



# SPEChpc™ 2021 Small Result

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## Intel

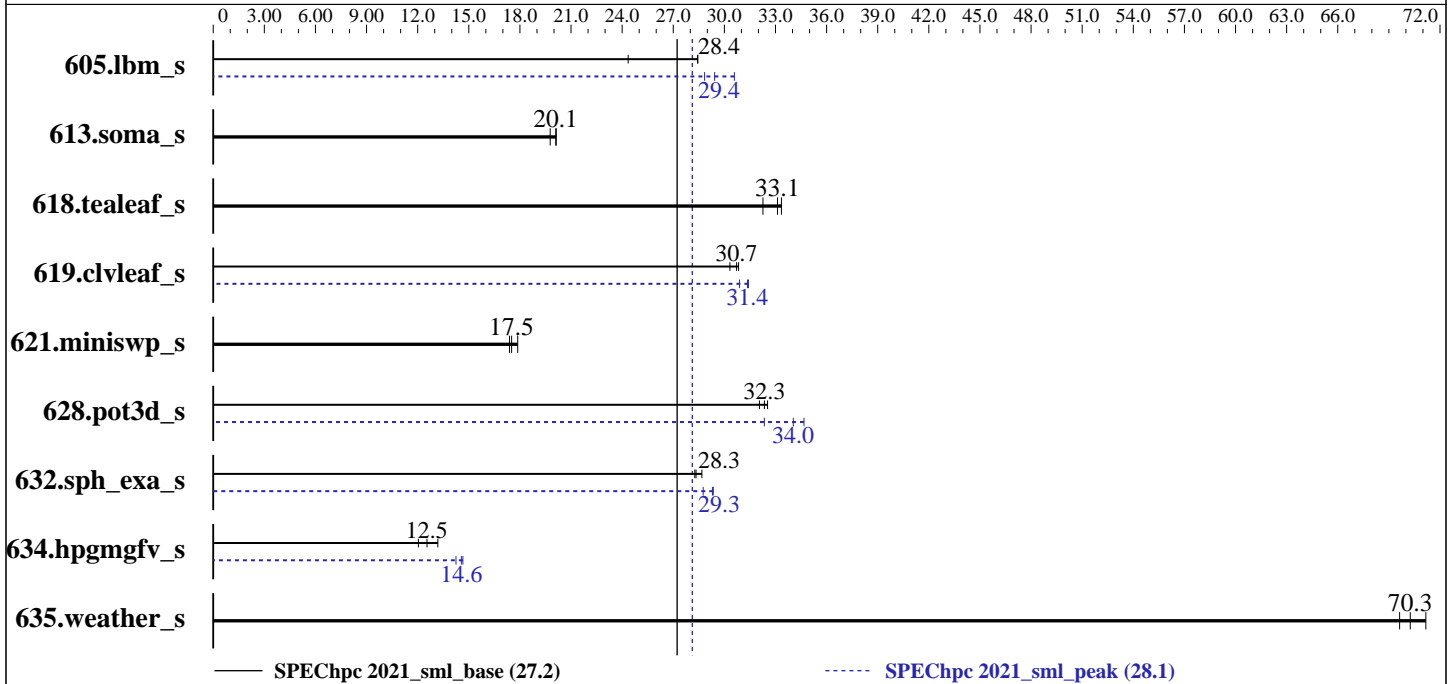
SPEChpc 2021\_sml\_base = 27.2

Endeavour: Intel Server D50DNP1SBB (Xeon Max 9480)

SPEChpc 2021\_sml\_peak = 28.1

hpc2021 License: 13  
Test Sponsor: Intel  
Tested by: Intel

Test Date: Jun-2024  
Hardware Availability: Jan-2023  
Software Availability: Mar-2024



## Results Table

Benchmark	Base								Peak									
	Model	Ranks	Thrds/Rnk	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Model	Ranks	Thrds/Rnk	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
605.lbm_s	OMP	256	14	63.6	24.4	<b>54.5</b>	<b>28.4</b>	54.5	28.4	OMP	512	7	53.7	28.8	<b>52.7</b>	<b>29.4</b>	50.7	30.6
613.soma_s	OMP	256	14	<b>79.6</b>	<b>20.1</b>	80.9	19.8	79.5	20.1	OMP	256	14	<b>79.6</b>	<b>20.1</b>	80.9	19.8	79.5	20.1
618.tealeaf_s	OMP	256	14	63.5	32.3	<b>61.9</b>	<b>33.1</b>	61.5	33.3	OMP	256	14	63.5	32.3	<b>61.9</b>	<b>33.1</b>	61.5	33.3
619.clvleaf_s	OMP	256	14	54.4	30.3	53.5	30.8	<b>53.7</b>	<b>30.7</b>	OMP	512	7	52.5	31.4	<b>52.6</b>	<b>31.4</b>	53.4	30.9
621.miniswp_s	OMP	256	14	63.3	17.4	<b>62.8</b>	<b>17.5</b>	61.5	17.9	OMP	256	14	63.3	17.4	<b>62.8</b>	<b>17.5</b>	61.5	17.9
628.pot3d_s	OMP	256	14	51.5	32.5	52.3	32.1	<b>51.8</b>	<b>32.3</b>	OMP	512	7	48.3	34.7	<b>49.2</b>	<b>34.0</b>	51.8	32.3
632.sph_exa_s	OMP	256	14	81.4	28.3	80.2	28.7	<b>81.2</b>	<b>28.3</b>	OMP	512	7	78.4	29.3	80.0	28.8	<b>78.5</b>	<b>29.3</b>
634.hpgmgfv_s	OMP	256	14	74.0	13.2	<b>77.7</b>	<b>12.5</b>	81.0	12.0	OMP	512	7	68.4	14.2	<b>66.9</b>	<b>14.6</b>	66.5	14.7
635.weather_s	OMP	256	14	<b>37.0</b>	<b>70.3</b>	36.5	71.2	37.3	69.6	OMP	256	14	<b>37.0</b>	<b>70.3</b>	36.5	71.2	37.3	69.6

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



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### Hardware Summary

Type of System: Homogenous Cluster  
Compute Node: Intel Server D50DNP1SBB (Xeon Max 9480)  
Interconnect: Mellanox HDR  
Compute Nodes Used: 32  
Total Chips: 64  
Total Cores: 3584  
Total Threads: 7168  
Total Memory: 20 TB  
Max. Peak Threads: 14

### Software Summary

Compiler: Intel oneAPI Compiler 2024.1.0  
MPI Library: Intel MPI Library 2021.12 for Linux OS  
Other MPI Info: None  
Other Software: None  
Base Parallel Model: OMP  
Base Ranks Run: 256  
Base Threads Run: 14  
Peak Parallel Models: OMP  
Minimum Peak Ranks: 256  
Maximum Peak Ranks: 512  
Max. Peak Threads: 14  
Min. Peak Threads: 7

### Node Description: Intel Server D50DNP1SBB (Xeon Max 9480)

#### Hardware

Number of nodes: 32  
Uses of the node: Compute  
Vendor: Intel  
Model: Intel Server D50DNP1SBB (Xeon Max 9480)  
CPU Name: Intel Xeon Max 9480  
CPU(s) orderable: 1, 2 chips  
Chips enabled: 2  
Cores enabled: 112  
Cores per chip: 56  
Threads per core: 2  
CPU Characteristics: Turbo Boost Technology up to 3.5 GHz  
CPU MHz: 1900  
Primary Cache: 32 KB I + 48 KB D on chip per core  
Secondary Cache: 2 MB I+D on chip per core  
L3 Cache: 112.5 MB I+D on chip per chip  
Other Cache: None  
Memory: 640 GB (16 x 32GB 2Rx8 PC5-4800B-R + 8 x 16GB HBM2 3200 MT/s)  
Disk Subsystem: 1 x 1 TB NVMe U.2 2.5" SSD  
Other Hardware: None  
Accel Count: None  
Accel Model: None  
Accel Vendor: None  
Accel Type: None  
Accel Connection: None  
Accel ECC enabled: None  
Accel Description: None  
Adapter: Mellanox ConnectX-6 HDR  
Number of Adapters: 1  
Slot Type: PCI-Express 4.0 x16  
Data Rate: 200Gbit/s  
Ports Used: 1

#### Software

Accelerator Driver: None  
Adapter: Mellanox ConnectX-6 HDR  
Adapter Driver: 23.04-0.5.3  
Adapter Firmware: 20.37.1014  
Operating System: Rocky Linux 8.8 (Green Obsidian) 4.18.0-477.15.1.el8\_8.x86\_64  
Local File System: xfs  
Shared File System: PANASAS FS  
System State: Run level 5  
Other Software: None

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### Node Description: Intel Server D50DNP1SBB (Xeon Max 9480)

#### Hardware (Continued)

Interconnect Type: Mellanox HDR

### Interconnect Description: Mellanox HDR

#### Hardware

#### Software

Vendor: Mellanox  
Model: Mellanox HDR  
Switch Model: Mellanox MQM8790-HS2F Quantum HDR InfiniBand Switch  
Number of Switches: 18  
Number of Ports: 40  
Data Rate: 200 Gbit/s  
Firmware: 20.36.1010  
Topology: Fat-tree  
Primary Use: MPI Traffic

: --

### Submit Notes

The config file option 'submit' was used.

### General Notes

The PANASAS filesystem as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC HPG Policy document, <http://www.spec.org/hpg/policy.html>

HBM is configured as HBM cache mode.

### Compiler Version Notes

```
=====
CXXC 632.sph_exa_s(base, peak)
-----
Intel(R) oneAPI DPC++/C++ Compiler 2024.1.0 (2024.1.0.20240308)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir:
/global/panfs05/admin5/opt/intel/oneAPI/2024.1.0/compiler/2024.1/bin/compiler
Configuration file:
/global/panfs05/admin5/opt/intel/oneAPI/2024.1.0/compiler/2024.1/bin/compiler/./icpx.cfg
```

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## Compiler Version Notes (Continued)

=====  
CC 605.lbm\_s(base, peak) 613.soma\_s(base, peak) 618.tealeaf\_s(base, peak)  
621.miniswp\_s(base, peak) 634.hpgmgfv\_s(base, peak)  
=====

Intel(R) oneAPI DPC++/C++ Compiler 2024.1.0 (2024.1.0.20240308)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir:  
/global/panfs05/admin5/opt/intel/oneAPI/2024.1.0/compiler/2024.1/bin/compiler  
Configuration file:  
/global/panfs05/admin5/opt/intel/oneAPI/2024.1.0/compiler/2024.1/bin/compiler/./icx.cfg  
=====

=====  
FC 619.clvleaf\_s(base, peak) 628.pot3d\_s(base, peak) 635.weather\_s(base,  
peak)  
=====

ifx (IFX) 2024.1.0 20240308  
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.  
=====

## Base Compiler Invocation

C benchmarks:  
mpiicc -cc=icx

C++ benchmarks:  
mpicpc -cxx=icpx

Fortran benchmarks:  
mpiifort -fc=ifx

## Base Portability Flags

605.lbm\_s: -lstdc++ -std=c++14  
613.soma\_s: -lstdc++ -std=c++14  
618.tealeaf\_s: -lstdc++ -std=c++14  
621.miniswp\_s: -lstdc++ -std=c++14  
634.hpgmgfv\_s: -lstdc++ -std=c++14



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## Base Optimization Flags

C benchmarks:

```
-O3 -Ofast -xCORE-AVX512 -mprefer-vector-width=512  
-qopt-multiple-gather-scatter-by-shuffles -fiopenmp -ffast-math -flto  
-funroll-loops
```

C++ benchmarks:

```
-O3 -Ofast -xCORE-AVX512 -mprefer-vector-width=512  
-qopt-multiple-gather-scatter-by-shuffles -fiopenmp -ffast-math -flto  
-funroll-loops
```

Fortran benchmarks:

```
-O3 -Ofast -xCORE-AVX512 -mprefer-vector-width=512  
-qopt-multiple-gather-scatter-by-shuffles -fiopenmp -ffast-math -flto  
-funroll-loops -nostandard-realloc-lhs -align array64byte
```

## Base Other Flags

C benchmarks:

```
-Wno-incompatible-function-pointer-types
```

## Peak Compiler Invocation

C benchmarks:

```
mpiicc -cc=icx
```

C++ benchmarks:

```
mpiicpc -cxx=icpx
```

Fortran benchmarks:

```
mpiifort -fc=ifx
```

## Peak Portability Flags

```
605.lbm_s: -lstdc++ -std=c++14  
613.soma_s: -lstdc++ -std=c++14  
618.tealeaf_s: -lstdc++ -std=c++14  
621.miniswp_s: -lstdc++ -std=c++14  
634.hpgmgfv_s: -lstdc++ -std=c++14
```



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## Peak Optimization Flags

C benchmarks:

```
605.lbm_s: -O3 -Ofast -xCORE-AVX512 -mprefer-vector-width=512  
-qopt-multiple-gather-scatter-by-shuffles -fiopenmp  
-ffast-math -flto -funroll-loops
```

613.soma\_s: basepeak = yes

618.tealeaf\_s: basepeak = yes

621.miniswp\_s: basepeak = yes

634.hpgmgfv\_s: Same as 605.lbm\_s

C++ benchmarks:

```
-O3 -Ofast -xCORE-AVX512 -mprefer-vector-width=512  
-qopt-multiple-gather-scatter-by-shuffles -fiopenmp -ffast-math -flto  
-funroll-loops
```

Fortran benchmarks:

```
619.clvleaf_s: -O3 -Ofast -xCORE-AVX512 -mprefer-vector-width=512  
-qopt-multiple-gather-scatter-by-shuffles -fiopenmp  
-ffast-math -flto -funroll-loops -nostandard-realloc-lhs  
-align array64byte
```

628.pot3d\_s: Same as 619.clvleaf\_s

635.weather\_s: basepeak = yes

## Peak Other Flags

C benchmarks:

```
-Wno-incompatible-function-pointer-types
```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/hpc2021/flags/HBM.html>

[http://www.spec.org/hpc2021/flags/Intel\\_compiler\\_flags.2024-12-11.html](http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2024-12-11.html)

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/hpc2021/flags/HBM.xml>

[http://www.spec.org/hpc2021/flags/Intel\\_compiler\\_flags.2024-12-11.xml](http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2024-12-11.xml)



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

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