Choosing a Workstation or a Desktop That Best Meets Your Needs

Workstations based on the Intel® Xeon® processor E3-1200 v2 product family are much more than a turbo-charged Intel® Core™ processor-based PC, they are a workload-optimized innovation platform designed to deliver the processing, graphics and bandwidth capacities artist, animators, analysts, engineers, scientists and other professionals demand in order to accelerate their innovation.

From Computer Aided Design (CAD) to number-crunching to video editing or image processing, compared to a desktop PC an Intel Xeon processor E3-1200 v2 product family-based workstation will provide the intelligent performance that is demanded by many professional applications. Still, not everyone needs a workstation. A typical office worker running standard office applications such as word processing, e-mail, and presentation software will get all the performance needed from a standard business PC.

Beyond processing speed and capacity advantages, Intel Xeon processor E3-1200 v2 product family-based workstations provide users increased levels of reliability, stability and potentially accuracy when compared to business or consumer desktop solutions.
Building The Right Workstation

A recent study completed by CATi, a SolidWorks reseller, found that even in environments like CAD (e.g., single threaded application) most users will benefit from a workstation with between four and six cores. As it turns out, almost all users mega task between arrays of needs that range from Microsoft user productivity tools and web surfing to IT updating licenses and performing security updates. Today, two cores are not enough and four cores are barely enough.

If a user employs any application that is multi-threaded (e.g., ray-tracing, simulation, analysis, etc.), then the user benefits from access to a dual-socket workstation. Other critical findings from CATi:

- **Do not underinvest in memory,** this can potentially reduce your productivity by as much as 2X.¹

- **Consider SSDs.** While expensive, users can experience up to a 3.2X increase in productivity.²

- **Consider which graphics card is really needed.** In CATi’s study they noted limited performance or productivity increases between an entry and high-end graphics adapter. While industry-standard benchmarks may suggest otherwise – real work cases show limited advantages.

The Workstation Advantage

Workstations are purpose-built to deliver the performance, reliability and stability demanded by designers, engineers, financial analysts, and researchers running large complex applications.

### Table 1. Quick guide to feature differences between the Intel® Core™ processor and Intel® Xeon® processor E3-1200 product families.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Intel® Core™ i3 Processor Product Family</th>
<th>Intel® Core™ i5 Processor Product Family</th>
<th>Intel® Core™ i7-3770 Processor Product Family</th>
<th>Intel® Xeon® Processor E3-1275 v2 Product Family</th>
<th>Intel® Xeon® Processor E3-1290 v2 Product Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Frequency</td>
<td>3.4 GHz</td>
<td>3.4 GHz</td>
<td>3.5 GHz</td>
<td>3.5 GHz</td>
<td>3.7 GHz</td>
</tr>
<tr>
<td>Max Intel® Turbo Boost Technology³</td>
<td>N/A</td>
<td>3.8 GHz</td>
<td>3.9 GHz</td>
<td>3.9 GHz</td>
<td>4.1 GHz</td>
</tr>
<tr>
<td>Cores/Threads</td>
<td>2/4</td>
<td>4/4</td>
<td>4/8</td>
<td>4/8</td>
<td>4/8</td>
</tr>
<tr>
<td>Intel® Turbo Boost Technology</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Intel® Hyper-Threading Technology⁴</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>ECC Memory Support</td>
<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Intel® HD Graphics P4000⁴</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Graphics Frequency</td>
<td>650-1050 MHz</td>
<td>650-1150 MHz</td>
<td>650-1150 MHz</td>
<td>650-1250 MHz</td>
<td>650-1250 MHz</td>
</tr>
<tr>
<td>Professional CAD/Media/DCC certifications</td>
<td></td>
<td></td>
<td></td>
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<td>✔</td>
</tr>
</tbody>
</table>

- **Performance is achieved** through an assortment of technologies
  - **Processor frequency:** The Intel Xeon processor E3-1290⁴ v2 product family supports a base frequency of 3.7 GHz and a max Intel® Turbo Boost Technology frequency of 4.1 GHz. The Intel® Core™ processor i7-3770⁲ supports a base frequency of 3.4 GHz and a max Intel® Turbo Boost Technology frequency of 3.9 GHz.
  - **Cores:** Both the Intel Xeon processor E3-1290 v2 product family and the Intel Core i7-3770 processor support four cores and eight threads. The Intel® Xeon® processor E5-2600 product family supports up to eight cores and a dual-processor workstation will support up to 16 cores and 32 threads.
  - **I/O:** While I/O for both Intel Xeon processor E3-1200 v2 product family and the Intel Core i7 processor family are similar, the I/O feature set found in workstations with the Intel Xeon processor E5-1600/2600 product family offer users a significantly more robust infrastructure – making it ideal for large multifaceted workloads that place a premium on having the data expedited through the entire workstation solutions.
  - **New Instructions:** The need for greater computing performance continues to grow across industry segments. To support rising demand and evolving usage models, Intel continues to introduce new instructions in order to help users employ all the processing power available.
Intel® Advanced Vector Extensions (Intel® AVX) is our latest foray. It is a new 256-bit instruction set extension to SSE and is designed for applications that are Floating Point (FP) intensive. Intel AVX improves performance due to wider vectors, new extensible syntax, and rich functionality. This results in better management of data and general purpose applications like image, audio/video processing, scientific simulations, financial analytics and 3D modeling and analysis.

• Processor-based Graphics: The Intel Xeon processor E3-1200 v2 product family is built on Intel 22nm processes using 3D Tri-Gate transistors. The improvement to the on-die GPU, Intel® HD Graphics P4000, represents a new high-end offering for processor-based graphics for entry-level workstations. It is equipped with 16 execution units (EUs), up from 12 in the previous generation and also includes improved geometry performance, fast clear of render target and increased compute throughput. It is an ideal solution for 2D, basic 3D and entry-level video editing requirements. The Intel Xeon processor E3-1200 v2 product family comes with five new professional application certifications which include Autodesk Maya 2013, 3dsMax 2013 and Adobe After Effects CS6. This is in addition to the already existing eight applications certified for the earlier Intel Xeon processor E3-1200 v2 product family from major ISVs like Autodesk, Adobe, Bentley and Siemens.

• Reliability and Stability
  - ECC Memory: The greatest difference between a desktop and an Intel Xeon processor E3-1200 v2 processor-based workstation is its opportunity to employ ECC memory – a type of memory that can detect and correct the more common kinds of internal data corruption. It also checks to make sure that data is not corrupted in memory and prevents 99.988 percent of all soft memory errors. The net benefit is that accuracy and integrity are preserved. See “The Numbers Don’t Lie” side bar for more data.
  - Certified solution: Workstation solutions are almost always certified with professional-grade applications – that means the application has been tested, validated and often times optimized at the platform or graphics level. Users can depend on these answers to be correct because they have been validated by OEMs and ISVs.

Summary
Intel® Xeon® processor-based workstations are purpose-built for professionals. Through an array of technologies, they offer users the opportunity to explore more ideas in less time – making it more likely to potentially arrive at the ideal solution. They accelerate end user insight and innovation.

The Numbers Don’t Lie. But What if They Did?

A Reason to Use ECC Memory
Data corruption means more than just hardware failure. It can produce problems beyond a system crash. In fact, data changing in memory can go completely undetected. Corrupted data can impact every aspect of your business and you might not even realize it.

How and why data can change in system memory?
• Faster memory speeds and larger capacities increase the likelihood of soft memory errors that occur when memory bits “flip” and corrupt the data.
• This “flip” can completely change a piece of data. It might go undetected. It might cause a visible error, or a system crash.

How common are soft memory errors? More common than you might think.
• Take the average system without ECC memory: one in three will experience a memory error each year.1
• 24/7 operation equals a greater risk of soft memory errors.

There’s a solution: Error-correcting code (ECC) memory.
• ECC memory finds and fixes 99.988% of all soft memory errors.8 ECC memory is available on workstations, but is not available on desktop PCs.
• Gain added protection against crashes and data errors.

Choose a real workstation with ECC memory and an Intel® Xeon® processor.
Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See www.intel.com/products/processor_number for details.


2 http://www.youtube.com/watch?v=QylIinkHPtk&feature=results_video&playnext=1&list=PL698CFFD6A37A1ACB.

3 Performance comparison using Linpack benchmark. Baseline score of 159.4 based on Intel internal measurements as of 5 December 2011 using a Supermicro® X10DTN+ system with two Intel® Xeon® processor X5690, Turbo Enabled, EIST Enabled, Hyper-Threading Enabled, 48 GB RAM, Red Hat® Enterprise Linux Server 6.1 beta for x86_64. New score of 347.7 based on Intel internal measurements using an Intel® Rose City platform with two Intel® Xeon® processor E5-2690, Turbo Enabled or Disabled, EIST Enabled, Hyper-Threading Enabled, 64 GB RAM, Red Hat® Enterprise Linux Server 6.1 beta for x86_64.


5 Requires a system with Intel® Turbo Boost Technology capability. Intel Turbo Boost Technology 2.0 is the next generation of Turbo Boost Technology and is only available on 2nd gen Intel® Core™ processors. Consult your PC manufacturer. Performance varies depending on hardware, software, and system configuration. For more information, visit http://www.intel.com/technology/turboboost.

6 Requires an Intel® HT Technology enabled system, check with your PC manufacturer. Performance will vary depending on the specific hardware and software used. Not available on Intel® Core™ i5-750. For more information including details on which processors support HT Technology, visit http://www.intel.com/info/hyperthreading.


8 Source: X. Li, K. Shen, M. Huang, and L. Chu. “A Memory Soft Error Measurement on Production Systems.” – http://www.ece.rochester.edu/~xinli/usenix07/. Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, reference www.intel.com/software/products.

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