



OpenFOAM Performance on AWS

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 AWS instances based on various **Intel® Xeon® processor generations** in a hyper-threaded configuration. The latest custom processors can reach an all-core Turbo clock speed of up to 3.5GHz and feature **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.

M6i.32xlarge

3rd Gen
Intel® Xeon®
Scalable
Processor

c5n.18xlarge

Intel® Xeon®
Scalable
Processor

C6i.32xlarge

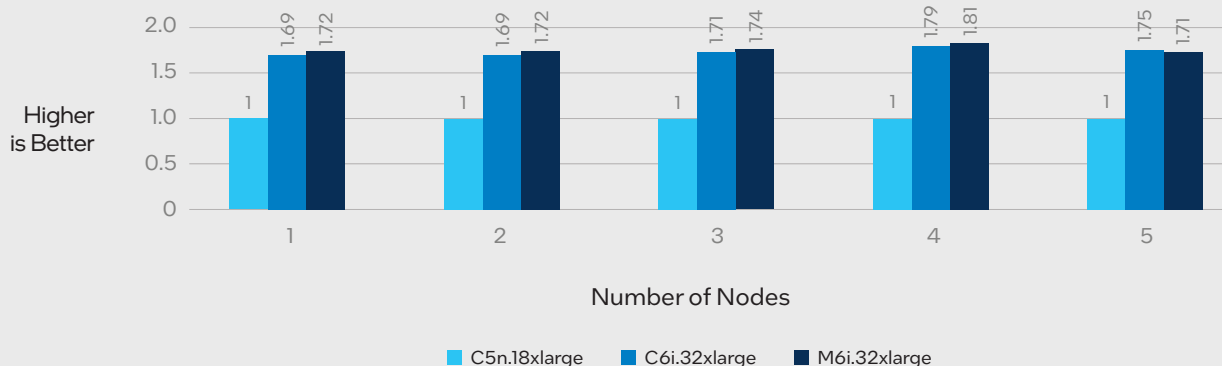
3rd Gen
Intel® Xeon®
Scalable
Processor

What is OpenFOAM?

OpenFOAM is an open source computational fluid dynamics (CFD) software that is a highly memory bandwidth-bound application. If multiple nodes are used, file system performance is also important since each MPI rank will read and write files. MPI pinning should be used on physical cores only. CPU utilization will be more than 95 percent during the run. Some IO time is needed during startup. Using Intel® Hyper Threading Technology is not recommended.

OpenFOAM Benchmarking on AWS Instances

OpenFOAM-Motorbike42M_AWS Instances
Relative Performance over C5n.18xlarge



See below for workloads and configurations. Results may vary.

This offering is not approved or endorsed by OpenCFD Limited, producer and distributor of the OpenFOAM software via www.openfoam.com, and owner of the OPENFOAM® and OpenCFD® trademark.

Configuration of C6i.32xlarge – 3rd Gen Intel® Xeon® Scalable Processor @ 2.9GHz, 256GB Memory Capacity, Network bandwidth 50 Gbps, FSX, CentOS Linux 7 release kernel 3.10.0-1160.45.1.el7.x86_64, OpenFOAM version 8 & ThirdParty version 8, icc 2021.4.0 20210910, Intel® MPI Library for Linux OS, Version 2021.4 Build 20210831 (id: 758087adf), Tested by Intel by 11/09/2021

Configuration of C5n.18xlarge – Intel® Xeon® Scalable Processor @ 2.9GHz, 192GB Memory Capacity, Network bandwidth 100 Gbps, FSX, CentOS Linux 7 release kernel 3.10.0-1160.45.1.el7.x86_64, OpenFOAM version 8 & ThirdParty version 8, icc 2021.4.0 20210910, Intel® MPI Library for Linux OS, Version 2021.4 Build 20210831 (id: 758087adf), Tested by Intel by 11/09/2021

Configuration of M6i.32xlarge – 3rd Gen Intel® Xeon® Scalable Processor @ 2.9GHz, 512GB Memory Capacity, Network bandwidth 50 Gbps, FSX, CentOS Linux 7 release kernel 3.10.0-1160.45.1.el7.x86_64, OpenFOAM version 8 & ThirdParty version 8 2021.3, icc 2021.4.0 20210910, Intel® MPI Library for Linux OS, Version 2021.4 Build 20210831 (id: 758087adf), Tested by Intel by 11/09/2021

How to Get Intel Benefits

3rd Gen Intel Xeon Scalable processors provide significant performance gains for OpenFOAM due to their memory bandwidth advantage. Customers running this workload can realize significant performance gains on AWS by deploying on 3rd Gen Intel Xeon Scalable instance types (M6i, C6i) vs. running on 1st Gen Intel Xeon Scalable processors at AWS.

Resources: www.intel.com/HPC

Notices & Disclaimers

Performance varies by use, configuration and other factors. Learn more at www.Intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. No product or component can be absolutely secure.

Your costs and results may vary.

Intel technologies may require enabled hardware, software or service activation.

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