



# SPEC® MPIM2007 Result

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## Intel Corporation

Endeavor (Intel Xeon Gold 6148, 2.40 GHz, DDR4-2666 MHz, SMT on, Turbo on)

SPECmpiM\_peak2007 = Not Run

SPECmpiM\_base2007 = 49.0

MPI2007 license: 13

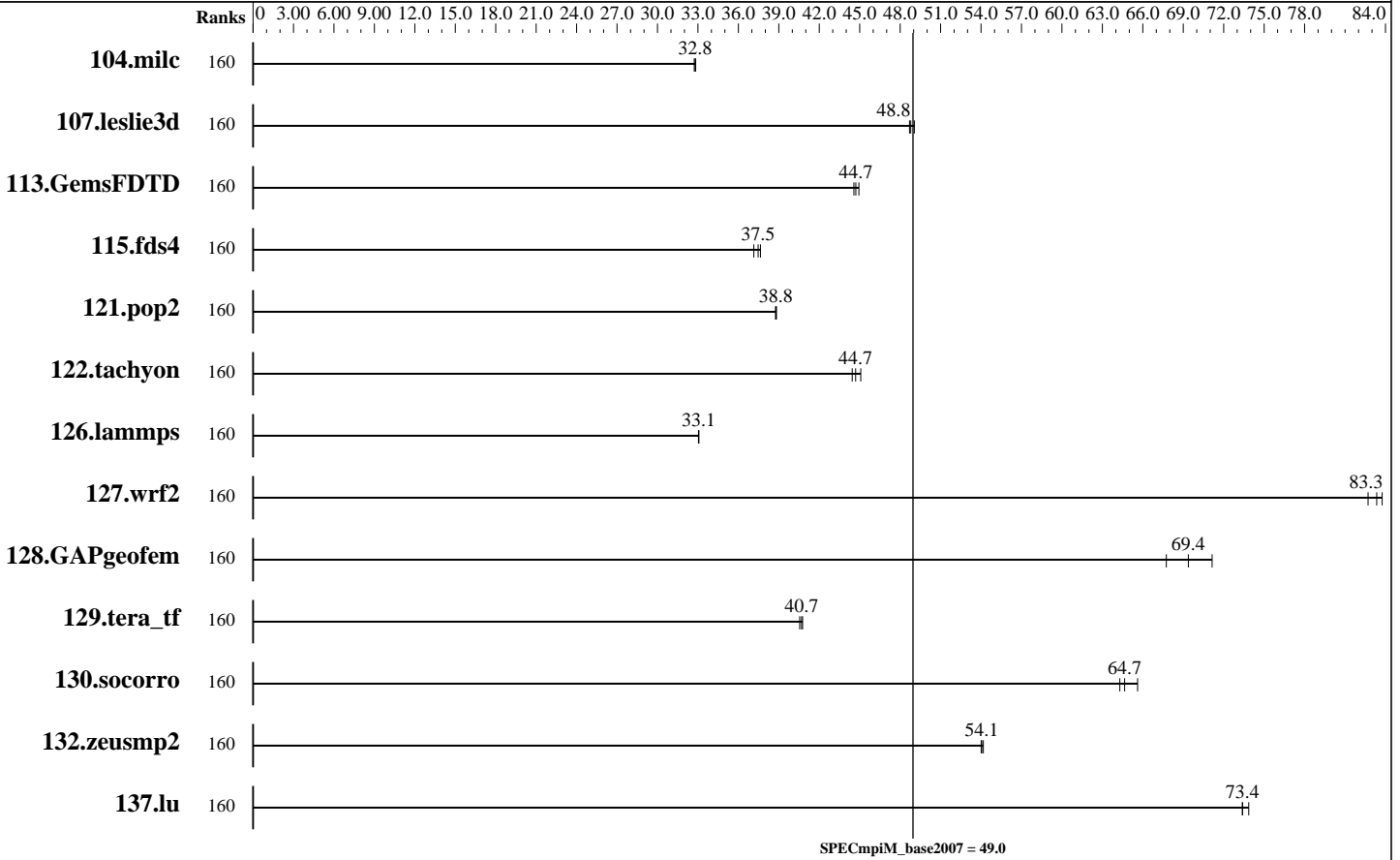
Test sponsor: Intel Corporation

Tested by: Intel Corporation

Test date: Aug-2018

Hardware Availability: Aug-2018

Software Availability: Nov-2018



## Results Table

Benchmark	Base							Peak						
	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
104.milc	160	47.7	32.8	47.8	32.7	<b>47.7</b>	<b>32.8</b>							
107.leslie3d	160	106	49.1	<b>107</b>	<b>48.8</b>	107	48.7							
113.GemsFDTD	160	140	44.9	142	44.6	<b>141</b>	<b>44.7</b>							
115.fds4	160	<b>52.1</b>	<b>37.5</b>	52.5	37.1	51.8	37.6							
121.pop2	160	<b>106</b>	<b>38.8</b>	106	38.8	107	38.8							
122.tachyon	160	62.1	45.1	<b>62.6</b>	<b>44.7</b>	62.9	44.4							
126.lammps	160	88.2	33.0	<b>88.2</b>	<b>33.1</b>	88.2	33.1							
127.wrf2	160	<b>93.5</b>	<b>83.3</b>	93.1	83.8	94.3	82.7							
128.GAPgeofem	160	<b>29.8</b>	<b>69.4</b>	29.0	71.1	30.5	67.7							
129.tera_tf	160	<b>68.0</b>	<b>40.7</b>	68.3	40.5	67.9	40.8							

Table continues on next page. Results appear in the order in which they were run. Bold underlined text indicates a median measurement.



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## Results Table (Continued)

Benchmark	Base							Peak						
	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
130.socorro	160	58.2	65.6	<b><u>59.0</u></b>	<b><u>64.7</u></b>	59.4	64.3							
132.zeusmp2	160	57.5	54.0	57.3	54.2	<b><u>57.4</u></b>	<b><u>54.1</u></b>							
137.lu	160	50.1	73.4	49.8	73.9	<b><u>50.1</u></b>	<b><u>73.4</u></b>							

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

### Hardware Summary

Type of System: Homogeneous  
 Compute Node: Intel Server System R2208WFTZS  
 Interconnect: Intel Omni-Path 100 series  
 File Server Node: Lustre FS  
 Total Compute Nodes: 4  
 Total Chips: 8  
 Total Cores: 160  
 Total Threads: 320  
 Total Memory: 768 GB  
 Base Ranks Run: 160  
 Minimum Peak Ranks: --  
 Maximum Peak Ranks: --

### Software Summary

C Compiler: Intel C++ Composer XE 2018 for Linux  
 Version 18.0.0 Build 20170811  
 C++ Compiler: Intel C++ Composer XE 2018 for Linux  
 Version 18.0.0 Build 20170811  
 Fortran Compiler: Intel Fortran Composer XE 2018 for Linux  
 Version 18.0.0 Build 20170811  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 MPI Library: Intel MPI Library 2019 Build 20180829  
 Other MPI Info: libfabric-1.6.1  
 Pre-processors: No  
 Other Software: None

## Node Description: Intel Server System R2208WFTZS

### Hardware

Number of nodes: 4  
 Uses of the node: Compute  
 Vendor: Intel  
 Model: Intel Server System R2208WFTZS  
 CPU Name: Intel Xeon Gold 6148  
 CPU(s) orderable: 1-2 chips  
 Chips enabled: 2  
 Cores enabled: 40  
 Cores per chip: 20  
 Threads per core: 2  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.7 GHz  
 CPU MHz: 2400  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 1 MB I+D on chip per core  
 L3 Cache: 27.5 MB I+D on chip per chip  
 Other Cache: None  
 Memory: 192 GB (16 x 12 GB 2Rx4 DDR4-2666)  
 Disk Subsystem: ATA INTEL SSDSC2BA80  
 Other Hardware: None  
 Adapter: Intel Omni-Path Edge Switch 100 series  
 Number of Adapters: 1  
 Slot Type: PCI-Express x16  
 Data Rate: 12.5 GB/s  
 Ports Used: 1

### Software

Adapter: Intel Omni-Path Edge Switch 100 series  
 Adapter Driver: IFS 10.7  
 Adapter Firmware: 1.26.1  
 Operating System: Oracle Linux Server release 7.4  
 Local File System: Linux/xfst  
 Shared File System: Lustre FS  
 System State: Multi-User  
 Other Software: IBM Platform LSF Standard 9.1.1.1

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### Node Description: Intel Server System R2208WFTZS

Interconnect Type: Intel Omni-Path Fabric 100 series

### Node Description: Lustre FS

#### Hardware

Number of nodes: 11  
 Uses of the node: Fileserver  
 Vendor: Intel  
 Model: Intel Server System R2208GZ4GC4  
 CPU Name: Intel Xeon E5-2680  
 CPU(s) orderable: 1-2 chips  
 Chips enabled: 2  
 Cores enabled: 16  
 Cores per chip: 8  
 Threads per core: 2  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.5 GHz  
 CPU MHz: 2700  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 2 MB I+D on chip per chip  
 L3 Cache: None  
 Other Cache: None  
 Memory: 64 GB per node (8 x 8 GB 1600MHz Reg ECC DDR3)  
 Disk Subsystem: 136 TB 3 RAID with 8 SAS/SATA  
 Other Hardware: None  
 Adapter: Intel Omni-Path Fabric Adapter 100 series  
 Number of Adapters: 1  
 Slot Type: PCI-Express x16  
 Data Rate: 12.5 GB/s  
 Ports Used: 1  
 Interconnect Type: Intel Omni-Path Fabric 100 series

#### Software

Adapter: Intel Omni-Path Fabric Adapter 100 series  
 Adapter Driver: IFS 10.7  
 Adapter Firmware: 1.26.1  
 Operating System: Redhat Enterprise Linux Server Release 7.4  
 Local File System: None  
 Shared File System: Lustre FS  
 System State: Multi-User  
 Other Software: None

### Interconnect Description: Intel Omni-Path 100 series

#### Hardware

Vendor: Intel  
 Model: Intel Omni-Path Fabric 100 series  
 Switch Model: Intel Omni-Path Edge Switch 100 series  
 Number of Switches: 24  
 Number of Ports: 48  
 Data Rate: 12.5 GB/s  
 Firmware: 1.26.1  
 Topology: Fat tree  
 Primary Use: MPI and I/O traffic

#### Software



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### Submit Notes

The config file option 'submit' was used.

### General Notes

130.socorro (base): "nullify\_ptrs" src.alt was used.  
129.tera\_tf (base): "add\_rank\_support" src.alt was used.  
143.dleslie (base): "integer\_overflow" src.alt was used.

MPI startup command:

```
mpiexec.hydra command was used to start MPI jobs.
export I_MPI_FABRICS=shm:ofi
export FI_PSM2_INJECT_SIZE=8192
export I_MPI_PIN_DOMAIN=core
export I_MPI_PIN_ORDER=bunch
export FI_PSM2_DELAY=0
export FI_PSM2_LAZY_CONN=1
export I_MPI_COMPATIBILITY=3
```

Spectre & Meltdown:

```
Kernel: 3.10.0-862.11.6.el7.crt1.x86_64
Microcode: 0x200004d
lltf: Mitigation: PTE Inversion
meltdown: Mitigation: PTI
spec_store_bypass: Mitigation: Speculative Store Bypass disabled via prctl and seccomp
spectre_v1: Mitigation: Load fences, __user pointer sanitization
spectre_v2: Mitigation: IBRS (kernel)
```

BIOS settings:

```
Intel Hyper-Threading Technology (SMT) = Enabled (default is Enabled)
Intel Turbo Boost Technology (Turbo) = Enabled (default is Enabled)
```

RAM configuration:

Compute nodes have 2x16-GB RDIMM on each memory channel.

Network:

Endeavour Omni-Path Fabric consists of 48-port switches = 24 core switches connected to each leaf of the rack switch.

HFI driver parameters:

```
cache_size = 1024
rcvhdrCnt = 4096
```

Job placement:

Each MPI job was assigned to a topologically compact set of nodes, i.e. the minimal needed number of leaf switches was used for each job = 1 switch for 40/80/160/320/640 ranks, 2 switches for 1280 and 1980 ranks.

IBM Platform LSF was used for job submission. It has no impact on performance. Information can be found at: <http://www.ibm.com>

### Base Compiler Invocation

C benchmarks:  
mpiicc

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## Base Compiler Invocation (Continued)

C++ benchmarks:

126.lammps: mpiicpc

Fortran benchmarks:

mpiifort

Benchmarks using both Fortran and C:

mpiicc mpiifort

## Base Portability Flags

121.pop2: -DSPEC\_MPI\_CASE\_FLAG  
126.lammps: -DMPICH\_IGNORE\_CXX\_SEEK  
127.wrf2: -DSPEC\_MPI\_CASE\_FLAG -DSPEC\_MPI\_LINUX  
130.socorro: -assume nostd\_intent\_in

## Base Optimization Flags

C benchmarks:

-O3 -xCORE-AVX512 -no-prec-div -ipo

C++ benchmarks:

126.lammps: -O3 -xCORE-AVX512 -no-prec-div -ipo

Fortran benchmarks:

-O3 -xCORE-AVX512 -no-prec-div -ipo

Benchmarks using both Fortran and C:

-O3 -xCORE-AVX512 -no-prec-div -ipo

The flags file that was used to format this result can be browsed at

[http://www.spec.org/mpi2007/flags/EM64T\\_Intel140\\_flags.20190110.html](http://www.spec.org/mpi2007/flags/EM64T_Intel140_flags.20190110.html)

You can also download the XML flags source by saving the following link:

[http://www.spec.org/mpi2007/flags/EM64T\\_Intel140\\_flags.20190110.xml](http://www.spec.org/mpi2007/flags/EM64T_Intel140_flags.20190110.xml)



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For questions about this result, please contact the tester.  
For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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