intel Fortran Composer XE ships with lots of sample code and tutorials to simplify development with examples and snippets.

Take a Test Drive – See for yourself how Intel Fortran Composer XE can help deliver application performance

Intel Fortran Composer XE 30-day evaluations are available for download from our web site (http://intel.ly/sw-tools-eval). You'll need a system with Visual Studio 2008, 2010 or 2012 for a Windows eval. For Linux, you'll need a system with the gnu tool chain. Check out the link above for more details. The download includes tutorials and lots of code samples, or you can jump right in using your own code. To join the community of your fellow Intel Fortran Composer XE developers, visit the Intel Software Network Forums (http://software.intel.com/en-us/forums/) or go to the Intel Fortran Composer XE web site (http://software.intel.com/en-us/articles/intel-composer-xe/) and click the support tab.

What's New

Feature	Benefit
Performance Leadership	Provide users of your software a level of performance not provided by other compilers and libraries.
Parallelism Tools and Methods	New with the SP1 release: enhanced support for Fortran 2003, Fortran 2008 and OpenMP* 4.0, and enhanced Linux-based application debugging for Intel Xeon Phi coprocessors. Get better performance faster.
Compatibility	With standards support, development environment compatibility, and compatibility with Compaq Visual Fortran, you can preserve the investment in your code, the knowledge you have in using the development environments, and deliver software with outstanding performance on systems with Intel and compatible processors.

Purchase Options: Language Specific Suites

Several suites are available combining the tools to build, verify and tune your application. The product covered in this product brief is highlighted in blue. Named-user or multi-user licenses along with volume, academic, and student discounts are available.

	Suites >>	Intel® Cluster Studio XE	Intel® Parallel Studio XE	Intel® C++ Studio XE	Intel® Fortran Studio XE	Intel® Composer XE	Intel® C++ Composer XE	Intel® Fortran Composer XE
Components	Intel® C / C++ Compiler	●	●	●		●	●	
	Intel® Fortran Compiler	●	●		●	●		●
	Intel® Integrated Performance Primitives[3]	●	●	●		●	●	
	Intel® Math Kernel Library[3]	●	●	●	●	●	●	●
	Intel® Cilk™ Plus	●	●	●		●	●	
	Intel® Threading Building Blocks	●	●	●		●	●	
	Intel® Inspector XE	●	●	●	●			
	Intel® VTune™ Amplifier XE	●	●	●	●			
	Intel® Advisor XE	●	●	●	●			
	Static Analysis	●	●	●	●			
	Intel® MPI Library	●						
	Intel® Trace Analyzer & Collector	●						
	Rogue Wave IMSL* Library[2]							●
	Operating System[1]	W, L	W, L	W, L	W, L	W, L	W, L, O	W, L, O

Note: [1] Operating System: W=Windows*, L= Linux*, O= OS X*. [2] Available in Intel® Visual Fortran Composer XE for Windows with IMSL*
[3] Not available individually on OS X, it is included in Intel® C++ & Fortran Composer XE suites for OS X

Technical Specifications

Technical Specifications	
Processor Support	Supports both genuine Intel® processors and compatible processors.
Operating Systems	Windows*, Linux* and OS X*
Programming Languages	Fortran
Compatibility	Designed to work with Microsoft development products and leading Linux distributions. It provides expanded 32-bit and 64-bit multicore processor support, including enhanced Intel® AVX support. The Intel Fortran Compiler continues to support established standards, such as Fortran 90, Fortran 77, and Fortran IV, near-complete support for Fortran 2003 and significant parts of Fortran 2008.
System Requirements	Intel Fortran Composer XE is available for IA-32 and Intel® 64 architecture and compatible platforms. For details on hardware and software requirements, please refer to: www.intel.com/software/products/systemrequirements/
Documentation, including Release Notes	[Current link: http://software.intel.com/en-us/articles/intel-fortran-composer-xe-documentation/]

Learn more about Intel Composer XE

- Click or enter the link below: http://intel.ly/composer-xe
- Or scan the QR code on the left

Download a free 30-day evaluation

- Click or enter the link below: http://intel.ly/sw-tools-eval
- Click on 'Compilers and Libraries' link

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.