intel.

Ansys LS-DYNA on Azure Instances

Why Intel for HPC in the Cloud

Technology partnerships with leading ingredient providers to ensure optimization to Intel® CPUs.

Deep ISV and HPC community collaborations focused on optimization for leading HPC codes.

Scalability and flexibility for varying workloads in the cloud environment.

3rd Gen Intel® Xeon® Scalable Processor

Intel® Turbo Boost Technology 2.0

Intel® Advanced Vector Extensions 512 (Intel® AVX-512)

Intel® Deep Learning Boost

Intel Instances for HPC Workloads

The tests below were conducted on Azure instances that are based on various generations of **Intel® Xeon® processor** in a hyper-threaded configuration. This custom processor can reach an all-core Turbo clock speed of up to 3.5GHz and features **Intel® Turbo Boost Technology 2.0, Intel® Advanced Vector Extensions 512 (Intel® AVX-512),** and **Intel® Deep Learning Boost.** These new offerings deliver a better value proposition for general-purpose and memory-intensive workloads compared to the prior generation (e.g., increased scalability and an upgraded CPU class), including better performance.

Standard D96ds_v5
3rd Gen Intel® Xeon® Scalable Processor

Standard FX48mds
2nd Gen Intel® Xeon® Scalable Processor

Standard HC44rs
Intel® Xeon® Platinum Processor

What is Ansys LS-DYNA?

Ansys workloads have both memory bandwidth and compute intensive requirements that can vary for many reasons, including dataset size and the solver used.
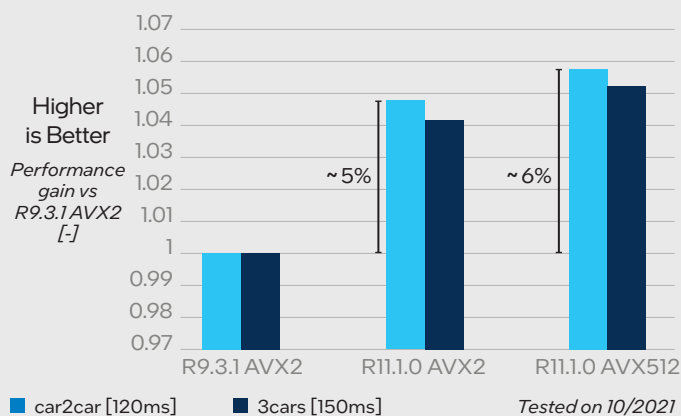
Ansys LS-DYNA is a general-purpose finite element program capable of simulating complex real-world problems. It is used by the automobile, aerospace, construction, military, manufacturing, and bioengineering industries. LS-DYNA is optimized for shared and distributed memory Unix, Linux, and Windows-based platforms, and it is fully quality assured by Livermore Software

Technology Corporation (LSTC). The code's origins lie in highly nonlinear, transient dynamic finite element analysis using explicit time integration.
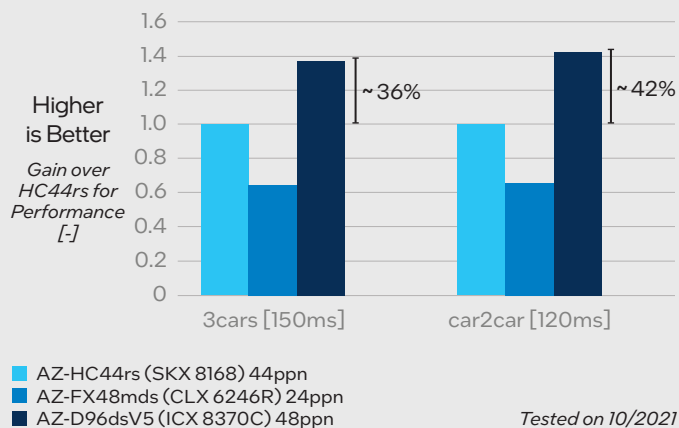
Ansys LS-DYNA performance is sensitive to MPI processes, processor generation, data locality, and memory bandwidth.

Ansys LS-DYNA Benchmarking on Azure Instances

Ansys LS-Dyna Cross Software/ISA Analysis
SKU: AZ-D96dsVS (ICX-8370C) 48ppn
Details: Single-node, 2 socket/node, IMPI 2019u7

Higher is Better

Performance gain vs R9.3.1 AVX2 [-]

~ 5%   ~ 6%

R9.3.1 AVX2   R11.1.0 AVX2   R11.1.0 AVX512

■ car2car [120ms]   ■ 3cars [150ms]   *Tested on 10/2021*

Ansys LS-Dyna Cross Platform Analysis
Details: Single-node, 2 socket/node, R9.3.1 AVX2

Higher is Better

Gain over HC44rs for Performance [-]

~36%   ~42%

3cars [150ms]   car2car [120ms]

■ AZ-HC44rs (SKX 8168) 44ppn
■ AZ-FX48mds (CLX 6246R) 24ppn
■ AZ-D96dsV5 (ICX 8370C) 48ppn

Tested on 10/2021

See below for workloads and configurations. Results may vary.

Configuration of AZ-D96dsV5 – Instance Type Standard D96ds_v5, 96 cores of Intel® Xeon® Platinum 8370C Processor @ 2.80GHz, 384GB Memory Capacity, Premium SSD Ephemeral, CentOS Linux release 8.1.1911 kernel 4.18.0-147.8.1.el8_1. x86_64, Intel® MPI Library for Linux OS, Version 2019 Update 7 Build 20200219, Tested by Intel on 10/7/2021

Configuration of AZ-HC44rs – Instance Type Standard HC44rs, 44 cores of Intel® Xeon® Platinum 8168 Processor, 352GB Memory Capacity, Premium SSD Ephemeral, CentOS Linux release 8.1.1911 kernel 4.18.0-147.8.1.el8_1.x86_64, Intel® MPI Library for Linux OS, Version 2019 Update 7 Build 20200219, Tested by Intel on 10/8/2021

Configuration of AZ-FX48mds – Instance Type Standard FX48mds, 48 cores of Intel® Xeon® Platinum 6246R Processor @ 2.80GHz, 384GB Memory Capacity, Premium SSD Ephemeral, CentOS Linux release 8.1.1911 kernel 4.18.0-147.8.1.el8_1. x86_64, Intel® MPI Library for Linux OS, Version 2019 Update 7 Build 20200219, Tested by Intel on 09/29/2021

How to Get Intel Benefits

3rd Gen Intel Xeon Scalable processors provide significant performance gains for the LS-DYNA workload that are accelerated by the Intel R11.1 AVX2, R11.1 AVX-512, Intel Fortran Compiler, and Intel Deep Learning Boost technologies. Customers running this LS-DYNA workload can realize significant performance gains by deploying on 3rd Gen Intel Xeon Scalable instance type AZ-D96dsV5 vs. running on previous generation Intel Xeon Scalable processors on Azure.

Resources: **www.intel.com/HPC**

Notices & Disclaimers

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