(intel)

Higher Performance Across a Wide Range of ANSYS Fluent* Simulations with the Intel® Xeon® Gold 6148 Processor

The Intel® Xeon® Gold 6148 processor boosts performance for ANSYS Fluent* 18.1 by up to 41 percent versus a previous-generation processor—and provides up to 34 percent higher performance per core.[1]

Designers and engineers invariably want more from their simulations—more detail, more variables, greater accuracy, and faster time to results. ANSYS Fluent* 18.1 and Intel® Xeon® Scalable processors address these needs by delivering powerful performance gains for engineering simulations, including per-core gains that help to speed performance while containing software licensing costs.

"ANSYS teamed with Intel to make sure software and hardware improvements go hand in hand. The latest combination of ANSYS Fluent* 18.1 and the Intel® Xeon® Gold 6148 processor is a clear testament of impressive overall performance gains achieved for customers who want to increase their engineering productivity."

– Dr. Wim Slagter,
Director of HPC and cloud alliances, ANSYS

A Major Leap in Simulation Performance

The Intel® Xeon® Gold 6148 processor includes more cores, higher memory bandwidth, and an enhanced cache structure compared to the previous-generation Intel® Xeon® processor E5 v4 product family. ANSYS and Intel worked together to optimize ANSYS Fluent 18.1 for these and other new hardware features, using Intel® software development products to help ensure that the additional processing power delivers meaningful performance gains for real-world simulations.

A key focus of the optimization effort was to improve vectorization in the solver code to take better advantage of the advanced vector processing capabilities of Intel® Xeon® processors. The improved vectorization, which is available as a runtime option in Fluent 18.1, was used in these benchmarks.
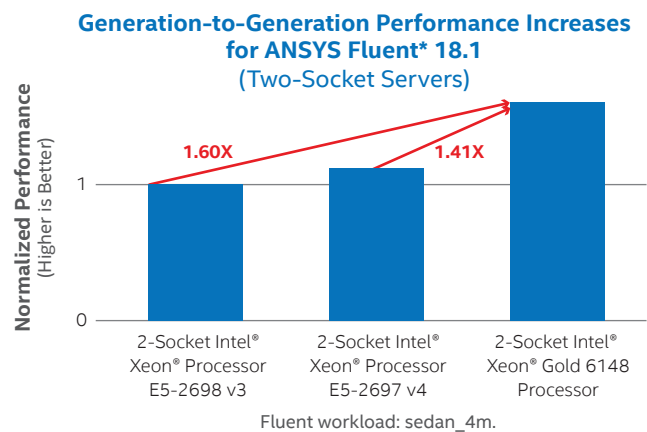

Generation-to-Generation Performance Increases for ANSYS Fluent* 18.1
(Two-Socket Servers)

Fluent workload: sedan_4m.

Figure 1. The Intel® Xeon® Gold 6148 processor provided up to 1.41X the performance of the previous-generation Intel® Xeon® processor E5-2697 v4 for a four million cell model that solves for the external air flow around a car body.

To verify performance with the new processors, benchmark tests were run using a variety of models targeting different industries and ranging in size from two million to 33 million cells. Results showed that a two-socket server based on the new Intel Xeon Gold 6148 processor can improve performance for ANSYS Fluent by as much as 41 percent[1] versus a previous-generation server based on the Intel® Xeon® processor E5-2697 v4, and by as much as 60 percent[1] versus a comparable server based on the earlier Intel® Xeon® processor E5-2698 v3.

Significant Per-Core Performance Improvement

Tests were also run to measure per-core performance across each of the three processor generations (using 32 cores in each test). The Intel Xeon Gold 6148 processor provided up to 34 percent[1] higher performance per core than the previous generation Intel Xeon processor E5-2697 v4 and up to 46 percent[1] higher performance per core than the Intel Xeon processor E5-2698 v3. Because ANSYS licenses its software based on the number of cores in use, these results indicate the types of gains customers can potentially achieve without increasing their licensing costs.

Efficient Cluster Scaling to Support the Most Demanding CFD Models

Intel® MPI is integrated into the ANSYS Fluent release. Together, ANSYS Fluent and Intel MPI are designed to provide high performance that scales seamlessly from multi-core workstations to clusters with thousands of cores (the benchmark results demonstrate performance in single-node scenarios).

For customers moving to clustered architectures, Intel® Omni-Path Architecture (Intel® OPA) provides a high performance, low-latency fabric that helps to resolve the performance, scalability, and cost challenges of traditional InfiniBand* solutions. For more information, read the ANSYS and Intel white paper, "Higher Cluster Performance for ANSYS Fluent with Intel Omni-Path Architecture."

Table 1. Benchmark tests for Ansys® Fluent® 18.1 showed substantial performance gains across all tested models using the Intel® Xeon® Gold 6148 processor versus the two previous-generation processors.

|	ANSYS® Fluent® 18.1 Solver			
Model	**2-Socket Server Performance Improvement[1]** Intel® Xeon® Gold 6148 processor versus:		**Per-Core Performance Improvement[1]** (based on testing with 32 cores in use) Intel® Xeon® Gold 6148 processor versus:	
	Intel® Xeon® processor E5-2698 v3	Intel® Xeon® processor E5-2697 v4	Intel® Xeon® processor E5-2698 v3	Intel® Xeon® processor E5-2697 v4
pump_2m	57%	41%	49%	35%
ice_2m	49%	24%	41%	22%
fluidized_bed_2m	51%	23%	34%	19%
aircraft_wing_2m	63%	30%	41%	27%
rotor_3m	54%	34%	41%	28%
sedan_4m	60%	40%	46%	34%
oil_rig_7m	53%	26%	39%	23%
combustor_12m	55%	30%	40%	23%
aircraft_wing_14m	57%	36%	47%	32%
landing_gear_15m	52%	35%	42%	28%
combustor_16_m	45%	21%	29%	16%
exhaust_system_33m	56%	35%	42%	28%

Take the Next Step

With ANSYS 18.1, the Intel Xeon Gold 6148 processor, and Intel OPA, engineering and design teams can get higher value from their engineering simulations today, and scale their computing infrastructure as needed to maintain fast runtimes as their models grow in complexity.

Visit the following websites for more information:

- **ANSYS Fluent*:** **http://ansys.com/Products/Fluids/ANSYS-Fluent**
- **Intel® Xeon® Scalable processors:** **www.intel.com/XeonSoftwareSolutions**
- **Intel® Omni-Path Fabric:** **www.intel.com/content/www/us/en/high-performance-computing-fabrics/omni-path-architecture-fabric-overview.html**
- **Additional Information:** **www.ansys.com/intel**

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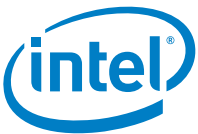
[1] Source: Intel internal testing, March 2017.
  BASELINE: 2x Intel® Xeon® processor E5-2698 v3 (16 cores, 2.3 GHz), 128 GB total memory (8x 16 GB @ 2133 MT/s DDR4), Red Hat Enterprise Linux* 7.3.
  NEXT-GEN: 2x Intel® Xeon® processor E5-2697 v4 (18 cores, 2.3 GHz), 128 GB total memory (8x 16 GB @ 2400 MT/s DDR4), Red Hat Enterprise Linux 7.3.
  NEW: 2x Intel® Xeon® Gold 6148 processor (20 cores, 2.4 GHz), 192 GB total memory (12x 16 GB @ 2666 MT/s DDR4), Red Hat Enterprise Linux 7.3.

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