PRODUCT BRIEF

intel Software

Create Faster Code — Faster

Intel® Parallel Studio XE 2016

Intel Software Development Tools

What it Does

- **Lets you develop faster code.** Boost application performance that scales on today's and next-generation processors.
- **Helps you code faster.** Use a toolset that simplifies creating fast, reliable parallel code.
- Includes high-performance compiler(s), libraries, parallel models, threading and vectorization advisor, memory/threading debugger, profiler, and more.

What's New

- Make fast code using both vectorization and threading. Vectorization Advisor gives you the tools and tips to vectorize effectively in days instead of months.
- Boost the speed of data analytics and machine learning programs with the Intel® Data Analytics Acceleration Library (Intel® DAAL).
- Improve cluster performance by profiling MPI jobs faster (up to at least 32K ranks) using MPI Performance Snapshot.
- Much more...

You are developing software that needs to run faster. Your software performs big data analytics, medical imaging, time-critical financial analysis, simulations (e.g., CFD or weather) or one of thousands of tasks that need to get done *now*. You are already using incumbent development tools (e.g., GNU, XCode* or Visual Studio*) on Linux*, OS X*, and Windows*.

What you need is a toolset that's compatible with the way you already work and makes it easier to speed code execution. Intel Parallel Studio XE is a performance tool suite that boosts application speed by taking advantage of the ever increasing core count and vector registers width available in Intel® Xeon® processors and Intel® Xeon Phi™ coprocessors.

Intel Parallel Studio XE Editions

Intel Parallel Studio XE is available in three editions. Choose the one that meets your development needs.

EDITION	WHAT IT DOES	WHAT IS INCLUDED
Composer Edition	Build fast code using industry-leading compilers and libraries including new data analytics library	C++ and/or Fortran compilers, performance libraries, and parallel models
Professional Edition	Adds analysis tools	Composer Edition plus performance profiler, vectorization optimization and thread prototyping, memory and thread debugger
Cluster Edition	Adds MPI cluster tools	Professional Edition plus MPI cluster communications library and MPI error checking and tuning

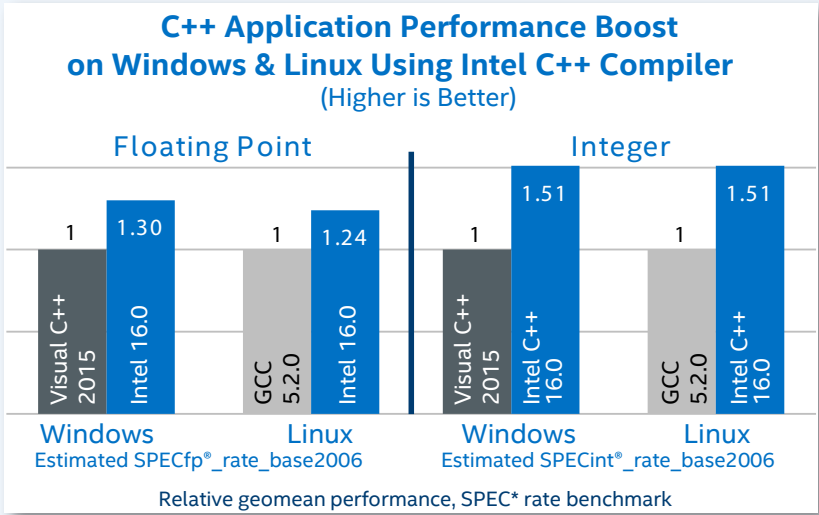
One Year of Product Support and Updates Included

Product purchase provides you access to and support for new updates and releases, as well as older versions. It also entitles you to private, direct and responsive answers to product questions, along with access to decades of product experience from our user community through forums and a library of self-help documents.

Composer Edition

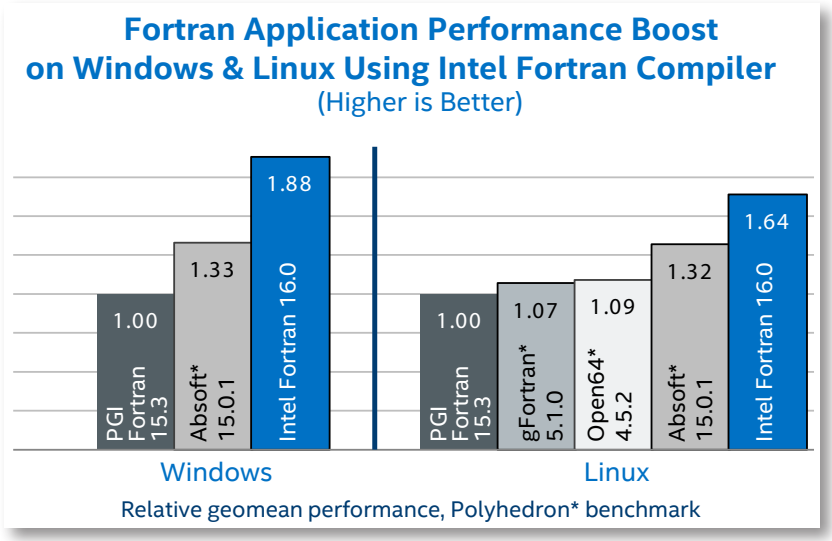
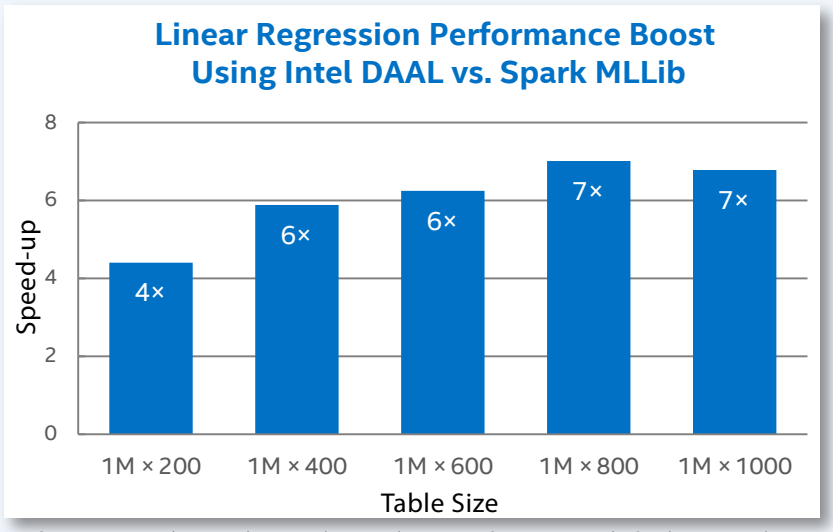
- Get better performance with a simple recompile using industry-leading C++ and Fortran compilers.
- Simplify adding parallelism with built-in, intuitive parallel models and vectorization support.
- Drop advanced libraries optimized for the latest hardware right into your code.

COMPONENT	DETAILS
C/C++ Compiler **Intel® C++ Compiler**	• Industry-leading C++ application performance • Compatible with popular compilers, development environments and operating systems • Simplified development through standards-based parallelism models including OpenMP

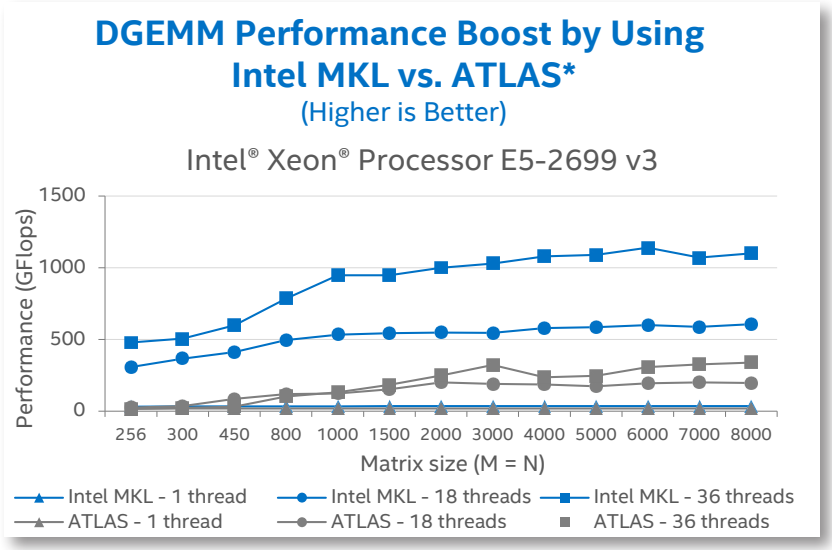


Configuration: Windows hardware: HP DL320e Gen8 v2 (single-socket server) with Intel Xeon CPU E3-1280 v3 @ 3.60GHz, 32 GB RAM, HyperThreading is off; Linux hardware: HP BL460c Gen9 with Intel Xeon CPU E5-2680 v3 @ 2.50GHz, 256 GB RAM, HyperThreading is on. Software: Intel C++ compiler 16.0, Microsoft C/C++ Optimizing Compiler Version 19.00.23026 for x86/x64, GCC 5.2.0. Linux OS: Red Hat Enterprise Linux Server release 7.1 (Maipo), kernel 3.10.0-229.el7.x86_64. Windows OS: Windows 8.1. SPEC Benchmark (www.spec.org).

Composer Edition (Cont.)

COMPONENT	DETAILS
Fortran Compiler **Intel® Fortran Compiler**	• Industry-leading Fortran application performance • Extensive support for Fortran standards, OpenMP*, and more • Compatible with leading development environments and compilers  **Configuration:** Hardware: Intel Core i7-4770K CPU @ 3.50GHz, HyperThreading is off, 16 GB RAM. Software: Intel Fortran compiler 16.0, Absoft 15.0.1,. PGI Fortran* 15.3, Open64 4.5.2, gFortran 5.1.0. Linux OS: Red Hat Enterprise Linux Server release 7.0 (Maipo), kernel 3.10.0-123.el7.x86_64. Windows OS: Windows 7, Service pack 1. 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. Polyhedron Fortran Benchmark (www.fortran.uk).
Data Analytics and Machine Learning Library **Intel® Data Analytics Acceleration Library (Intel® DAAL)**	• Boost big data analytics and machine learning performance with easy-to-use library • Delivers high application performance across spectrum of Intel-architecture devices • Speeds time-to-value through data source and environment integration • Reduces application development time via wide selection of pre-optimized advanced analytics algorithms  **Configuration:** Versions: Intel Data Analytics Acceleration Library 2016, CDH v5.3.1, Apache Spark v1.2.0; Hardware: Intel Xeon Processor E5-2699 v3, 2 Eighteen-core CPUs (45MB LLC, 2.3GHz), 256GB of RAM per node; Operating System: CentOS 6.6 x86_64. Linear regression (DAAL NormEq method vs. MLLib 8 iterations) on an 8-node Hadoop cluster based on Intel Xeon Processors E5-2697 v3.

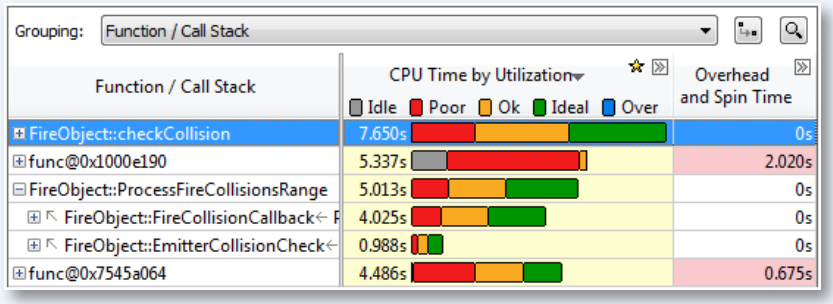
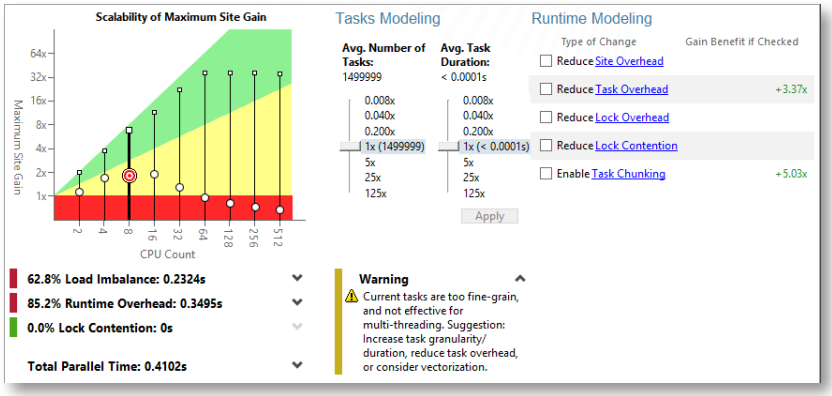
Composer Edition (Cont.)

COMPONENT	DETAILS
Math Library **Intel® Math Kernel Library**	• Fastest and most used math library for Intel and compatible processors • Highly tuned for best performance on older, newer, and future processors before they are released • *De facto* standard APIs for simple code integration  **Configuration**: Versions: Intel Math Kernel Library (Intel MKL) 11.3, ATLAS 3.10.2; Hardware: Intel Xeon Processor E5-2699v3, 2 Eighteen-core CPUs (45MB LLC, 2.3GHz), 64GB of RAM; Intel Core Processor i7-4770K, Quad-core CPU (8MB LLC, 3.5GHz), 8GB of RAM; Operating System: RHEL 6.4 GA x86_64.
Algorithmic Building Blocks for Media and Data Applications **Intel® Integrated Performance Primitives**	• Multi-core ready, pre-optimized building blocks with computationally intensive functions to help with large dataset problem processing and high-performance computing • Broad domain support including image/signal processing, data compression, cryptography and string processing • Cross-platform support, optimized for current and future processors
Threading Library **Intel® Threading Building Blocks**	• Widely used C++ template library for task parallelism • Has high-level parallel algorithms, concurrent containers and low-level building blocks such as scalable memory allocator, locks and atomic operations • Efficient, scalable way to exploit the power of multi-core processors • Compatible with multiple compilers and portable to various operating systems
Standards-based Parallel Model **Intel® OpenMP**	• Performance-oriented implementation of OpenMP 4.0 and initial support for 4.1 • Support for Intel® SSE and AVX
Simplified Parallel Model **Intel® Cilk™ Plus**	• Simplifies adding parallelism for performance with only three keywords • Scale for the future with runtime system operates smoothly on systems with hundreds of cores • Vectorized and threaded for highest performance on all Intel and compatible processors
Fortran Numerical Analysis **Rogue Wave IMSL* Library**	• Numerical analysis functions for Fortran applications with a comprehensive set of 1,000+ mathematics and statistics algorithms • Available as an add-on for any Fortran suite (included in Composer Edition)

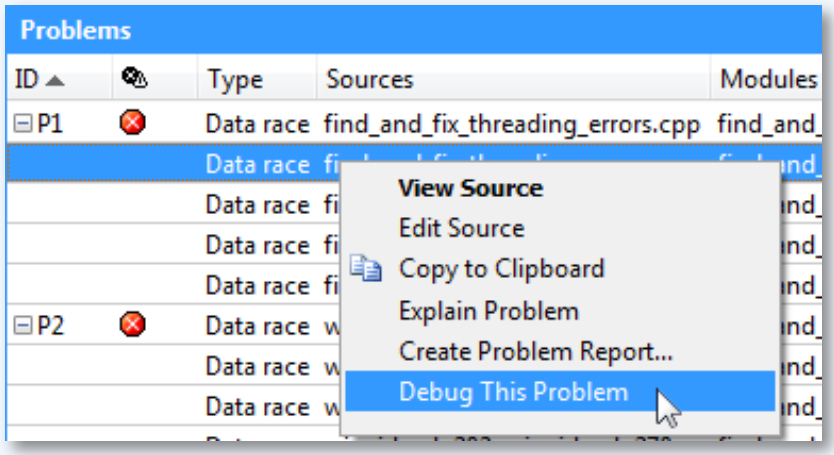
Professional Edition

Includes everything in Composer Edition plus:

- New data analytics acceleration library for delivering faster big data processing
- Advanced performance and threading profiler to tune application performance and multicore scalability
- Vectorization and threading advisor to vectorize and thread effectively in days instead of months
- Memory and thread debugger for easy identification of memory leaks and memory allocation errors

COMPONENT	DETAILS
Performance Profiler **Intel® VTune™ Amplifier XE**	• Collect a rich set of data to tune CPU and GPU compute performance, multi-core scalability, OpenMP, bandwidth and more • Sort, filter and visualize results for quick insight into performance bottlenecks • Automate regression tests and collect data remotely using the powerful command line interface 
Vectorization Optimization and Thread Prototyping **Intel® Advisor XE**	• Comprises two tools: Vectorization Advisor and Threading Advisor • Get more performance from your code with vectorization and threading • Vectorize and thread effectively in days instead of months • Memory access pattern, loop-carried dependency and trip count analyses • Design, tune and check threading without disrupting normal development 

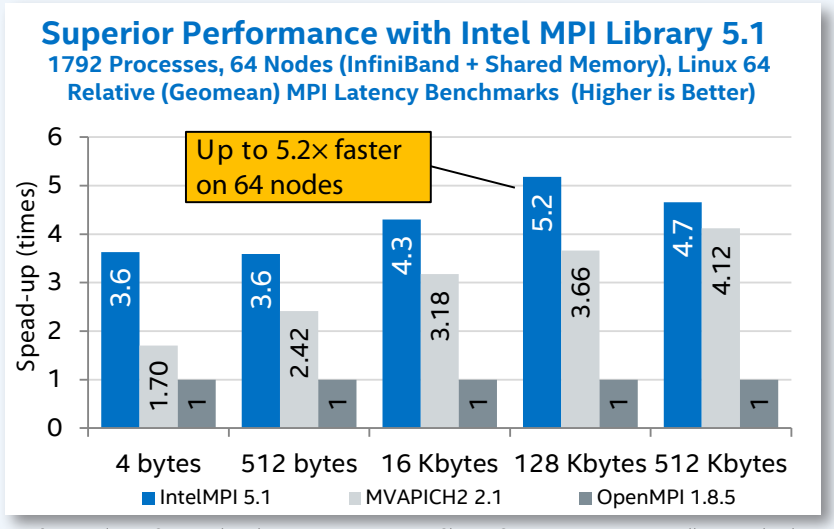
Professional Edition (Cont.)

COMPONENT	DETAILS
Memory and Thread Debugger **Intel® Inspector XE**	• Quickly find memory leaks and memory allocation errors • Locate difficult-to-find threading errors such as data races and deadlocks • Detect out-of-bounds accesses and dangling pointers 

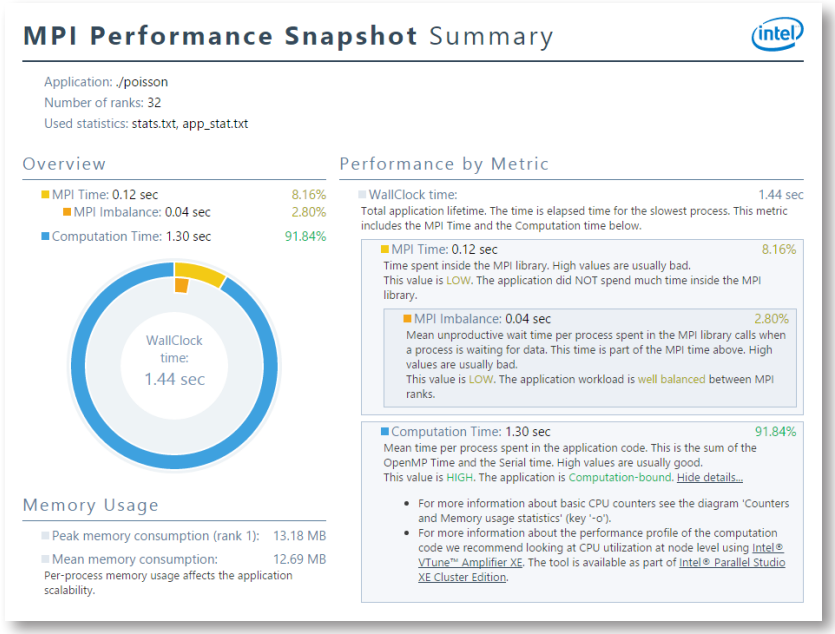
Cluster Edition

Includes everything in Professional Edition plus:

- Accelerate applications performance on Intel architecture-based clusters with multiple fabric flexibility
- Profile MPI application to quickly finding bottlenecks, achieving high performance for parallel cluster applications

COMPONENT	DETAILS
Message Passing Interface Library **Intel® MPI Library**	• Making applications perform better on Intel architecture-based clusters with multiple fabric flexibility • Performance-optimized MPI library • Sustained scalability — low latencies, higher bandwidth and increased processes • Full hybrid support for multi-core and many-core systems  **Configuration:** Hardware: CPU: Dual Intel Xeon E5-2697v3@2.60Ghz; 64 GB RAM. Interconnect: Mellanox Technologies MT27500 Family [ConnectX*-3]. Software: RHEL 6.5; OFED 3.5-2; Intel® C/C++ Compiler XE 15.0.3; Intel® MPI Library 5.1; Intel® MPI Benchmarks 4.1

Cluster Edition (Cont.)

COMPONENT	DETAILS
MPI Tuning and Analysis **Intel® Trace Analyzer and Collector**	• Profile MPI application to quickly find bottlenecks, and achieve high performance for parallel cluster applications • Faster performance profiling of larger MPI jobs (up to 32K ranks) with MPI Performance Snapshot • Scalable — low overhead and effective visualization • Flexible-to-fit workflow — compile, link or run 

Included in Intel Parallel Studio XE

	COMPOSER EDITION[1]	PROFESSIONAL EDITION[1]	CLUSTER EDITION
Intel C++ Compiler	✓	✓	✓
Intel Fortran Compiler	✓	✓	✓
Intel Data Analytics Acceleration Library	✓	✓	✓
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 in a single or dual-language version (C++ and/or Fortran).
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.

Specifications 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 (OS X developers can choose between the C++ or Fortran versions of the Composer Edition).
Development Environment	**Windows:** Integrates into Microsoft Visual Studio* **Linux:** Compatible with GNU tools **OS X:** XCode
Additional Details	www.intel.com/software/products/systemrequirements/

To learn more and download a free 30-day evaluation: **intel.ly/parallel-studio-xe**

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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.

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