



Small Business Upgrades to Reliable, High-Performance Intel® Xeon® Processor-based Workstations to Satisfy Complex 3D Animation Needs

Intel, BOXX Technologies* and Caffelli* collaborated to deploy a local workstation-based render farm featuring Intel® Xeon® processors E5-2687W v3 and the Intel® Solid-State Drive DC S3700 Series. These workstations replaced the integrated branding agency's existing prosumer processor-based systems with true workstations that each offered up to 4x performance improvement.^{1,2}



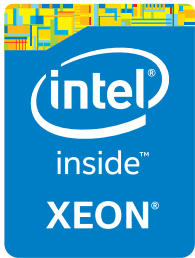
Collaboration Drives Successful Implementation

Caffelli*, a full-service integrated branding agency in Portland, Oregon, required additional performance and flexibility for their expanding 3D animation and graphics rendering needs. Combining Intel® products and technologies with the expertise and support of BOXX Technologies*, Caffelli was able to configure and deploy the ideal setup. The new solution, featuring the Intel® Xeon® processor E5-2687W v3 and Intel® Solid-State Drive DC S3700 Series, enables Caffelli to render richly detailed and highly complex 3D models and scenes at faster speeds—effectively taking their computing and creativity to entirely new levels.

Workflows for Caffelli's* 3D animators were dramatically streamlined through the use of BOXX* workstations featuring Intel® Xeon® processors.

“Every customer is unique, faces different challenges, and requires a hardware solution tailored to their specific workflow. By listening to the professionals at Caffelli, we were able to configure the ideal solution featuring the latest Intel® Xeon® technology and other enterprise class components designed to accelerate their workflow to speeds never seen before.”

Shoaib Mohammad, VP of Marketing and Business Development, BOXX Technologies*



System Configuration:

- 2 x Intel® Xeon® E5-2687W v3 3.1 GHz processors, 25MB cache, 9.60 QPI (Ten-Core)
- 32GB DDR4-2133MHz REG ECC (8 x 4GB DIMMS)
- NVIDIA Quadro* K4200 4GB
- 1 x 800GB Intel® Solid State Drive—SATA 6Gb/s
- Microsoft Windows* 7 Professional Edition 64-Bit

Intel + BOXX Solution

BOXX Technologies, Inc. specializes in high performance workstations and rendering systems for various industries. Their expertise, top-of-the-line components and the latest enterprise-grade Intel components combined to create a custom solution tailored to Caffelli’s expanding 3D animation workflows. Considerations for Caffelli’s new workstation configuration included introducing more computing power while maintaining a high level of energy efficiency for multithreaded, compute-intensive workloads, as well as gaining the stability and reliability of a true enterprise-grade computing platform. Caffelli’s previous rendering system featured an Intel® Core™ i7-3960X processor Extreme Edition with six cores and capable of running twelve computing threads. Stepping up to the Intel Xeon processor E5-2687W v3, Caffelli gained an additional fourteen cores—ten cores per processor in a dual-processor configuration. Built with the latest Intel® 22nm technology and 3D Tri-Gate transistors, the Intel Xeon processor E5-2687W v3 delivers half the power consumption versus the prior manufacturing process.³

A large capacity, 800GB enterprise class Intel Solid-State Drive DC S3700 Series rounded out the solution offering with superior responsiveness and true enterprise-grade reliability.

“Organizations of all kinds are seeing significant advantages through application of the highly versatile Intel Xeon processor E5 family and Intel Solid-State Drives for their business challenges. BOXX’s innovative solution for Caffelli is just one example of how the groundbreaking features of these products are helping to streamline the way things get done.”

Ryan Rodman, Director of Datacenter Channels, Intel

Processing at Super Speeds

The final workstation configuration featured two Intel Xeon processors E5-2687W v3, each with ten cores capable of running twenty threads. A total of three workstations were deployed at Caffelli. When combined with Caffelli’s existing rack server, featuring the Intel Xeon processor E5-2650 (dual-processor with eight cores and sixteen threads per processor), seventy-six total cores supporting one hundred and fifty-two threads were available. Caffelli was able to make full use of these cores and threads through a local gigabit-based distributed rendering network.

Distributed Rendering with CINEMA 4D*

Through distributed rendering across a gigabit network with CINEMA 4D* Team Render and V-Ray Distributed Render, Caffelli can dedicate three complete Intel Xeon processor-based workstations and a rack server to extended rendering sessions. When not rendering, each individual system can be used as a standalone workstation. The result is increased utilization of compute resources and amazingly flexible configurations across the business.

Multi-Threaded Performance Scales

As a multi-threaded application, CINEMA 4D can take full advantage of Intel® Hyper-Threading Technology⁵ available on the Intel Xeon processor E5-2687W v3. By utilizing all available compute cores and threads to their fullest potential, Caffelli generates highly detailed character features like flowing hair, billowing fabric and detailed textures up to four times faster than before.^{1,2} The Intel Xeon processors E5-2687W v3 also use Intel® QuickPath Interconnect (QPI) to speed up data transfer in dual-socket systems. This high-speed point-to-point interconnect enables high bandwidth, low latency and the potential to scale—making it a step up from Caffelli’s previous Intel Core i7-3960X processor Extreme Edition-based system.

With each workstation upgrade, Caffelli is able to render out amazingly detailed characters and environments **up to 4x faster** than before.^{1,2}

Additionally, CINEMA 4D uses Embree*, a collection of high-performance ray tracing instructions, developed by Intel, with support for Streaming SIMD Extensions (SSE), Advanced Vector Extensions (AVX)⁴ and others in the render engine to streamline rendering on the Intel Xeon processor E5-2687W v3.

This solution was put to the test when creating the Intel character, “Aurora,” and her surrounding environments. Additional features help further streamline the rendering process. With 20 MB of Intel® Smart Cache located on each processor die, more data is kept close to the computational core. In addition, Intel® Turbo Boost Technology⁶ delivers higher processor frequencies when power and thermal headroom allows.

Stability & Consistency

The new solution also provided the stability and consistency Caffelli needs to carry out long render and animation-based tasks with no downtime. Error-Correcting Code (ECC) Memory, supported by Intel Xeon processor-based systems, detects and corrects common kinds of internal data corruption. As a result, real server-grade platforms gain added protection against memory errors that can crash a long render project. Intel Xeon processors E5-2687W v3 further support data integrity with integrated storage features like support for x16 non-transparent bridging (vs. x8 NTB), to increase scalability and accelerated RAID for implementing RAID 5 and 6 without a custom ASIC.

Render Time Comparison

To see the benefits of their new workstation configuration, Caffelli benchmarked their previous Intel Core i7-3960X processor Extreme Edition-based system against the new dual Intel Xeon processor E5-2687W v3 setup using the MAXON* CINEBENCH R15 benchmark tests for CPU and GPU and a one hour test render for a local project. The results of both were impressive.

CINEBENCH Benchmark Details

The CINEBENCH R15 CPU test evaluates processing speed by using all available processing cores to render out a photorealistic 3D scene using various algorithms. While the Intel Core i7-3960X Processor Extreme Edition performed admirably, (returning a score of 858 at 3.30 GHz), with more available cores and the ability to run more simultaneous threads, the dual Intel Xeon Processor E5-2687W v3 configuration trumped this number, scoring 3,027 at 3.10 GHz.¹

To test graphics card performance, the CINEBENCH R15 GPU test was used. The test required the graphics card to display nearly one million polygons, textures and a variety of effects. The final score, measured with OpenGL*, showed the Intel Core i7-3960X processor Extreme Edition at 65.87 frames per second (fps), while the dual Intel Xeon Processor E5-2687W v3 delivered 162.54 fps.¹

Detailed character renderings like Aurora can now be completed in less time thanks to Caffelli's new BOXX workstations featuring Intel Xeon processors.



	Processing Cores / Threads	Processor Base Frequency	TDP (Thermal Design Power) in Watts	ECC Memory Supported?
Intel® Core™ i7-3960X Processor Extreme Edition	6 / 12	3.3 GHz	130 W	No
Intel® Xeon® Processor E5-2687W v3	20 (10x2) / 40 (20x2)	3.1 GHz	160 W	Yes
Intel® Xeon® Processor E5-2650	16 (8x2) / 32 (16x2)	2.0 GHz	95 W	Yes

The local project one-hour test render also yielded impressive results—the Intel Core i7-3960X processor Extreme Edition rendered a series of frames in 12 minutes, 24 seconds, while the dual Intel Xeon processor E5-2687W v3 configuration rendered those same frames in just 3 minutes, 11 seconds.² Clearly, with multi-threaded applications like CINEMA 4D, scaling to more cores brings with it equivalent performance gains. It may also be assumed that these performance gains can be extrapolated to other usages beyond gaming character and environment renders. Other industries, like architecture, filmmaking, scientific modeling, engineering, biosciences and other high-performance computing-dependent industries may expect to see similar performance gains when running multi-threaded applications.

Additional Intel Components Complete the Solution

In addition to the Intel Xeon processors E5-2687W v3, an Intel Solid-State Drive DC S3700 Series in each workstation helped ensure that storage bandwidth could keep pace with available compute resources. These drives come equipped with end-to-end data protection using an advanced error correction code scheme that ensures data integrity by protecting against possible data corruption in the NAND, SRAM and DRAM memory. All things considered, the 20nm Multi-Level Cell (MLC) NAND flash memory-based drives provide a reliable, cohesive system addition enabling maximum security and performance.



“Collaborating with Intel and BOXX enabled our creative agency to perform seamlessly during large 3D animation renders, by using workstations as on-demand render nodes. This maximized our budget, and has created a solid model for growth.”

Marcelo Anteparra-Naujock, Executive Creative Director, Caffelli

Faster 3D Rendering Unleashes Creativity & Efficiency

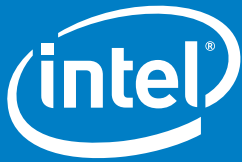
Caffelli is now equipped for the present and ready for the future with a fast, reliable BOXX configuration that is both expandable and enterprise-grade. As a result, the integrated branding agency is better able to produce hyper-realistic 3D characters, objects and environments in less time. With more compute cores featuring Intel® Hyper-Threading Technology⁵ and Intel® Turbo Boost Technology⁶, Caffelli can complete rendering tasks that rely on multi-threaded applications like CINEMA 4D up to four times faster than previously possible.^{1,2}

Caffelli more than doubled their total local workstation processing power with three BOXX workstations featuring dual Intel Xeon processors E5-2687W v3 and their existing Intel Xeon processor E5-2650-based rack server. These systems add up to a combined total of seventy-six cores capable of running one hundred and fifty-two threads. With this new multi-workstation render farm configuration, Caffelli's 3D artists are able to manipulate large render files with less waiting—resulting in workflow efficiencies and the ability to unleash greater creativity.



Looking to the Future

Thanks to the collaboration between Intel, BOXX Technologies and Caffelli, implementation of the new systems was a huge success. Caffelli is thrilled to be able to leverage the cutting-edge capabilities of their new workstations to deliver professional-grade 3D animations in less time. This flexible, future-ready solution provides a launching pad for Caffelli to unleash creativity without concern for computing limitations.



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BOXX

Learn more about BOXX Technologies:
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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. For more information go to <http://www.intel.com/performance>.

- 1 Source: Caffelli internal testing using MAXON CINEBENCH R15 GPU and CPU tests, November 2014. Configurations: Intel® Core™ i7-3960X CPU with 6 cores, 12 threads @ 3.30 GHz, Intel® Hyper-Threading Technology enabled, Intel® Turbo Boost Technology enabled. Operating System: Windows 7, 64 Bit, Professional Edition Service Pack 1 (build 7601), GFX Board: Quadro 4000/PCIe/SSE2; versus dual Intel® Xeon® processor E5-2687W v3 with 20 cores, 40 threads @ 3.10 GHz, Operating System: Windows 7, 64 Bit, Professional Edition Service Pack 1 (build 7601), GFX Board: Quadro K4200/PCIe/SSE2. GPU results with OpenGL: Intel® Core™ i7-3960X: 65.87 fps; versus dual Intel® Xeon® processor E5-2687W v3: 162.54 fps. CPU results: Intel® Core™ i7-3960X: 858; versus dual Intel® Xeon® processor E5-2687W v3: 3,027. Intel does not control or audit the design or implementation of third party benchmark data or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites 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.
- 2 Source: Caffelli internal local project one-hour test render comparison for series of frames, November 2014. Configurations: Intel® Core™ i7-3960X CPU with 6 cores, 12 threads @ 3.30 GHz, Intel® Hyper-Threading Technology enabled, Intel® Turbo Boost Technology enabled. Operating System: Windows 7, 64 Bit, Professional Edition Service Pack 1 (build 7601), GFX Board: Quadro 4000/PCIe/SSE2; versus dual Intel® Xeon® processor E5-2687W v3 with 20 cores, 40 threads @ 3.10 GHz, Operating System: Windows 7, 64 Bit, Professional Edition Service Pack 1 (build 7601), GFX Board: Quadro K4200/PCIe/SSE2. Results: Intel® Core™ i7-3960X: 12 minutes, 24 seconds; versus dual Intel® Xeon® processor E5-2687W v3: 3 minutes, 11 seconds. Intel does not control or audit the design or implementation of third party benchmark data or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites 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.
- 3 Compared to previous generation 2-D transistors on 32nm planar transistors. Source: Intel internal testing. 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.
- 4 Intel® Advanced Vector Extensions (Intel® AVX)* are designed to achieve higher throughput to certain integer and floating point operations. Due to varying processor power characteristics, utilizing AVX instructions may cause a) some parts to operate at less than the rated frequency and b) some parts with Intel® Turbo Boost Technology 2.0 to not achieve any or maximum turbo frequencies. Performance varies depending on hardware, software, and system configuration and you should consult your system manufacturer for more information. *Intel® Advanced Vector Extensions refers to Intel® AVX, Intel® AVX2 or Intel® AVX-512. For more information on Intel® Turbo Boost Technology 2.0, visit <http://www.intel.com/go/turbo>
- 5 Available on select Intel® processors. Requires an Intel® Hyper-Threading Technology (Intel® HT Technology) enabled system. Consult your system manufacturer. Performance will vary depending on the specific hardware and software used. For more information including details on which processors support HT Technology, visit <http://www.intel.com/info/hyperthreading>.
- 6 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 PC manufacturer. Performance varies depending on hardware, software, and system configuration. For more information, visit <http://www.intel.com/go/turbo>

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