Announcing
Intel® Parallel Studio XE 2011 Service Pack 1

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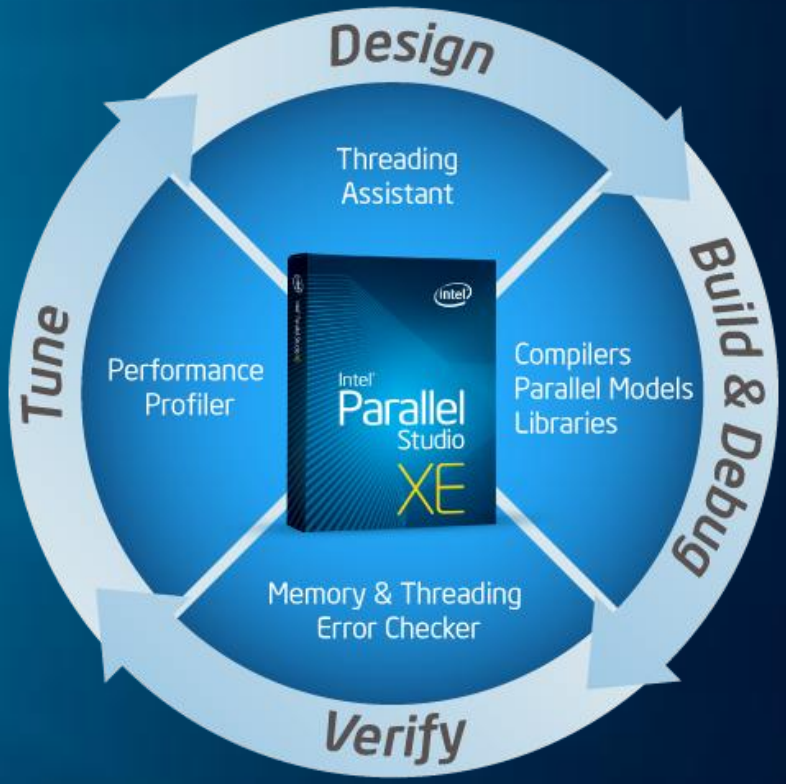
intel Software

Intel® Parallel Studio XE 2011 Service Pack 1

Intel continues to be the best choice for C/C++/Fortran development tools

- Performance
  - Updated compilers and libraries produce industry leading performance.
    - Up to 47% faster for C/C++ compiler, or more?
    - Up to 24% faster for Fortran compiler, or more?
  - Intel Compiler 12.1 is first compiler for IA to support IEEE 754-2008 standard, and high performance!
  - The most popular Analysis Tools[1] just got better
- Forward scaling
  - Intel® Threading Building Blocks 4.0, commercially supported. Code using TBB scales exceptionally well.
  - Intel® Cilk™ Plus v1.1 implemented with commercial support; simplifies going parallel
  - Advanced tools to develop code for Intel® Xeon® Processors (today), easily extends to Intel® MIC architecture (future)
- Tools that developers count on
  - Expanded standards support
    - OpenMP* 3.1
    - Leading support for key parts of the latest Fortran and C++ standards
  - Enhanced compatibility
    - Visual Studio* 2010 Shell for Visual Fortran*



[1] Evans Data Corp. North American Development Survey 2011 Volume I

Updated compilers and libraries produce industry leading performance

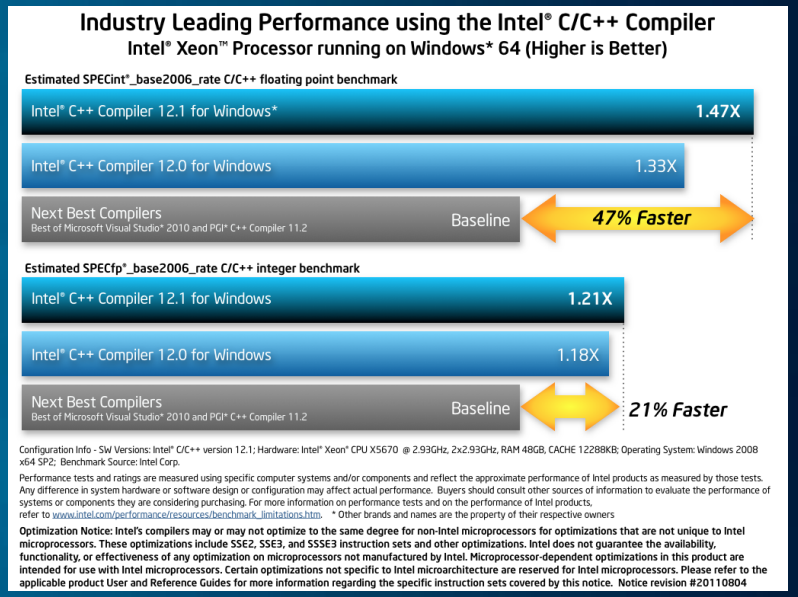
- Intel v12.1 compilers improve performance compared with:
  - Competitive compilers
  - Previous version Intel compilers

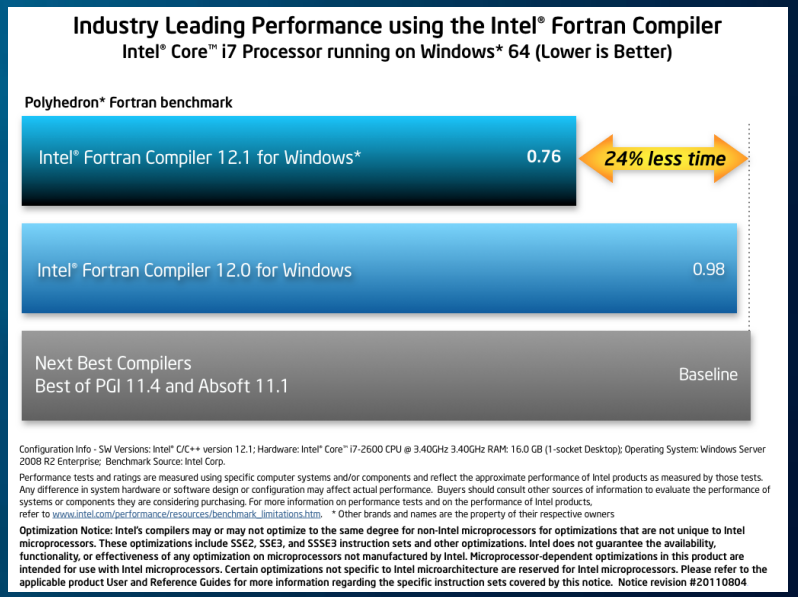
	Intel v12.1 Compiler on Windows* vs. nearest competitor	Intel v12.1 Compiler on Linux* vs. nearest competitor	Intel v12.1 Compiler on Windows vs. v12.0	Intel v12.1 Compiler on Linux vs. v12.0
C/C++ Integer[1]	47% faster	12% faster	11% faster	6% faster
C/C++ Floating Point[1]	21% faster	9% faster	3% faster	1% faster
Fortran[2]	24% faster	17% faster	22% faster	27% faster

Notes:

[1] C/C++ performance measured using SPECint®_base2006 estimated RATE benchmark running on a 64 bit operating system

[2] Fortran performance measured using Polyhedron* benchmark running on a 64 bit operating system. In this performance measurement, "faster" refers to percent reduction in time-to-completion.



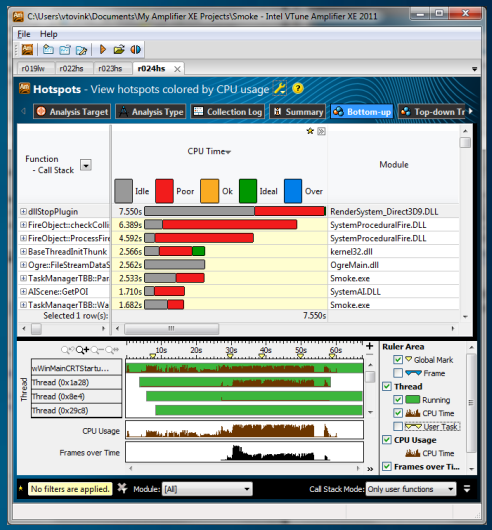


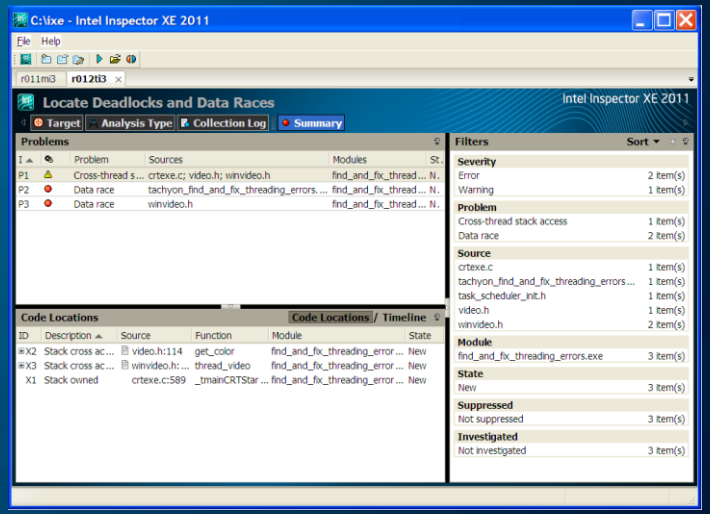
Intel Compiler 12.1 is first compiler for IA to support IEEE 754-2008 standard, and very high performance!

- First with IA conformance of both binary and decimal floating-point specs (radix-2 and radix-10)
  - IEEE Standard 754-2008 for Floating-Point Arithmetic
  - Technical Report ISO/IEC TR 24732, Extension for the programming language C to support decimal floating-point arithmetic

The most popular analysis tools[1] just got better

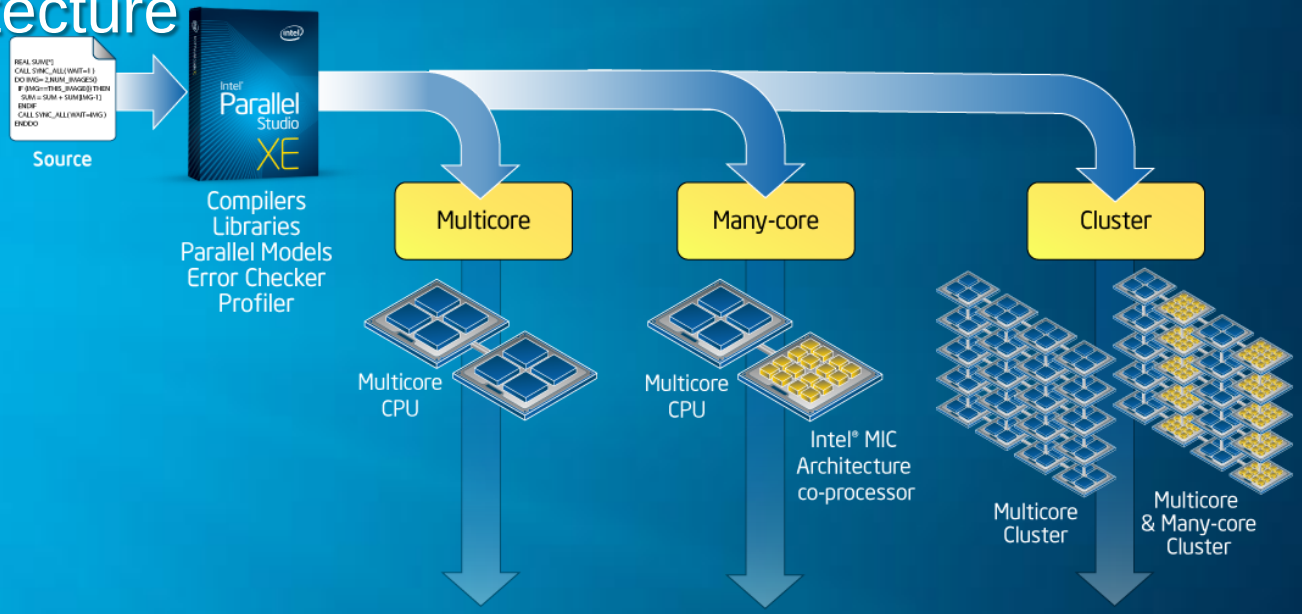
- Intel® VTune™ Amplifier XE
  - Attach to a running process is now available for both Windows* *and* Linux*
  - Project explorer for standalone version
    - Simplifies management and comparison of analysis results
- Intel® Inspector XE
  - Project explorer for standalone version
    - Simplifies management and comparison of analysis results
  - Improved performance for memory and thread checking





[1] EDC North American Development Survey 2011 Volume I

Advanced tools to develop code for Intel® Xeon® Processors today that easily extends to Intel® MIC architecture



KISTI www.kisti.re.kr

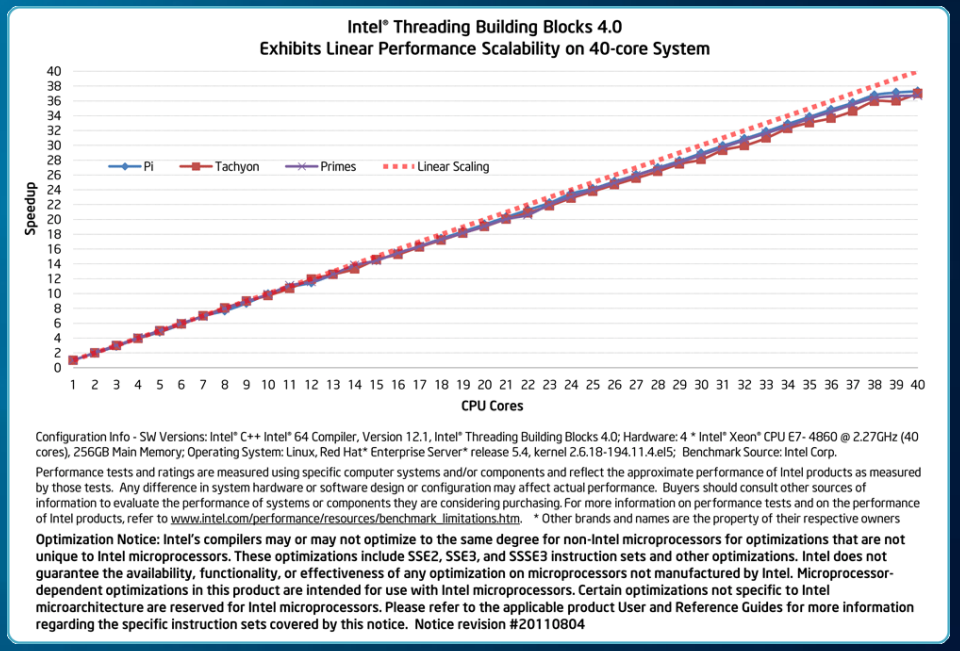
"By just utilizing standard programming on both Intel® Xeon processor and Intel® MIC architecture based platforms, the performance met multi-threading scalability expectations and we observed near-theoretical linear performance scaling with the number of threads." – *Hongsuk Yi, Heterogeneous Computing Team Leader, KISTI Supercomputing Center*

sgi

"SGI understands the significance of inter-processor communications, power, density and usability when architecting for exascale. Intel has made the leap towards exaflop computing with the introduction of Intel® Many Integrated Core (MIC) architecture. Future Intel® MIC products will satisfy all four of these priorities, especially with their expected ten times increase in compute density coupled with their familiar X86 programming environment." – *Dr. Eng Lim Goh, SGI CTO*

Intel® Threading Building Blocks 4.0, commercially supported code using TBB scales exceptionally well

- Flow Graph
  - API Extends applicability of Intel® TBB to event-driven/reactive programming models
- Concurrent Unordered Set
  - Thread-safe container to store and access user objects
- Memory Pools
  - Enables greater flexibility and performance by getting thread-safe and scalable object allocation
- Generic GCC* Atomics Support
  - Library portability enables development of Intel® TBB-based solutions on a broader range of platforms



Configuration Info - SW Versions: Intel® C++ Intel® 64 Compiler, Version 12.1, Intel® Threading Building Blocks 4.0; Hardware: 4 * Intel® Xeon® CPU E7- 4860 @ 2.27GHz (40 cores), 256GB Main Memory; Operating System: Linux, Red Hat* Enterprise Server* release 5.4, kernel 2.6.18-194.11.4.el5; Benchmark Source: Intel Corp.

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Intel® Cilk™ Plus v1.1 implemented with commercial support; simplifies going parallel

- Enhanced performance and utilization of future Intel CPU features
- SIMD pragma loops, vector length, and elemental functions support
- Mac OS* support

```
cilk_for (int i=0; i<n; ++i) {
  Foo(a[i]);
}
```

Parallel loops made easy

```
int fib(int n)
{
    if (n <= 2)
        return n;
    else {
        int x,y;
        x = fib(n-1);
        y = fib(n-2);
        return x+y;
    }
}
```

Turn serial code

```
int fib(int n)
{
    if (n <= 2)
        return n;
    else {
        int x,y;
        x = cilk_spawn fib(n-1);
        y = fib(n-2);
        cilk_sync;
        return x+y;
    }
}
```

Into parallel code

Open spec at: cilkplus.org

Tools that developers count on

"I use the Intel Fortran compiler in Intel® Fortran Composer XE, and I very much like the new Object Browser. It makes it much easier to navigate in modules that have many routines. The compiler is stable and offers outstanding performance. We are a small company but big proponents of Intel Fortran!"

Warner Weiss, Manager, Sugars International LLC

"Tried the latest Intel Cilk Plus and liked the lower overhead from using Intel Cilk Plus spawning compared to OpenMP* task. The concepts behind Cilk Plus – simplification of adding parallelism – is really great."

David Carver, Texas Advanced Computing Center
University of Texas at Austin

"The Intel tools provided an excellent return on investment. Intel® Parallel Inspector allowed the code to be validated as 'data race-free' on our validation suite, and Intel® Parallel Amplifier allows us to focus efforts on the hotspots."

Andrew Cunningham Technical Staff Member, ESI Group

"Standards support is important to us so I'm glad to see the extended Fortran 2003 support in the Intel® Fortran compiler that ships in Intel® Fortran Composer XE - and the Fortran 2008 additions are also welcome. We've found the Intel Fortran compiler to be stable and offer outstanding performance. Please keep the updates coming"

Simon Geard, Technical Lead, CAD Schroer UK Ltd.

"The new interface is a joy to use. Intel® Vtune™ Amplifier XE gives us precise, down-to-the-metal performance data that's invaluable for pinpointing hotspots and evaluating the effect of optimizations"

Daniel Schwarz, Performance Engineer Nik Software reference customer case study

"Using Intel TBB's new flow graph feature, we accomplished what was previously not possible, parallelize a very sizable task graph with thousands of interrelationships - all in about a week."

Robert Link, GCAM Project Scientist, Pacific Northwest National Laboratory

Tools that developers count on

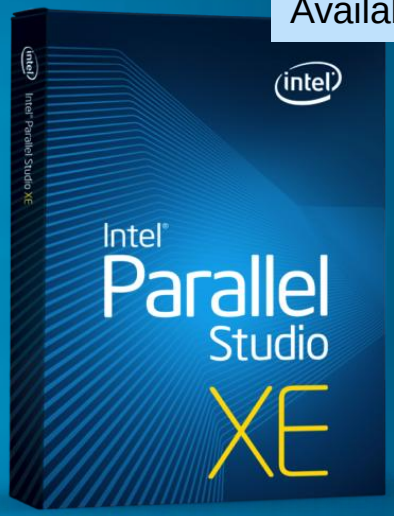
- Expanded standards support
  - OpenMP* 3.1
  - Key portions of the latest Fortran*and C++ standards
    - C++ Variadic templates
    - Lambda support
    - Fortran coarray support for distributed-memory systems
  - IEEE Standard 754-2008 for Floating-Point Arithmetic
- Enhanced compatibility
  - Visual Studio* 2010 Shell for Visual Fortran

"Especially liked the C++0x support in the Intel® C++ compilers, tested variadic templates function defaults and was happy to see the SFINAE for expressions'. For library writers, this is a very powerful feature and can greatly simplify the mess of template meta-programming."

Jesse Perla, PhD Candidate, New York University

Pricing and availability

Available Now!



Includes	C/C++ compiler	Fortran* compiler	For Linux*	For Windows*
Intel® Parallel Studio XE 2011 SP1	●	●	$2249	$1899
Intel® C++ Studio XE 2011 SP1	●		$1499	$1499
Intel® Fortran*Studio XE 2011 SP1		●	$1799	$1599
Intel® Visual Fortran Composer XE 2011 with IMSL* for Windows*		●	NA	$1699

Additional configurations including floating and academic are available at www.intel.com/software/products

Intel® Visual Fortran Composer XE 2011 with IMSL* for Windows*

- Same 12.1 compiler that is available separately
  - Highly optimizing Fortran compiler featuring scalable multi-threading with OpenMP, and introducing coarray Fortran (part of the Fortran 2008 standard), including new parallelism models
  - VAX Fortran and Compaq Visual Fortran compatibility
  - In addition to IMSL, it includes Intel® Math Kernel Library (Intel® MKL)
- Rogue Wave IMSL* 6.0 Math Library highlights
  - Over 1,000 mathematical and statistical algorithms for developers of Fortran applications
  - Support for shared memory and distributed memory computing environments
  - High performance linear programming optimizer
  - ScaLAPACK integration for MPI, LAPACK integration for SMP
  - New probability density functions and inverses
  - Time series and forecasting additions
  - New Deployment Licensing terms and pricing

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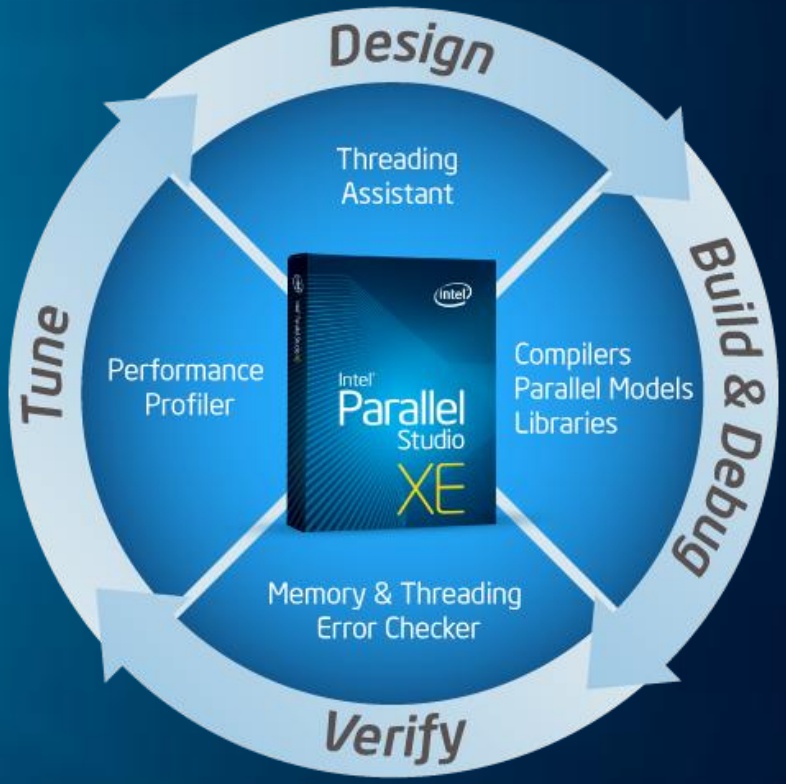

[1] Evans Data Corp. North American Development Survey 2011 Volume I

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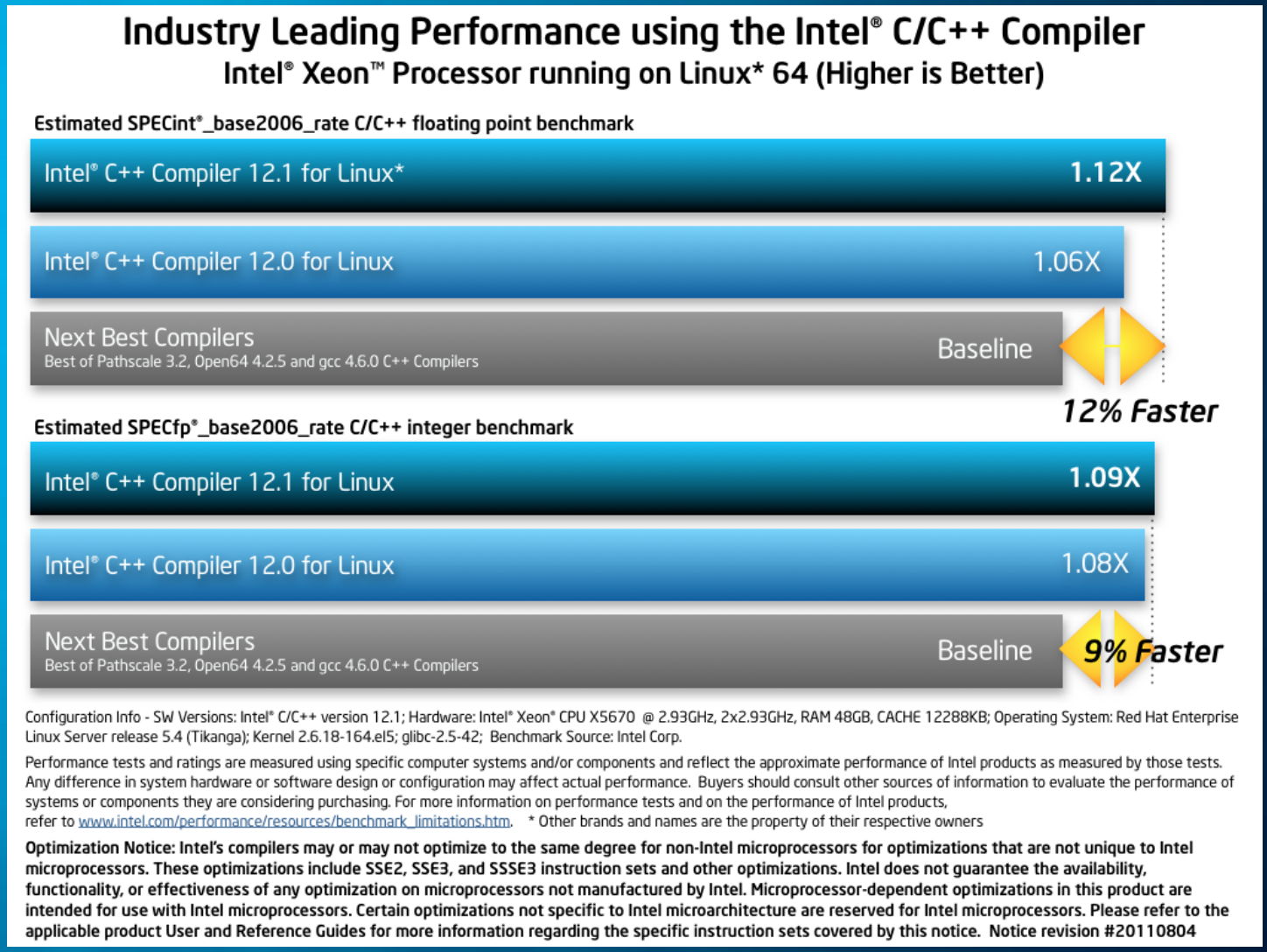
Notice revision #20110804

Benchmarks

For an Intel processor on Linux* 64, Intel Compilers (new and old) vs. best of Pathscale*, Open64* and GCC



Configuration Info - SW Versions: Intel® C/C++ version 12.1; Hardware: Intel® Xeon® CPU X5670 @ 2.93GHz, 2x2.93GHz, RAM 48GB, CACHE 12288KB; Operating System: Red Hat Enterprise Linux Server release 5.4 (Tikanga); Kernel 2.6.18-164.el5; glibc-2.5-42; Benchmark Source: Intel Corp.

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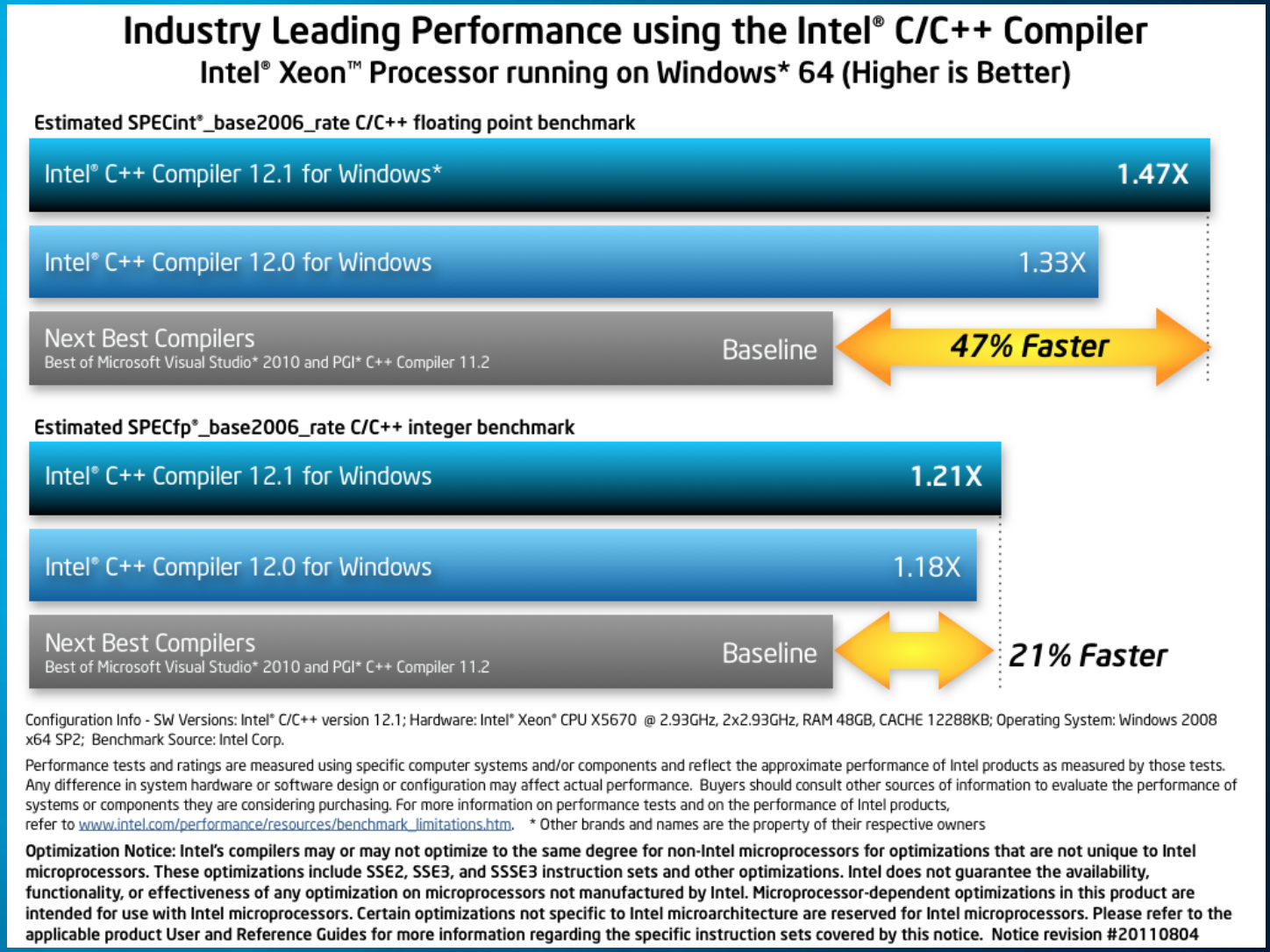
For an Intel processor on Windows* 64, Intel Compilers (new and old) vs. best of Microsoft & PGI



Configuration Info - SW Versions: Intel® C/C++ version 12.1; Hardware: Intel® Xeon® CPU X5670 @ 2.93GHz, 2x2.93GHz, RAM 48GB, CACHE 12288KB; Operating System: Windows 2008 x64 SP2; Benchmark Source: Intel Corp.

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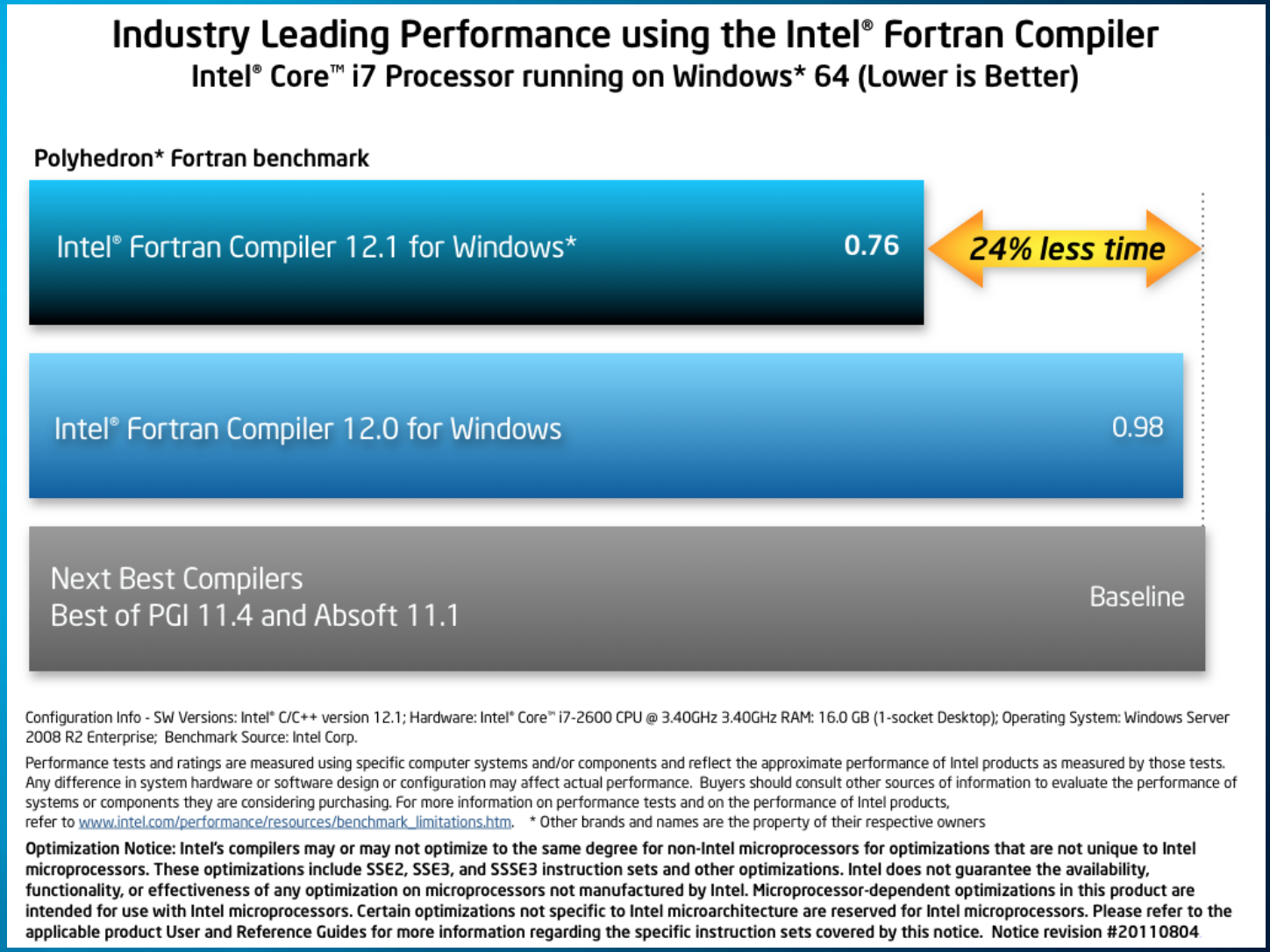
For an Intel processor on Windows* 64, Intel Compilers (new and old) vs. best of PGI and Absoft



Configuration Info - SW Versions: Intel® C/C++ version 12.1; Hardware: Intel® Core™ i7-2600 CPU @ 3.40GHz 3.40GHz RAM: 16.0 GB (1-socket Desktop); Operating System: Windows Server 2008 R2 Enterprise; Benchmark Source: Intel Corp.

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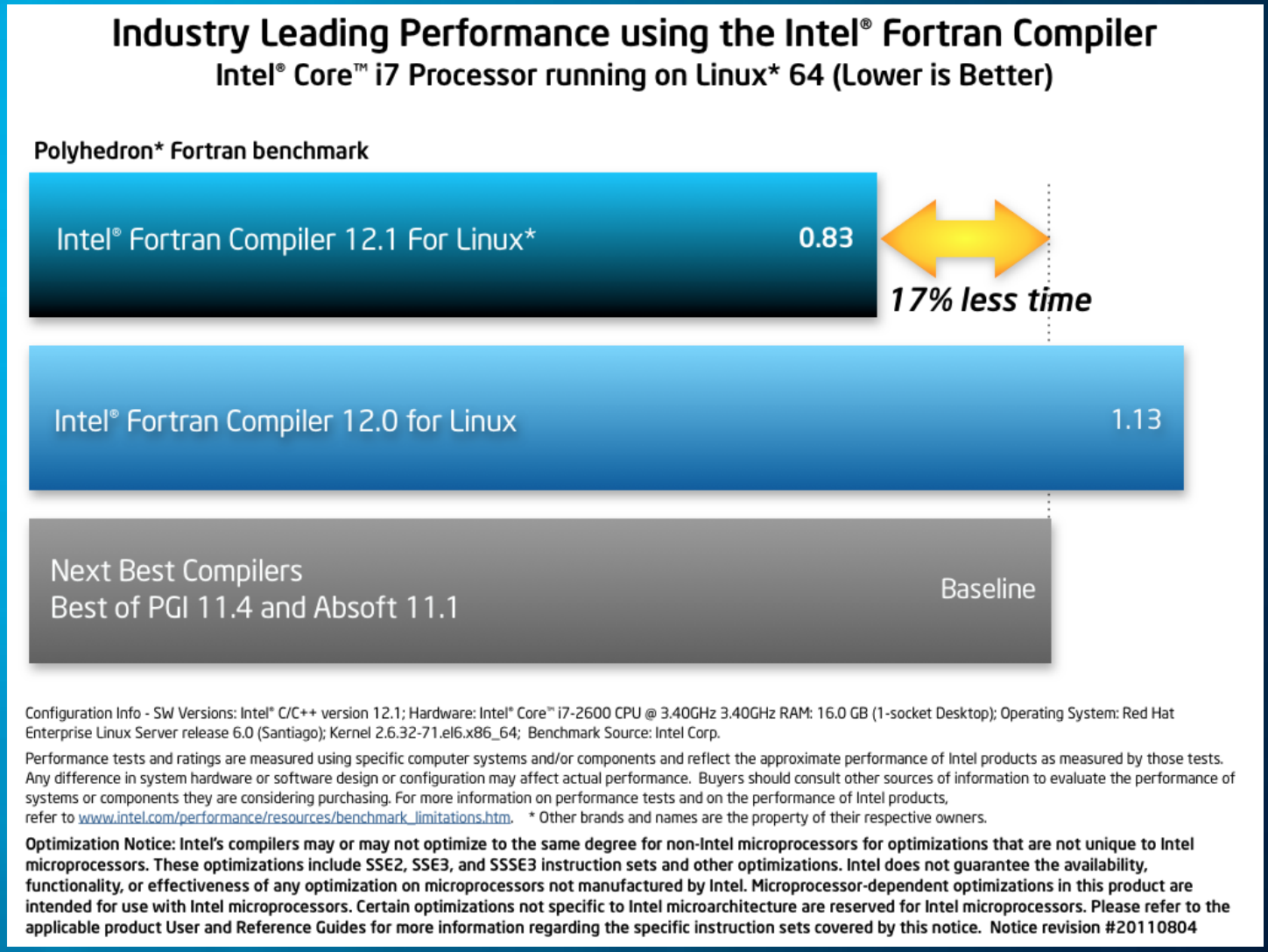
For an Intel processor on Linux* 64, Intel Compilers (new and old) vs. best of PGI and Absoft



Configuration Info - SW Versions: Intel® C/C++ version 12.1; Hardware: Intel® Core™ i7-2600 CPU @ 3.40GHz 3.40GHz RAM: 16.0 GB (1-socket Desktop); Operating System: Red Hat Enterprise Linux Server release 6.0 (Santiago); Kernel 2.6.32-71.el6.x86_64; Benchmark Source: Intel Corp.

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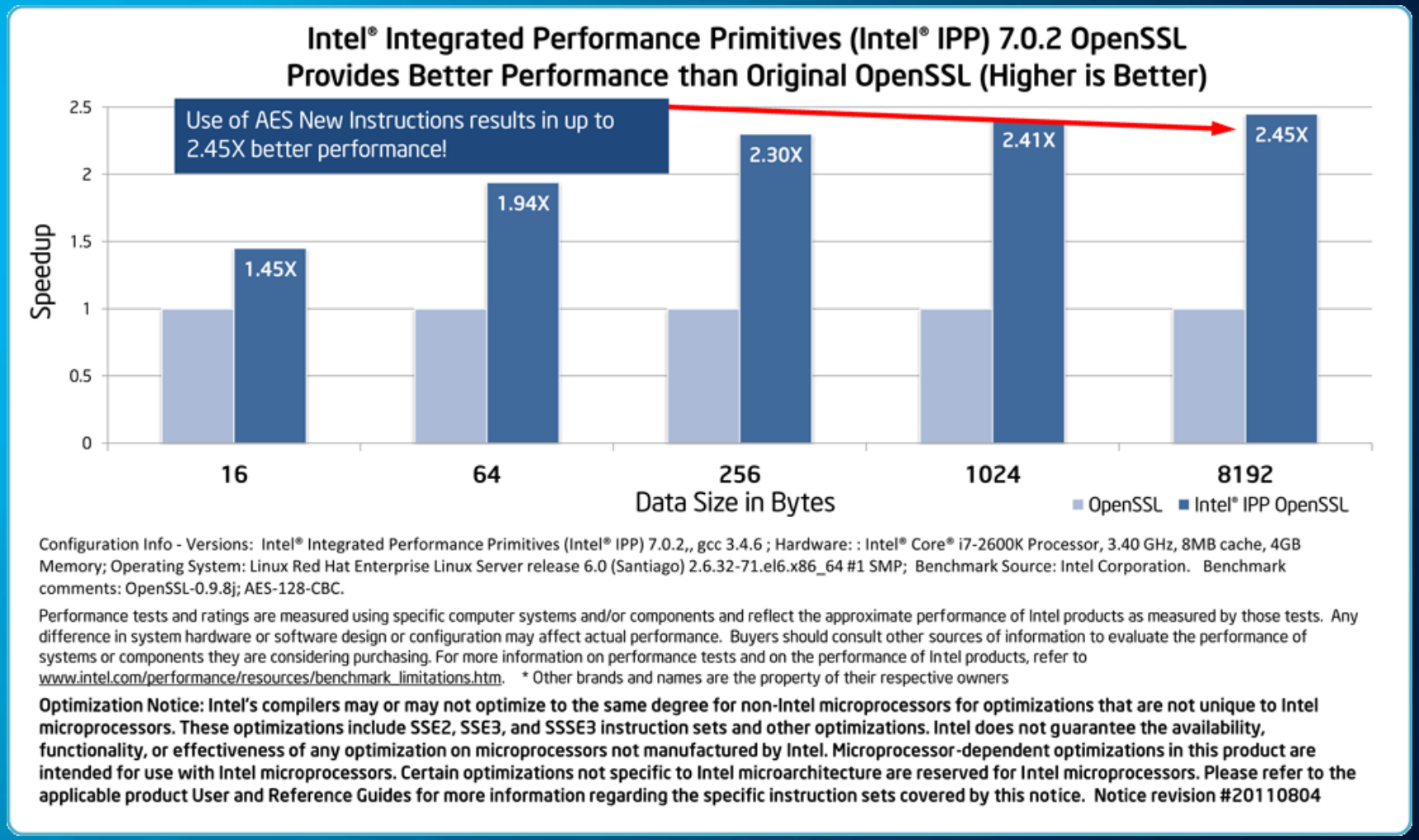
For an Intel processor,
Intel IPP vs. OpenSSL open source solution highlighting AES



Configuration Info - Versions: Intel® Integrated Performance Primitives (Intel® IPP) 7.0.2,, gcc 3.4.6 ; Hardware: : Intel® Core® i7-2600K Processor, 3.40 GHz, 8MB cache, 4GB Memory; Operating System: Linux Red Hat Enterprise Linux Server release 6.0 (Santiago) 2.6.32-71.el6.x86_64 #1 SMP; Benchmark Source: Intel Corporation. Benchmark comments: OpenSSL-0.9.8j; AES-128-CBC.

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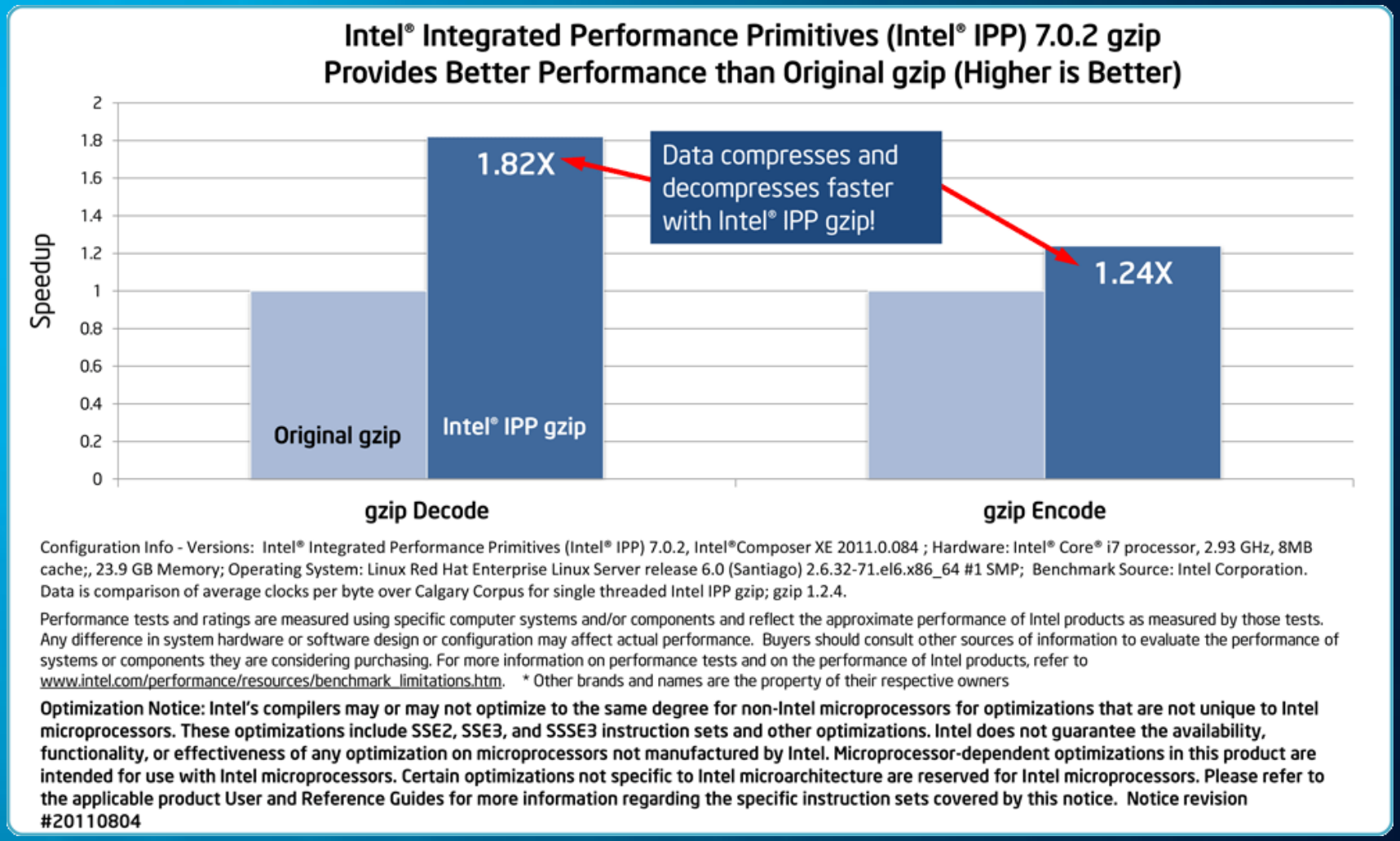
For an Intel processor, Intel IPP vs. original gzip yields faster encode and decode



Configuration Info - Versions: Intel® Integrated Performance Primitives (Intel® IPP) 7.0.2, Intel®Composer XE 2011.0.084 ; Hardware: Intel® Core® i7 processor, 2.93 GHz, 8MB cache;, 23.9 GB Memory; Operating System: Linux Red Hat Enterprise Linux Server release 6.0 (Santiago) 2.6.32-71.el6.x86_64 #1 SMP; Benchmark Source: Intel Corporation. Data is comparison of average clocks per byte over Calgary Corpus for single threaded Intel IPP gzip; gzip 1.2.4.

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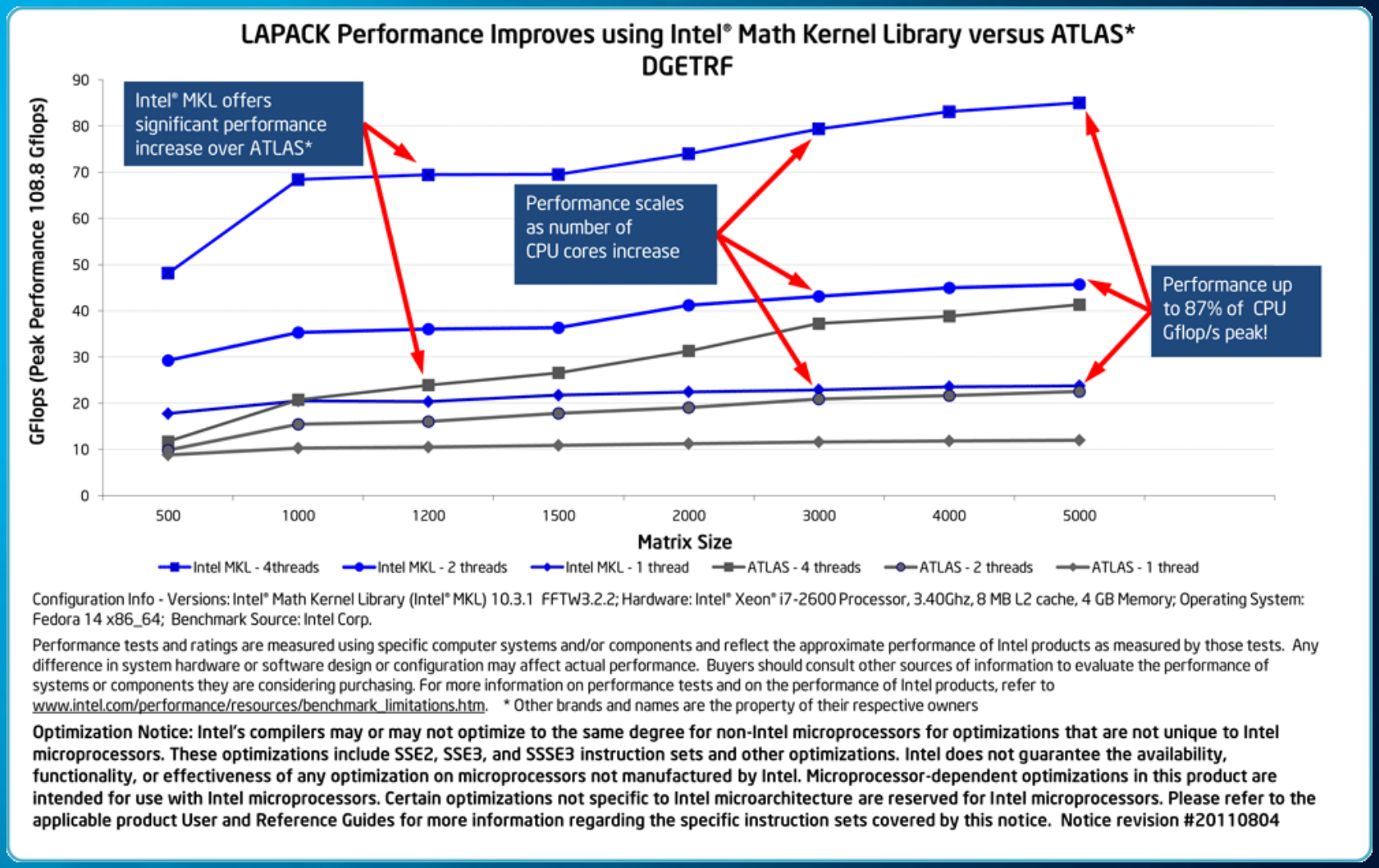
For an Intel processor, LAPACK Performance Intel MKL compared with ATLAS* open source solution



Configuration Info - Versions: Intel® Math Kernel Library (Intel® MKL) 10.3.1 FFTW3.2.2; Hardware: Intel® Xeon® i7-2600 Processor, 3.40Ghz, 8 MB L2 cache, 4 GB Memory; Operating System: Fedora 14 x86_64; Benchmark Source: Intel Corp.

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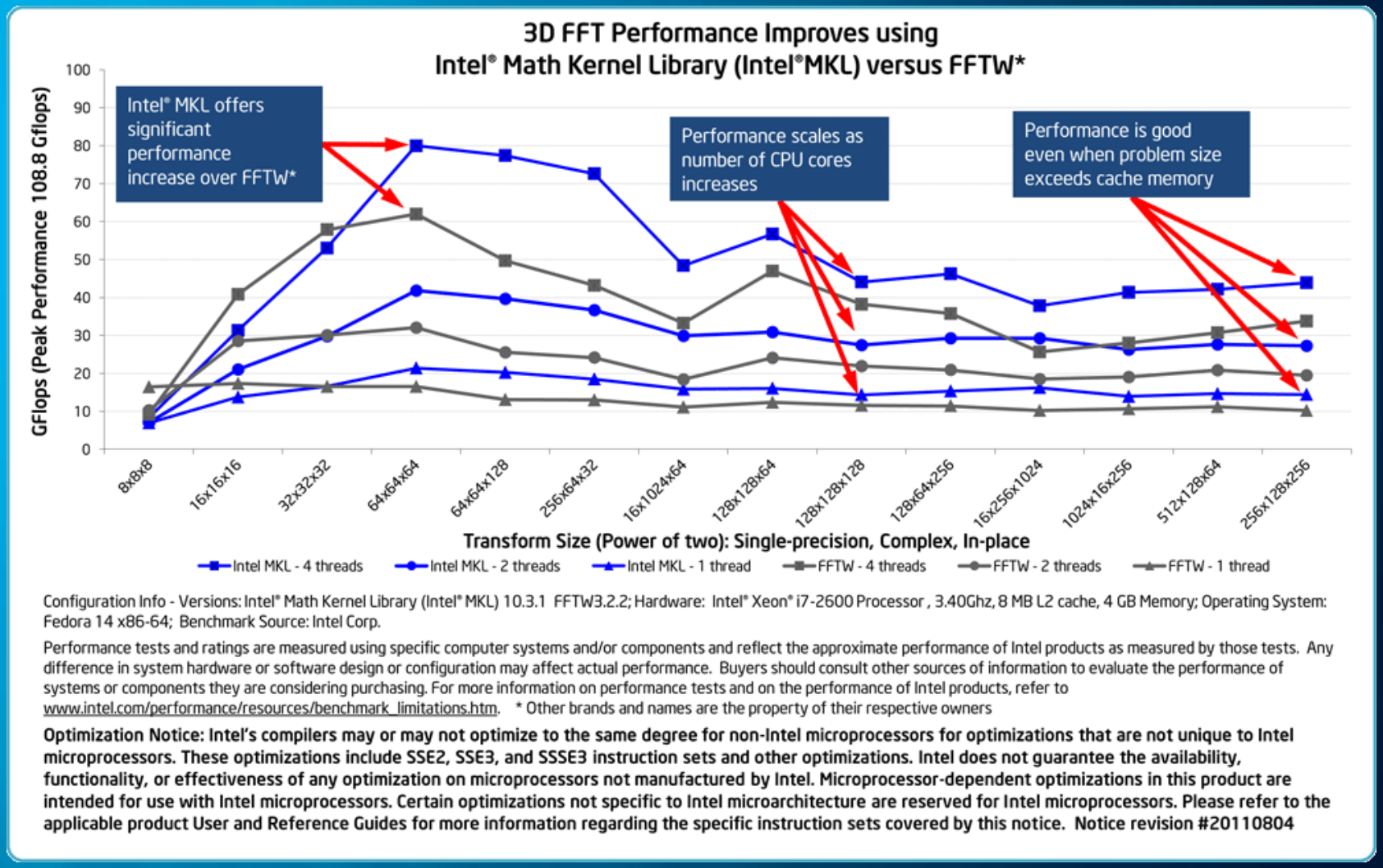
For an Intel processor, 3D FFT performance Intel MKL compared with FFTW*



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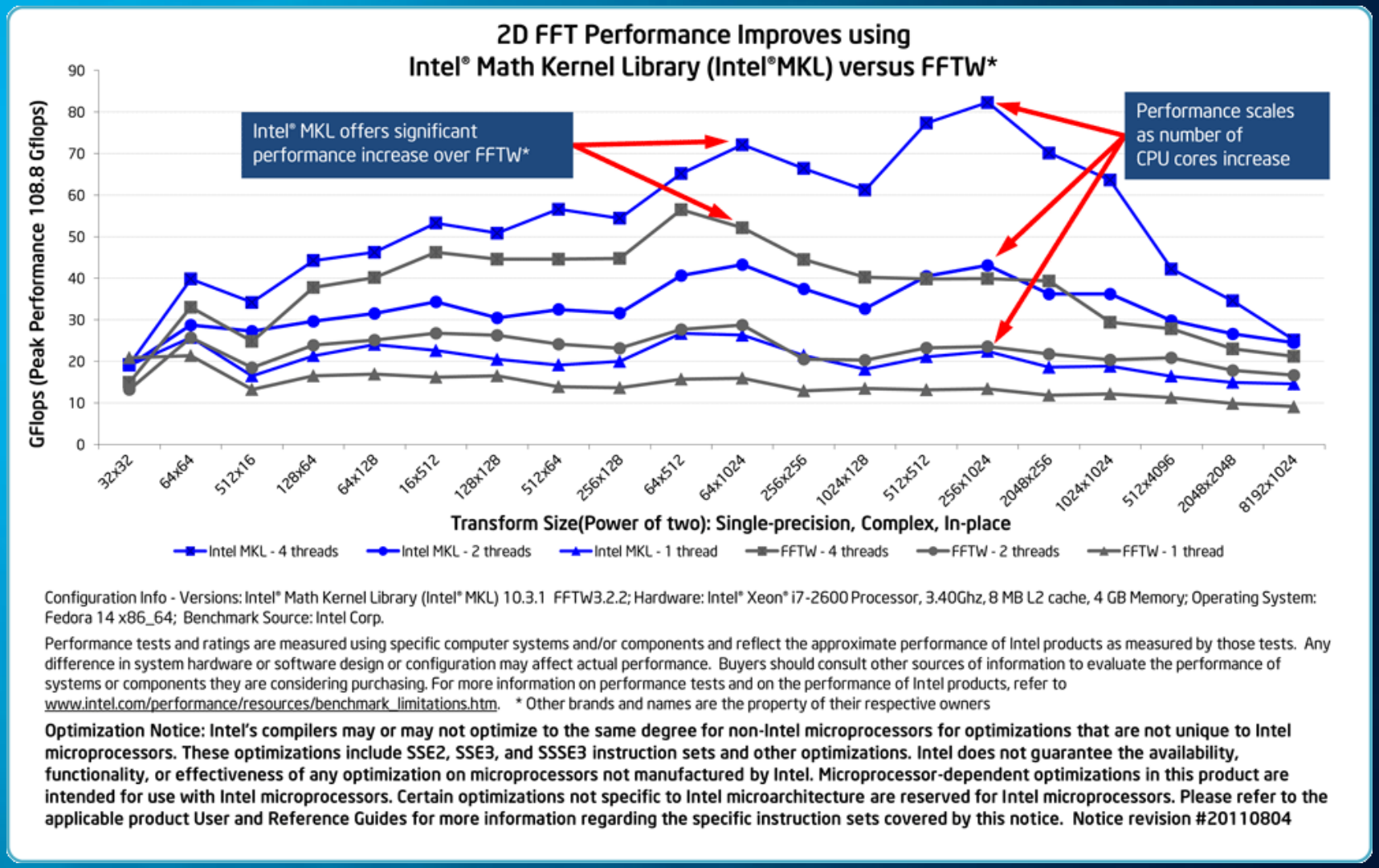
For an Intel processor, 2D FFT performance Intel MKL compared with FFTW*



Configuration Info - Versions: Intel® Math Kernel Library (Intel® MKL) 10.3.1 FFTW3.2.2; Hardware: Intel® Xeon® i7-2600 Processor, 3.40Ghz, 8 MB L2 cache, 4 GB Memory; Operating System: Fedora 14 x86_64; Benchmark Source: Intel Corp.

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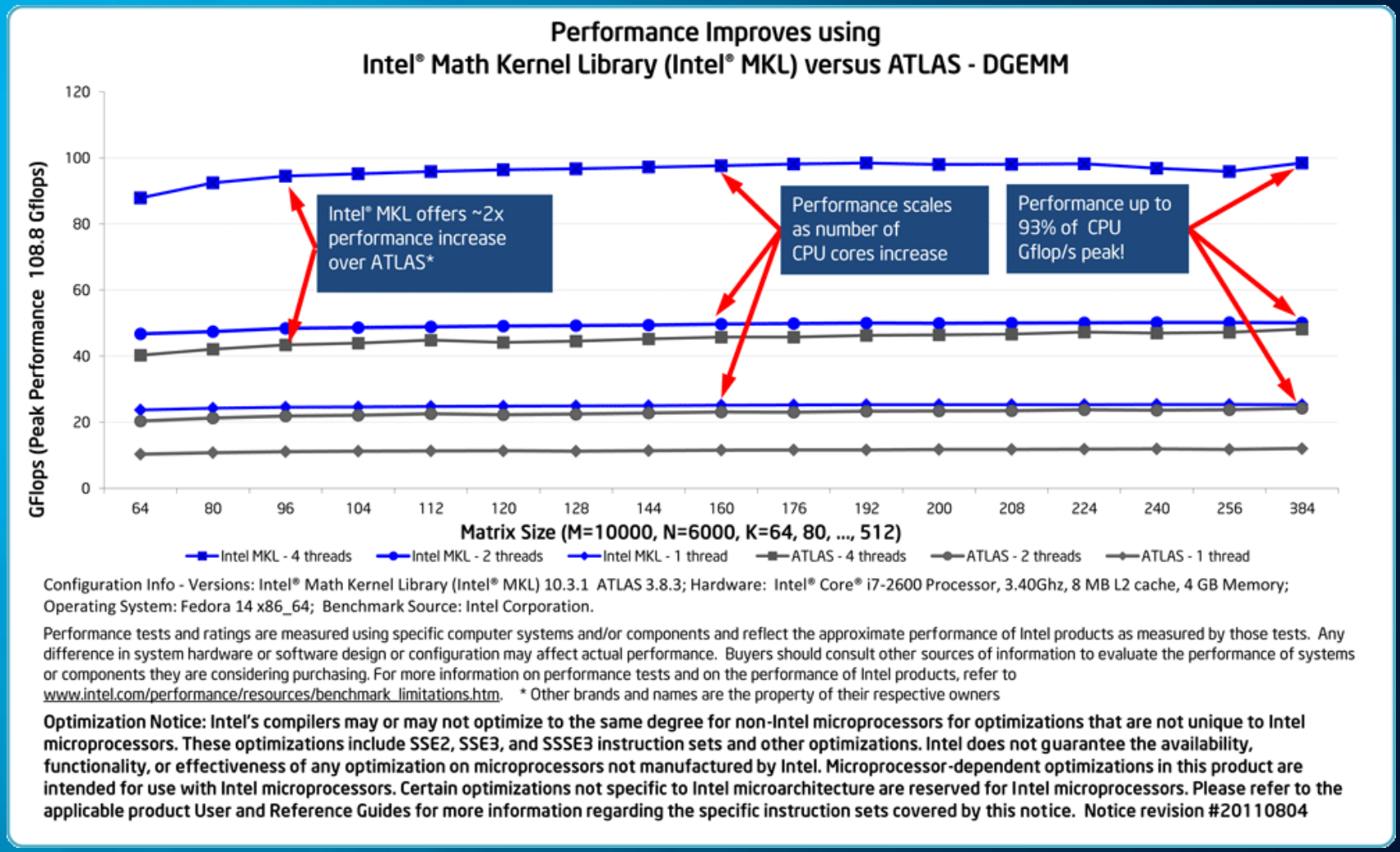
For an Intel processor, DGEMM Performance Intel MKL vs. ATLAS* open source solution



Configuration Info - Versions: Intel® Math Kernel Library (Intel® MKL) 10.3.1 ATLAS 3.8.3; Hardware: Intel® Core® i7-2600 Processor, 3.40Ghz, 8 MB L2 cache, 4 GB Memory; Operating System: Fedora 14 x86_64; Benchmark Source: Intel Corporation.

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OpenMP* 3.1 details

- Intel Compiler 12.1 support of new capabilities available in OpenMP 3.1
  - taskyield directive
  - task clauses final and mergeable
  - atomic read/write/update/capture
  - reduction min/max