# SPEC® MPIM2007 Result

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## Intel Corporation

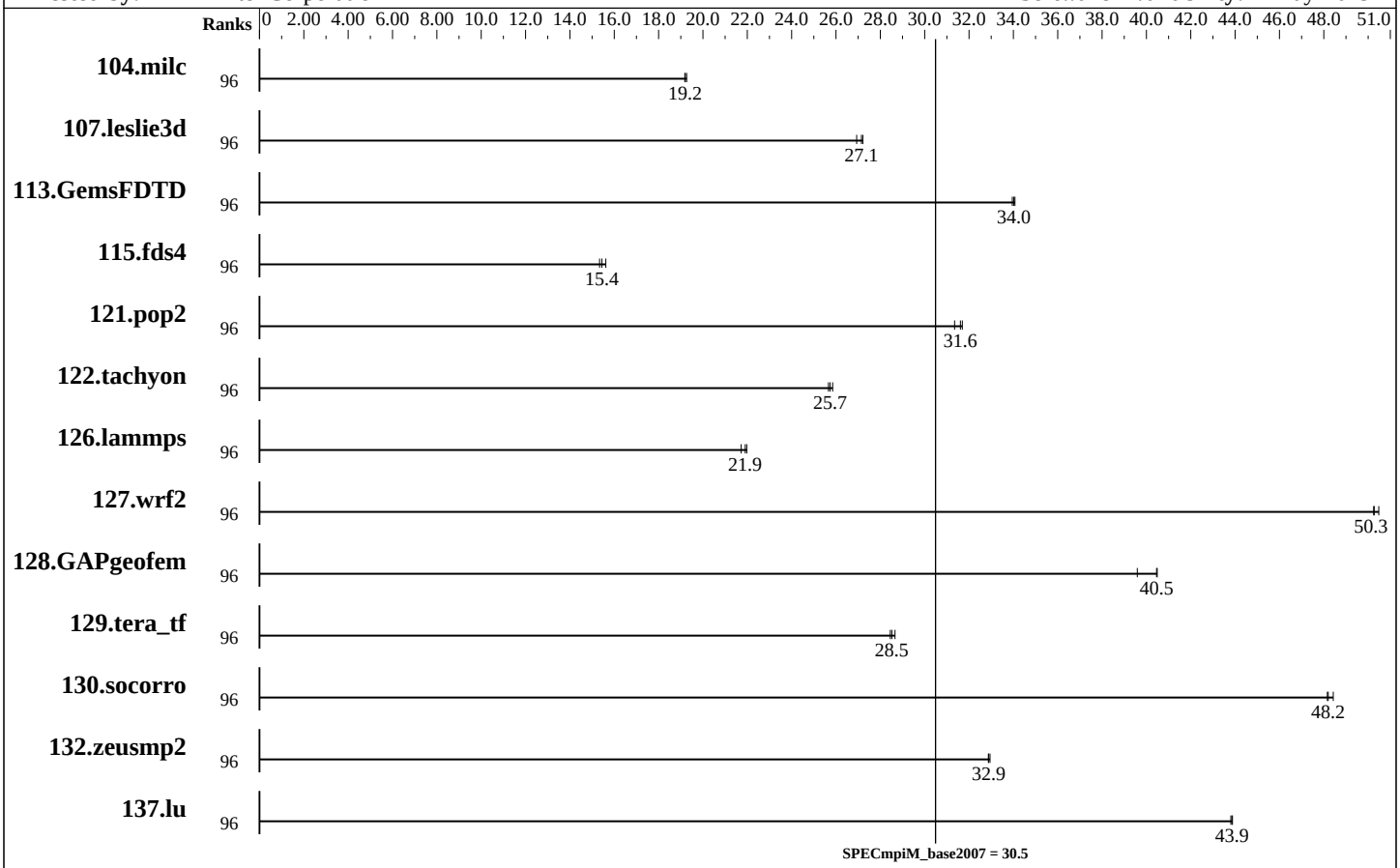
Intel Server System S9248WK1HLC (Intel Xeon 9242 Platinum, 2.30 GHz, DDR4-2993 MHz, Turbo on)

SPECmpiM_peak2007 = Not Run

SPECmpiM_base2007 = 30.5

**MPI2007 license:** 13
**Test sponsor:** Intel Corporation
**Tested by:** Intel Corporation

**Test date:** Jun-2019
**Hardware Availability:** Jul-2019
**Software Availability:** May-2019




## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ranks | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Ranks | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 104.milc | 96 | 81.6 | 19.2 | **81.5** | **19.2** | 81.2 | 19.3 | | | | | | | |
| 107.leslie3d | 96 | 194 | 26.9 | **192** | **27.1** | 192 | 27.2 | | | | | | | |
| 113.GemsFDTD | 96 | **185** | **34.0** | 185 | 34.1 | 186 | 34.0 | | | | | | | |
| 115.fds4 | 96 | 127 | 15.3 | **126** | **15.4** | 125 | 15.6 | | | | | | | |
| 121.pop2 | 96 | 132 | 31.3 | **131** | **31.6** | 130 | 31.7 | | | | | | | |
| 122.tachyon | 96 | 108 | 25.9 | 109 | 25.7 | **109** | **25.7** | | | | | | | |
| 126.lammps | 96 | 133 | 22.0 | 134 | 21.7 | **133** | **21.9** | | | | | | | |
| 127.wrf2 | 96 | **155** | **50.3** | 155 | 50.2 | 154 | 50.5 | | | | | | | |
| 128.GAPgeofem | 96 | 51.0 | 40.5 | **51.0** | **40.5** | 52.2 | 39.6 | | | | | | | |
| 129.tera_tf | 96 | **97.1** | **28.5** | 97.3 | 28.4 | 96.6 | 28.7 | | | | | | | |

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 | 96 | 79.3 | 48.2 | **79.2** | **48.2** | 78.8 | 48.4 | | | | | | | |
| 132.zeusmp2 | 96 | **94.3** | **32.9** | 94.4 | 32.9 | 94.2 | 32.9 | | | | | | | |
| 137.lu | 96 | 83.8 | 43.9 | 83.9 | 43.8 | **83.8** | **43.9** | | | | | | | |

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 S9248WK1HLC |
| Interconnect: | Intel Omni-Path 100 series |
| File Server Node: | Lustre FS 2.10.4 |
| Total Compute Nodes: | 1 |
| Total Chips: | 2 |
| Total Cores: | 96 |
| Total Threads: | 192 |
| Total Memory: | 384 GB |
| Base Ranks Run: | 96 |
| Minimum Peak Ranks: | -- |
| Maximum Peak Ranks: | -- |

### Software Summary

| | |
|---|---|
| C Compiler: | Intel C++ Composer XE 2019 Update 3 for Linux Version 19.0.3.199 20190206 |
| C++ Compiler: | Intel C++ Composer XE 2019 Update 3 for Linux Version 19.0.3.199 20190206 |
| Fortran Compiler: | Intel Fortran Composer 2019 Update 3 for Linux Version 19.0.3.199 20190206 |
| Base Pointers: | 64-bit |
| Peak Pointers: | 64-bit |
| MPI Library: | Intel MPI Library 2018 Update 4 Build 20180823 |
| Other MPI Info: | libfabric-1.7.0 |
| Pre-processors: | No |
| Other Software: | None |

## Node Description: Intel Server System S9248WK1HLC

### Hardware

| | |
|---|---|
| Number of nodes: | 1 |
| Uses of the node: | Compute |
| Vendor: | Intel |
| Model: | Intel Server System S9248WK1HLC (2 x Intel Xeon 9242 Platinum, Turbo ON) |
| CPU Name: | Intel Xeon Platinum 9242 |
| CPU(s) orderable: | 1,2 chips |
| Chips enabled: | 2 |
| Cores enabled: | 96 |
| Cores per chip: | 48 |
| Threads per core: | 2 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.8 GHz |
| CPU MHz: | 2200 |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 1 MB I+D on chip per core |
| L3 Cache: | 71.5 MB I+D on chip per chip, 35.75 MB shared / 24 cores |
| Other Cache: | None |
| Memory: | 384 GB (24 x 16 GB 2Rx8 DDR4-2993Y-R) |
| Disk Subsystem: | N/A |
| Other Hardware: | None |
| Adapter: | Intel Omni-Path Edge Switch 100 series |
| Number of Adapters: | 2 |
| Slot Type: | PCI-Express x16 |

Continued on next page

### Software

| | |
|---|---|
| Adapter: | Intel Omni-Path Edge Switch 100 series |
| Adapter Driver: | IFS 10.9.0.0.210 |
| Adapter Firmware: | 1.27.0 |
| Operating System: | Oracle Linux Server release 7.6 |
| Local File System: | Linux/xfs |
| Shared File System: | Lustre FS 2.10.4 |
| System State: | Multi-User |
| Other Software: | IBM Platform LSF Standard 9.1.1.1 |

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**MPI2007 license:** 13
**Test sponsor:** Intel Corporation
**Tested by:** Intel Corporation

**Test date:** Jun-2019
**Hardware Availability:** Jul-2019
**Software Availability:** May-2019

## Node Description: Intel Server System S9248WK1HLC

| | |
|---|---|
| Data Rate: | 2 x 12.5 GB/s |
| Ports Used: | 1 |
| Interconnect Type: | Intel Omni-Path Fabric 100 series |

## Node Description: Lustre FS 2.10.4

### 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: | 20 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 64 GB per node (8*8GB 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 10.9.0.0.210 |
| Adapter Firmware: | 1.27.0 |
| Operating System: | Redhat Enterprise Linux Server Release 7.6 |
| Local File System: | None |
| Shared File System: | Lustre FS 2.10.4 2.10.4 |
| 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: | 8 |
| Number of Ports: | 48 |
| Data Rate: | 2 x 12.5 GB/s |
| Firmware: | 1.27.0 |
| Topology: | Fat tree |
| Primary Use: | MPI and I/O traffic |

### Software

## Submit Notes

```
The config file option 'submit' was used.
```

## Platform Notes

```
The system used pre-release CPUs running at 2200 MHz instead of the nominal base frequency (2300 MHz).
```

## 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 I_MPI_PIN_DOMAIN=core
   export I_MPI_PIN_ORDER=bunch
   export I_MPI_COMPATIBILITY=3
 HFI driver parameters:
   rcvhdrcnt = 4096
Spectre and Meltdown:
   Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
   is mitigated in the system as tested and documented.
   Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
   is mitigated in the system as tested and documented.
   Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
   is mitigated in the system as tested and documented.

Kernel & Microcode:
   Kernel: 3.10.0-957.12.2.el7.crt1.x86_64
   Microcode: 0x4000024
BIOS settings:
   Version: SE5C620.86B.0D.01.0505.050820190224
   Intel Hyper-Threading Technology (SMT) = Enabled (default is Enabled)
   Intel Turbo Boost Technology (Turbo)   = Enabled (default is Enabled)
 Job placement:
   Each MPI job was assigned to a topologically compact set of nodes.
 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

C++ benchmarks:

Continued on next page

## Base Compiler Invocation (Continued)

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`

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

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