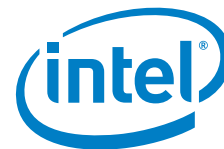


## PRODUCT BRIEF

Intel® Xeon® Processor  
E3-1200 v3 Product Family  
Single-Socket Server and Workstation Platforms



# Intel® Xeon® Processor E3-1200 v3 Product Family

A versatile platform to meet a range of business needs



Small business needs are becoming increasingly sophisticated. Applications that help automate design or iterate financial scenarios are becoming more demanding. Because of these needs, entry-level servers and workstations are becoming foundational to many businesses. At the same time, IT organizations are facing increasing demands for hardware, space, and energy efficiency. Specific solutions for data center graphics and lightweight scale-out workloads are emerging as additional ways to control costs while delivering application-optimized solutions. Meet the latest Intel® Xeon® processor E3-1200 v3 product family-based platforms—a smart investment for a range of business needs.

In addition to gains in CPU performance, CPU performance per watt, and graphics performance, Intel Xeon processor E3-1200 v3 product family-based platforms offer faster access to data, increased security, and proven reliability for a range of business needs. Explore the expanded product line to discover new options for microservers and data center graphics, in addition to traditional entry-level server and workstation applications.

### Small Business Servers

No matter what the size of your business, the value of your data is enormous. Keep it accessible and better protected at all times with an affordable Intel Xeon processor E3-1200 v3 product family-based server.

Protect your customer, inventory, and financial records with a server that

delivers the security features and reliability of an all-day, all-night workhorse. Implementing a powerful server is also a smart investment in growth. You'll gain the power to adopt new business-class applications and tools that can help you increase sales and improve margins. A server based on the Intel Xeon processor E3-1200 v3 product family lets you access your information faster and respond to customers sooner from any device on your network.

[Learn more about this smart investment in your small business >](#)

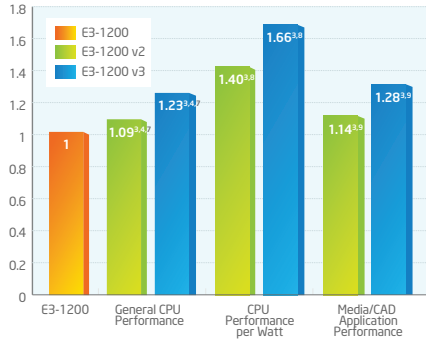
### Entry-Level Workstations

Step up to the performance and visuals demanded by professional-grade CAD or media and entertainment applications. With Intel Xeon processor E3-1200 v3 product family-based workstations, you'll find the capabilities that get designers, engineers, and animators started.

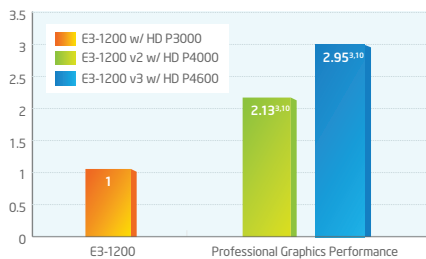
Accelerate exploration of complex data with the graphics performance of Intel® HD Graphics P4600. Improve the integrity and uptime of design data with ECC memory technology. And with Intel® vPro™ technology, you can make sure your workstations are as secure and manageable as any PC in your organization's fleet.<sup>1,2</sup>

Media and entertainment animators, artists, and editors looking to accelerate nonlinear editing or test select special effects—such as blur and motion filters—can work with greater efficiency. Imaging

**CPU Performance: Intel® Xeon® Processor E3**  
Generational Performance Gains



**Graphics Performance: Intel® Xeon® Processor E3 with Intel® HD Graphics**  
Generational Performance Gains



experts are supported by advanced features, access to Open CL acceleration, and faster processing performance. Your software benefits because the Intel Xeon processor E3-1200 v3 product family has been certified on and optimized for a wide range of third-party ISV applications.

[Learn more about this smart investment in your innovation >](#)

### Microservers

To achieve optimal performance per watt for specific lightweight scale-out workloads, look no further than an energy-efficient microserver based on the Intel Xeon processor E3-1200 v3 product family.

Enjoy increased node density and improved I/O performance, ideal for lightweight scale-out workloads such as low-end dedicated hosting, simple front-end web, and basic content delivery. Minimize frustrations with capabilities such as x86 compatibility, virtualization support, and integrated security. Get up to 5.8x greater performance per SSI rack as compared to a rack of 1U servers, while also leveraging the existing IA software ecosystem.<sup>3,4,5,6</sup> You will be able to scale your infrastructure to meet

growing operational needs in a simple and affordable way.

[Learn more about this smart microserver investment >](#)

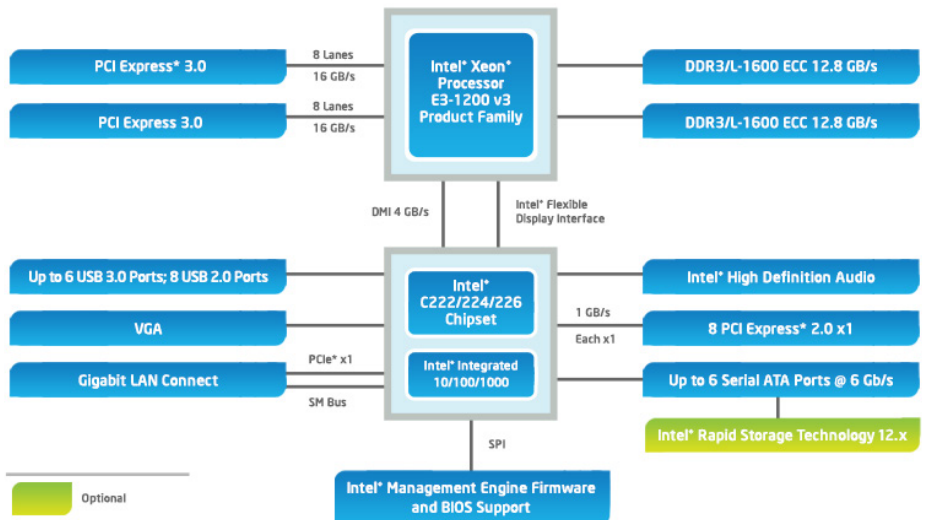
### Data Center Graphics

Media service providers require transcode solutions with cost-efficient, dense designs that can deliver high-quality images. A data center graphics server based on the Intel Xeon processor E3-1200 v3 product family does just that. Now you can support more concurrent media transcodes per rack than some discrete graphics solutions, lowering your total cost of ownership while enabling smoother content on demand, live broadcasting, or video conferencing.

Whether you host desktops and workstations remotely or deliver gaming online in the cloud, the graphics performance of Intel® HD Graphics P4700 can provide the rich visual experiences end users seek. At the same time, you'll benefit from more energy-efficient performance that enables greater density of games or users.

[Learn more about this smart investment in data center graphics >](#)

### Typical Intel Xeon Processor E3 Platform Configuration



Features may vary depending on processor and chipset SKUs.

## Intel® Xeon® Processor E3-1200 v3 Product Family Overview

Features	Benefits
Intel® Xeon® Processor E3-1200 v3 Product Family	Server-class performance, reliability, and security at entry-level price points <ul style="list-style-type: none"> <li>Up to 18 percent performance-per-watt improvement over previous-generation Intel® Xeon® processor-based servers<sup>3,8</sup></li> </ul>
Haswell microarchitecture	Enhanced energy efficiency and performance <ul style="list-style-type: none"> <li>Intel's industry-leading 22nm 3-D Tri-Gate transistor technology</li> </ul>
<b>Reliability and Security to Protect Your Business</b>	
Support for Error-Correcting Code (ECC) memory	Better data integrity and system reliability through automatic data correction
Intel® Rapid Storage Technology enterprise 3.x <sup>11</sup> (Intel® RSTe) [for servers]	Uninterrupted operation and quick data recovery in the event of a hard drive failure <ul style="list-style-type: none"> <li>Supports latest server operating systems (OSs), including Red Hat and SuSE Linux* OSs</li> </ul>
Intel® Rapid Storage Technology 12.x <sup>11</sup> (Intel® RST) [for workstations]	Uninterrupted operation and quick data recovery in the event of a hard drive failure <ul style="list-style-type: none"> <li>Dynamic storage acceleration—dynamically adjusts system power state policies based on I/O loading conditions and power profile</li> </ul>
Intel® Data Protection Technology (with Advanced Encryption Standard New Instructions <sup>12</sup> [AES-NI])	Improve security by encrypting data—without slowing response times
Intel® Data Protection Technology (with Secure Key <sup>12</sup> )	Enhances security and performance for a wide range of security applications <ul style="list-style-type: none"> <li>Enables faster, higher-quality cryptographic keys and certificates</li> </ul>
Intel® Platform Protection Technology (with BIOS Guard <sup>13</sup> )	Protects your system from malware and denial of service (DoS) attacks
Intel® Platform Protection Technology (with OS Guard <sup>13</sup> )	Improves security by strengthening malware protection <ul style="list-style-type: none"> <li>Provides hardware-based protection for your server operating system</li> </ul>
Intel® Platform Protection Technology (with Trusted Execution Technology <sup>13</sup> [TXT])	Protects your business by increasing security against many digital threats <ul style="list-style-type: none"> <li>Helps to ensure that the system launches into a “known good state”</li> </ul>
<b>Responsive Performance to Grow Your Business</b>	
Intel® Advanced Vector Extensions 2 <sup>14</sup> (Intel® AVX2)	New instructions for developers of imaging, video editing, modeling, and simulation applications
Intel® Turbo Boost Technology 2.0 <sup>15</sup>	Higher performance when you need it most <ul style="list-style-type: none"> <li>Accelerates processor and graphics performance for peak loads</li> </ul>
Intel® Hyper-Threading Technology <sup>16</sup> (Intel® HT Technology)	Faster performance for many demanding business applications <ul style="list-style-type: none"> <li>Thread-level parallelism benefits multi-threaded and concurrently running applications</li> </ul>
PCI Express* 3.0 ports	Extra capacity and flexibility for storage and networking connections <ul style="list-style-type: none"> <li>Up to double the I/O bandwidth of prior-generation PCIe 2.0<sup>3,4,17</sup></li> </ul>
Serial ATA 3.0 (SATA* 3.0)	Faster data access, system startups, and application load times <ul style="list-style-type: none"> <li>Doubles data throughput versus previous generation for faster hard drive performance<sup>3,4,18</sup></li> </ul>
Intel® Virtualization Technology <sup>19</sup> (Intel® VT) for IA-32 and Intel® 64 (Intel® VT-x)	Faster performance for core virtualization processes <ul style="list-style-type: none"> <li>Improves application performance, live migration, provisioning, dynamic load balancing, and disaster recovery</li> </ul>
Intel® Virtualization Technology <sup>19</sup> (Intel® VT) for Directed I/O (Intel® VT-d)	Built-in hardware support for I/O virtualization <ul style="list-style-type: none"> <li>Improves I/O performance, increases system reliability, and provides enhanced memory protection</li> </ul>
<b>Energy Efficiency and Manageability</b>	
Range of CPU options	Match performance versus energy efficiency to maximize total value <ul style="list-style-type: none"> <li>Choose from 84W/82W/80W/65W/45W/25W/13W processor SKUs</li> </ul>
Intel® Node Manager (Intel® NM)	Host more and heavier workloads per server while guarding against server overheating <ul style="list-style-type: none"> <li>Lets you dynamically monitor and limit server power consumption</li> </ul>
Intel® Active Management Technology <sup>20</sup> (Intel® AMT) [for small business servers]	Flexible local and remote management for troubleshooting, repair, and maintenance to increase reliability and uptime <ul style="list-style-type: none"> <li>Secure, out-of-band access, even for failed power states or a crashed OS</li> </ul>

## Intel® Xeon® Processor E3-1200 v3 Product Family SKU List

Processor Number <sup>A</sup>	CPU Cores	Graphics Cores	Speed	L3 Cache	Intel® Turbo Boost Technology 2.0	Intel® HT Technology	Intel® HD Graphics P4600**	Intel® HD Graphics P4700**	Power
<b>Standard Server and Workstation SKUs</b>									
Intel® Xeon® processor E3-1280 v3	4	0	3.60 GHZ	8 MB	▪	▪			82 W
Intel® Xeon® processor E3-1275 v3	4	2	3.50 GHZ	8 MB	▪	▪	▪		84 W
Intel® Xeon® processor E3-1270 v3	4	0	3.50 GHZ	8 MB	▪	▪			80 W
Intel® Xeon® processor E3-1245 v3	4	2	3.40 GHZ	8 MB	▪	▪	▪		84 W
Intel® Xeon® processor E3-1240 v3	4	0	3.40 GHZ	8 MB	▪	▪			80 W
Intel® Xeon® processor E3-1230 v3	4	0	3.30 GHZ	8 MB	▪	▪			80 W
Intel® Xeon® processor E3-1225 v3	4	2	3.20 GHZ	8 MB	▪		▪		84 W
Intel® Xeon® processor E3-1220 v3	4	0	3.10 GHZ	8 MB	▪				80 W
<b>Low-Power SKUs</b>									
Intel® Xeon® processor E3-1265L v3	4	1	2.50 GHZ	8 MB	▪	▪			45 W
Intel® Xeon® processor E3-1230L v3	4	0	1.80 GHZ	8 MB	▪	▪			25 W
Intel® Xeon® processor E3-1220L v3	2	0	1.10 GHZ	4 MB	▪	▪			13 W
<b>Data Center Graphics SKUs</b>									
Intel® Xeon® processor E3-1285 v3	4	2	3.60 GHZ	8 MB	▪	▪		▪	84 W
Intel® Xeon® processor E3-1285L v3	4	2	3.10 GHZ	8 MB	▪	▪		▪	65 W

\*\*Intel® HD Graphics P4600 requires the latest-version Intel® Graphics Driver, Intel® C226 chipset, and Intel® Xeon® processor E3-1225 v3, E3-1245 v3, or E3-1275 v3 to enable workstation application optimizations. Intel® HD Graphics P4700 requires the latest-version Intel® Graphics Driver, Intel® C226 chipset, and Intel® Xeon® processor E3-1285 v3, or E3-1285L v3 to enable workstation and data center graphics application optimizations. Optimized Intel HD Graphics P4600 and P4700 are only available on select models of the Intel Xeon processor E3 family. To learn more about Intel Xeon processors for workstations, visit [www.intel.com/go/workstation](http://www.intel.com/go/workstation). To learn more about Intel Xeon processors for data center graphics, visit [www.intel.com/datacentergraphics](http://www.intel.com/datacentergraphics).

## Intel® C220 Series Chipset

Chipset	Intel® HD Graphics	Intel® AMT 9.0	Intel® Node Manager	PCI Express* Ports				SATA Ports		Intel® Rapid Storage Technology	LAN
				Gen 3 PCH	Gen 2 PCH	USB 3.0 Ports	USB 2.0 Ports	6 Gb/s	3 Gb/s		
Intel® C226	▪	▪	▪	16	8 <sup>†</sup>	6 <sup>†</sup>	8	6 <sup>†</sup>		▪	Integrated MAC
Intel® C224			▪	16	8	4	8	4	2	▪	Integrated MAC
Intel® C222				16	8	2	8	2	4	▪	Integrated MAC

<sup>†</sup>Port counts are dependent on how IO flexibility is configured between PCIe, SATA 6G, and USB 3.0 for a total of 18 ports. C226 will support SATA 1.5/3/6Gb/s Intel Anti-Theft Technology is not supported on any SKU of C220 series chipset.

For more information on Intel® Xeon® processor E3-1200 v3 product family, visit [www.intel.com/xeone3](http://www.intel.com/xeone3).

<sup>Δ</sup> Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor series, not across different processor sequences. See [http://www.intel.com/products/processor\\_number](http://www.intel.com/products/processor_number) for details. Intel products are not intended for use in medical, lifesaving, life sustaining, critical control, or safety systems, or in nuclear facility applications. All dates and products specified are for planning purposes only and are subject to change without notice.

1. No computer system can provide absolute security under all conditions. Built-in security features available on select Intel® Core™ processors may require additional software, hardware, services, and/or an Internet connection. Results may vary depending upon configuration. Consult your system manufacturer for more details. For more information, visit [www.intel.com/technology/security](http://www.intel.com/technology/security).
2. Intel® vPro™ Technology is sophisticated and requires setup and activation. Availability of features and results will depend upon the setup and configuration of your hardware, software, and IT environment. To learn more, visit <http://www.intel.com/technology/vpro>.
3. 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.
4. Results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance.
5. Intel does not control or audit the design or implementation of third party benchmark data or websites referenced in this document. Intel encourages all of its customers to visit the referenced websites or others where similar performance benchmark data are reported and confirm whether the referenced benchmark data are accurate and reflect performance of systems available for purchase.
6. Baseline Rack configuration: Intel® Xeon® processor E3-1220L v2. Maximum number of nodes, 42U rack: 41 1U server + 1x 1U 48 port GbE Ethernet switch. Performance per node/rack: Best published SPECint™\_rate\_base2006 score of 87.3 as of April 15, 2013. <http://www.spec.org/cpu2006/results/res2012q2/cpu2006-20120522-22320.html>. Total performance 41 servers = 3579.3

Power per node: Max power consumption of one Intel® Xeon® processor E3-1220L v2 on a Intel® C206-based platform using SPECpower\_ssj2008, EIST Enabled, Turbo Boost Enabled, 8GB memory (2x 4GB DDR3-1600 UDIMM), 64G 3Gb/s SATA SSD, Windows 2008 R2 SP1, Java SE Runtime Environment (build 1.6.0\_30-b12), Java HotSpot 64-Bit Server VM (build 20.5-b03, mixed mode). Source: TR1276, Intel internal testing as of Mar 2012. Score: ssj\_ops@100%: 195,006, Power@100%: 51.3W, Active idle power: 26.4

Power per rack: 2.3kW total. 1U switch = 240W, 41 1U server nodes = 2103W

New Microserver Configuration: Intel® Xeon® processor E3-1230L v3

Maximum number of nodes: SSI rack = 12 3U chassis with 144 nodes + 3x 1U 48 port GbE switches

Performance per node/rack: Intel® C226 chipset-based platform with one Intel® Xeon® processor E3-1230L v3 (8M Cache, 1.8 GHz, C0 stepping), EIST Enabled, Turbo Boost enabled, Hyper-Threading Enabled, 16GB memory (2x 8GB DDR3-1600 ECC UDIMM), 160GB SATA 7200RPM HDD, Red Hat® Enterprise Linux Server 6.3. Compiler version: 13.0 of Intel C++ Studio XE and Intel Fortran. Source: Intel internal testing as of April 2013. Score: SPECint\_rate\_base2006 of 143, 144 nodes = 20592

Power per node: Based on Intel estimates of 39.3W per node with one Intel® Xeon® processor E3-1220L v3 node, EIST Enabled, Turbo Boost Enabled, 8GB memory (2x 4GB DDR3-1600 UDIMM), 1x SSD, assuming shared cooling resources and shared power supplies.

Power per rack: 6.4kW total. 3x 1U switches at 240W per switch = 720W, 144 nodes at 39.3W per node = 6372W

#### 7. SPEC® CPU2006:

Baseline configuration: Intel® C206 chipset-based Intel® Xeon® workstation platform with one Intel® Xeon® processor E3-1275 (quad-core, 3.4GHz, 8M cache), ASNBCPT1.86C.0085.P00 July 5, 2012, Intel® Hyper Threading Technology (Intel® HT Technology) enabled, 16GB memory (4x4GB DDR3-1333 ECC UDIMM), 2TB 7200RPM SATAIII HDD (WD2000FYYZ), RHEL v6.3 - 2.6.32-278.e16.x86\_64. Compiler version 13.0.0.133 of Intel® C++ Studio XE and Intel® Fortran. Source: Intel internal estimated measurements, April 2013. Scores: SPECint®\_rate\_base2006=170.

Previous configuration: Intel® C216 chipset-based Intel® Xeon® workstation platform with one Intel Xeon processor E3-1275 v2 (quad-core, 3.5GHz, 8M cache), ACRVMBY1.86C.0096.P00 September 9, 2012, Intel HT Technology enabled, 16GB memory (4x4GB DDR3-1600 ECC UDIMM), 2TB 7200RPM SATAIII HDD (WD2000FYYZ), RHEL v6.3 - 2.6.32-278.e16.x86\_64. Compiler version 13.0.0.133 of Intel C++ Studio XE and Intel Fortran. Source: Intel internal estimated measurements, April 2013. Scores: SPECint®\_rate\_base2006=185.

New configuration: Intel® C226 chipset-based Intel® Xeon® workstation platform with one Intel Xeon processor E3-1275 v3 (quad-core, 3.5GHz, 8M cache), HSWLPTU1.86C.0116.R00 March 3, 2013, Intel HT Technology enabled, 16GB memory (4x4GB DDR3-1600 ECC UDIMM), 2TB 7200RPM SATAIII HDD (WD2000FYYZ), RHEL v6.4 - 2.6.32-358.e16.x86\_64. Compiler version 13.0.0.133 of Intel C++ Studio XE and Intel Fortran. Source: Intel internal estimated measurements, April 2013. Scores: SPECint®\_rate\_base2006=209

#### 8. Baseline configuration: Intel® C206 chipset-based server platform with one Intel® Xeon® processor E3-1260L (Quad-Core, 2.4GHz, 8MB L3 cache), Turbo Boost Disabled, Hyper-Threading Enabled, 8GB (2x4GB DDR3-1333 UDIMM), 64GB SATA SSD, Microsoft Windows® 2008 R2 SP1, Java SE Runtime Environment (build 1.6.0\_30-b12), Java HotSpot 64-Bit Server VM (build 20.5-b03, mixed mode). Source: Intel internal testing as of Mar 2012. SPECpower\_ssj2008® score: 3069

Previous configuration: Intel® C206 chipset-based server platform with one Intel® Xeon® processor E3-1265L v2 (8M Cache, 2.5GHz), EIST Enabled, Turbo Boost Enabled, Hyper-Threading Enabled, 8GB (2x 4GB DDR3-1600 UDIMM), 64G 3Gb/s SATA SSD, Microsoft Windows® 2008 R2 SP1, Java SE Runtime Environment (build 1.6.0\_30-b12), Java HotSpot 64-Bit Server VM (build 20.5-b03, mixed mode). Source: Intel internal testing as of Mar 2012. SPECpower\_ssj2008® score: 4291.2

New configuration: Intel® C226 chipset-based server platform with one Intel® Xeon® processor E3-1265L v3 (8M Cache, 2.5GHz), EIST Enabled, Turbo Boost Enabled, C3 Disabled, C6 Enabled, Hyper-Threading Enabled, 8GB (2x 4GB DDR3-1600 UDIMM), 64G 3Gb/s SATA SSD, Microsoft Windows® 2008 R2 SP1, IBM J9 VM (build 2.6, JRE 1.7.0 Windows Server 2008 amd64-64 20120322\_106209v)(JIT enabled, AOT enabled). Source: Intel internal testing as of April 2013. SPECpower\_ssj2008® score: 5094

#### 9. Media application performance based on SPECapc® for Maya® 2012 CPU composite. CAD application performance based on SPECapc® for Solidworks® 2013 CPU composite

Baseline configuration: Intel® C206 chipset-based Intel® Xeon® workstation platform with one Intel Xeon processor E3-1275 (quad-core, 3.4GHz, 8M cache), ASNBCPT1.86C.0085.P00 July 5, 2012, Intel® Hyper Threading Technology (Intel® HT Technology) best configuration, 8GB memory (2x4GB DDR3-1333 ECC UDIMM), Intel® HD Graphics P3000 with driver 2455, 2TB 7200RPM SATAIII HDD (WD2000FYYZ), Microsoft Windows 7® Service Pack 1. Source: Intel internal testing as of April 2013.

Previous configuration: Intel® C226 chipset-based Intel® Xeon® workstation platform with one Intel Xeon processor E3-1275 v2 (quad-core, 3.5GHz, 8M cache), ACRVMBY1.86C.0096.P00 September 9, 2012, Intel HT Technology best configuration, 8GB memory (2x4GB DDR3-1600 ECC UDIMM), Intel HD Graphics P4000 with driver 2712, 2TB 7200RPM SATAIII HDD (WD2000FYYZ), Microsoft Windows 7® Service Pack 1. Source: Intel internal testing as of April 2013.

New configuration: Intel® C226 chipset-based Intel® Xeon® workstation platform with one Intel Xeon processor E3-1275 v3 (quad-core, 3.5GHz, 8M cache), HSWLPTU1.86C.0116.R00 March 3, 2013, Intel HT Technology best configuration, 8GB memory (2x4GB DDR3-1600 ECC UDIMM), Intel HD Graphics P4600/4700 with driver 2989, 2TB 7200RPM SATAIII HDD (WD2000FYYZ), Microsoft Windows 7® Service Pack 1. Source: Intel internal testing as of April 2013.

#### 10. Baseline configuration: Intel® C206 chipset-based Intel® Xeon® workstation platform with one Intel Xeon processor E3-1275 (quad-core, 3.4GHz, 8M cache), ASNBCPT1.86C.0085.P00 July 5, 2012, Intel® Hyper Threading Technology (Intel® HT Technology) best configuration, 8GB memory (2x4GB DDR3-1333 ECC UDIMM), Intel® HD Graphics P3000 with driver 2455, 2TB 7200RPM SATAIII HDD (WD2000FYYZ), Microsoft Windows 7® Service Pack 1. Source: Intel internal testing as of April 2013, SPECviewperf® 11, geomean of 7 workloads (ensight-04, lightwave-01, maya-03, proe-05, sw-02, tcvis-02, snx-01)

Previous configuration: Intel® C226 chipset-based Intel® Xeon® workstation platform with one Intel Xeon processor E3-1275 v2 (quad-core, 3.5GHz, 8M cache), ACRVMBY1.86C.0096.P00 September 9, 2012, Intel HT Technology best configuration, 8GB memory (2x4GB DDR3-1600 ECC UDIMM), Intel HD Graphics P4000 with driver 2712, 2TB 7200RPM SATAIII HDD (WD2000FYYZ), Microsoft Windows 7® Service Pack 1. Source: Intel internal testing as of April 2013, SPECviewperf® 11, geomean of 7 workloads (ensight-04, lightwave-01, maya-03, proe-05, sw-02, tcvis-02, snx-01)

New configuration: Intel® C226 chipset-based Intel® Xeon® workstation platform with one Intel Xeon processor E3-1275 v3 (quad-core, 3.5GHz, 8M cache), HSWLPTU1.86C.0116.R00 March 3, 2013, Intel HT Technology best configuration, 8GB memory (2x4GB DDR3-1600 ECC UDIMM), Intel HD Graphics P4600/4700 with driver 2989, 2TB 7200RPM SATAIII HDD (WD2000FYYZ), Microsoft Windows 7® Service Pack 1. Source: Intel internal testing as of April 2013., SPECviewperf® 11, geomean of 7 workloads (ensight-04, lightwave-01, maya-03, proe-05, sw-02, tcvis-02, snx-01)

#### 11. For more information on Intel® Rapid Storage Technology, visit [http://www.intel.com/p/en\\_US/support/highlights/chpsts/imsms](http://www.intel.com/p/en_US/support/highlights/chpsts/imsms).

#### 12. No computer system can provide absolute security. Requires an enabled Intel® processor and software optimized for use of the technology. Consult your system manufacturer and/or software vendor for more information.

#### 13. No computer system can provide absolute security. Requires an enabled Intel® processor, enabled chipset, firmware, software, may require a subscription with a capable service provider (may not be available in all countries). Intel assumes no liability for lost or stolen data and/or systems or any other damages resulting thereof. Consult your Service Provider for availability and functionality. For more information, visit <http://www.intel.com/go/anti-theft>. Consult your system manufacturer and/or software vendor for more information.

#### 14. AVX/AVX2 is designed to achieve higher throughput to certain integer and floating point operations. Depending on processor power and thermal characteristics and system power and thermal conditions, AVX/AVX2 floating point instructions may run at lower frequency to maintain reliable operations at all times.

#### 15. Requires a system with Intel® Turbo Boost Technology. Intel Turbo Boost Technology and Intel Turbo Boost Technology 2.0 are only available on select Intel® processors. Consult your system manufacturer. Performance varies depending on hardware, software, and system configuration. For more information, visit <http://www.intel.com/go/turbo>.

#### 16. Available on select Intel® Core™ processors. Requires an Intel® Hyper-Threading Technology-enabled system; consult with your PC manufacturer. Performance will vary depending on the specific hardware and software used. For more information, including details on which processors support Intel HT Technology, visit <http://www.intel.com/info/hyperthreading>.

#### 17. 8 GT/s and 128b/130b encoding in PCIe 3.0 specification enables double the interconnect bandwidth over the PCIe 2.0 specification. Source: [http://www.pcisig.com/news\\_room/November\\_18\\_2010\\_Press\\_Release/](http://www.pcisig.com/news_room/November_18_2010_Press_Release/).

#### 18. The SATA 3.x specification enables double the data rate (from 3 GB/s to 6 Gb/s) of that enabled by the SATA 2.x specification. Source <http://www.sata-io.org/technology/6GbDetails.asp>.

#### 19. Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, and virtual machine monitor (VMM). Functionality, performance, or other benefits will vary depending on hardware and software configurations. Software applications may not be compatible with all operating systems. Consult your PC manufacturer. For more information, visit <http://www.intel.com/go/virtualization>.

#### 20. Requires activation and a system with a corporate network connection, an Intel® AMT enabled chipset, and network hardware and software. For notebooks, Intel AMT may be unavailable or limited over a host OS-based VPN, when connecting wirelessly, on battery power, sleeping, hibernating, or powered off. Results dependent upon hardware, setup, and configuration. For more information, visit <http://www.intel.com/content/www/us/en/architecture-and-technology/intel-active-management-technology.html>.

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 SSE3 instruction sets and other optimizations. Intel does not guarantee the availability, functionality, or effectiveness of any optimization on microprocessors not manufactured by Intel.

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Relative performance is calculated by assigning a baseline value of 1.0 to one benchmark result, and then dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms, and assigning them a relative performance number that correlates with the performance improvements reported.

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