



Driving Higher Performance for Advanced Structural Analysis

Altair RADIOSS* and Intel® Xeon® Scalable processors combine to provide an advanced solution stack for improved crashworthiness, safety, and manufacturability of automotive structural designs.

Altair RADIOSS* takes advantage of Intel® Xeon® Scalable processors to optimize highly non-linear problems in structural analysis, potentially helping customers to:

- **Accelerate simulations** to obtain results faster and run more variations
- **Run more complex simulations** to obtain richer insights
- **Reduce time to market** for faster design and development

Enormous advances in auto safety over the past several decades are due in no small part to the ongoing efforts by car manufacturers to make structural improvements during the design process. While the most dramatic testing may involve crash-test dummies piloting actual cars to destruction, the bulk of structural analysis happens in computer simulations. A structural analysis solver depended on by automotive, aerospace, electronics, and defense companies for more than 30 years, RADIOSS and its companion tools are the basis for sophisticated understanding and prediction of structural design behaviors under extreme conditions.

At the same time customers continue to build more complex and sophisticated simulation models, they also strive to tighten development windows, to speed time to market with ever-improving designs. RADIOSS draws on synergies with Intel® architecture to drive the performance that enables both those goals. Co-engineering by Altair and Intel for RADIOSS on the new Intel® Xeon® Scalable processors builds significantly on previous results.

Faster Completion of a Crash Simulation

Performance engineers at Altair found that a crash simulation ran with up to 2.1X greater performance on the Intel® Xeon® Gold 6148 processor, compared with a processor two generations old, as shown in Figure 1.¹ That baseline processor was introduced in 2014, just three years earlier, making it a viable comparison to servers that may be in wide use by customers. Even compared to more recent hardware—the Intel® Xeon® processor E5-2699 v4, introduced in 2016—the new processor showed up to a 1.64X performance increase.

“The Intel® Xeon® Scalable processor platform offers great computing power to run Altair HyperWorks* solvers and especially RADIOSS*. We are very pleased it is now available to our customers.”

– Eric Lequiniou, HPC Director, Altair

Potential customer benefits from this improved performance are significant. Auto manufacturers can run more simulations based on more complex data sets and configurations, in less time. As a result, they can meet the ongoing challenge to increase driver and passenger safety while compressing design windows. Better safety ratings can help make those car makers more competitive, while perhaps also achieving the best result of all—saving lives.

Two-Socket Generation-to-Generation Performance Increases¹ from Altair RADIOSS*

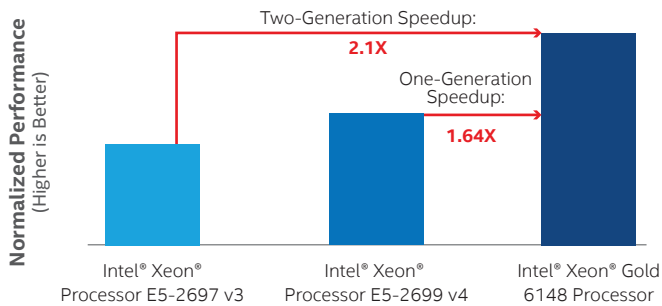


Figure 1. Improved performance for an Altair RADIOSS* workload on successive hardware generations.¹

Server Platform Benefits from Intel® Xeon® Scalable Processors

A range of hardware features built into the Intel Xeon Gold 6148 processor directly contribute to the acceleration of RADIOSS workloads. Built using a new microarchitecture based on 14-nanometer process technology, the processor features a redesigned memory subsystem with six channels, for 1.5X greater memory bandwidth than previous generations.² This advance works in conjunction with the new Intel® Ultra Path Interconnect, which provides a new, higher-bandwidth data path between processors, to offer improved system-level data handling, a critical contributor to performance on data-intensive RADIOSS workloads.

RADIOSS is also enabled to take advantage of Intel® Advanced Vector Extensions 512 (Intel® AVX-512) support in the Intel Xeon Scalable processors, including the Intel Xeon Gold 6148 processor. Improved vectorization based on Intel AVX-512 instructions allows each processor register to hold twice as much data as predecessor technologies, getting more advantage out of available hardware resources. For example, a single register under Intel AVX-512 can hold up to eight double-precision or 16 single-precision floating-point numbers, helping accelerate the floating-point calculations that are prevalent in RADIOSS simulations.

As a result of these hardware advances, RADIOSS customers can run more complex simulations in the same amount of time, run their existing simulations faster, and reduce design time, for potential cost savings and faster time to market.

Conclusion

RADIOSS customers in the automotive, aerospace, electronics, and defense industries now have the opportunity to dramatically improve their capabilities in structural analysis with just a simple hardware upgrade. Those who choose to can take a valuable step toward building higher-quality, lower-cost, more-competitive products.

Take the Next Step

Learn more about the Intel® Xeon® Scalable processors: intel.com/XeonScalable

Learn more about software ecosystem enablement: www.intel.com/XeonSoftwareSolutions

Learn more about Altair RADIOSS*: www.altair.com

Solution provided by:



Altair



¹ RADIOSS*: RADIOSS 2017, Neon 1M 8ms benchmark workload.

BASELINE: Altair RADIOSS 14 on Red Hat Enterprise Linux® 6.5, 2x Intel® Xeon® processor E5-2697 v3 @ 2.6GHz, Intel® Hyper-Threading Technology with 28 MPI x 2 OpenMP*, 64 GB DDR3-1833, regular DIMM, Intel® SSD DC S3700 Series (800 GB), 1Gb network, Source is Altair internal as of April 1, 2016.

NEXT GENERATION: Altair RADIOSS 2017 on Red Hat Enterprise Linux 6.5, 2x Intel® Xeon® processor E5-2699 v4 @ 2.2GHz, Intel Hyper-Threading Technology with 44 MPI x 2 OpenMP, 64 GB DDR3-1833, regular DIMM, Intel SSD DC S3700 Series (800 GB), 1Gb network, BIOS SE5C620.86B.01.00.0412, Source is Altair internal as of April 1, 2017.

NEW: Altair RADIOSS 2017 on CentOS® Linux 7.2, 2 Intel® Xeon® Gold 6148 processor @ 2.4 GHz, Intel Hyper-Threading Technology with 40 MPI x 2 OpenMP, 192 GB DDR4-2666, regular DIMM, Intel SSD DC S3700 Series (800 GB), 1Gb network, BIOS 0271.R00, Source is Altair internal as of April 11, 2017.

² www.intel.com/XeonScalable.

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 complete information visit <http://www.intel.com/performance/datacenter>.

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Normalized 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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