# SPEChpc™ 2021 Tiny Result

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## Intel

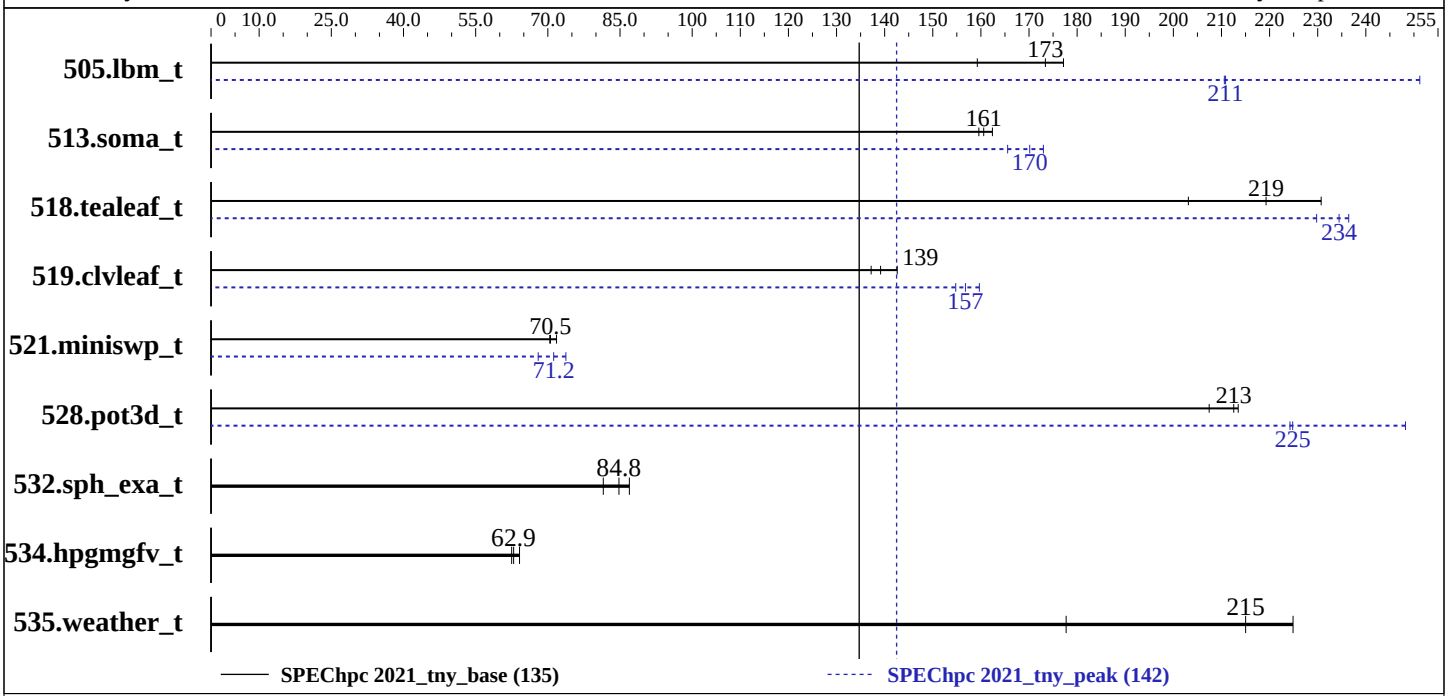
Endeavour: Intel Server D50DNP2MFALACB (Intel Xeon Platinum 8480+)

SPEChpc 2021_tny_base = 135

SPEChpc 2021_tny_peak = 142

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

**Test Date:** Jul-2023
**Hardware Availability:** Jan-2023
**Software Availability:** Apr-2023




## 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 |
| 505.lbm_t | OMP | 128 | 28 | 14.1 | 159 | **13.0** | **173** | 12.7 | 177 | OMP | 448 | 8 | 8.96 | 251 | 10.7 | 211 | **10.7** | **211** |
| 513.soma_t | OMP | 128 | 28 | 22.8 | 162 | **23.0** | **161** | 23.2 | 160 | OMP | 64 | 56 | 21.4 | 173 | **21.7** | **170** | 22.3 | 166 |
| 518.tealeaf_t | OMP | 128 | 28 | 7.15 | 231 | 8.12 | 203 | **7.53** | **219** | OMP | 64 | 56 | 7.18 | 230 | 6.98 | 236 | **7.04** | **234** |
| 519.clvleaf_t | OMP | 128 | 28 | 11.6 | 143 | 12.0 | 137 | **11.9** | **139** | OMP | 64 | 56 | 10.3 | 160 | **10.5** | **157** | 10.7 | 155 |
| 521.miniswp_t | OMP | 128 | 28 | 22.3 | 71.8 | **22.7** | **70.5** | 22.7 | 70.4 | OMP | 64 | 56 | 21.7 | 73.8 | 23.5 | 68.0 | **22.5** | **71.2** |
| 528.pot3d_t | OMP | 128 | 28 | **10.0** | **213** | 10.2 | 207 | 9.95 | 213 | OMP | 256 | 14 | 8.56 | 248 | **9.45** | **225** | 9.48 | 224 |
| 532.sph_exa_t | OMP | 128 | 28 | 22.4 | 86.9 | 23.9 | 81.5 | **23.0** | **84.8** | OMP | 128 | 28 | 22.4 | 86.9 | 23.9 | 81.5 | **23.0** | **84.8** |
| 534.hpgmgfv_t | OMP | 128 | 28 | 18.3 | 64.1 | **18.7** | **62.9** | 18.8 | 62.5 | OMP | 128 | 28 | 18.3 | 64.1 | **18.7** | **62.9** | 18.8 | 62.5 |
| 535.weather_t | OMP | 128 | 28 | 14.3 | 225 | 18.1 | 178 | **15.0** | **215** | OMP | 128 | 28 | 14.3 | 225 | 18.1 | 178 | **15.0** | **215** |

**SPEChpc 2021_tny_base = 135**

**SPEChpc 2021_tny_peak = 142**

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

# SPEChpc™ 2021 Tiny Result

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## Intel

Endeavour: Intel Server D50DNP2MFALACB (Intel Xeon Platinum 8480+)

SPEChpc 2021_tny_base = 135

SPEChpc 2021_tny_peak = 142

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

**Test Date:** Jul-2023
**Hardware Availability:** Jan-2023
**Software Availability:** Apr-2023

### Hardware Summary

| | |
|---|---|
| Type of System: | Homogenous Cluster |
| Compute Node: | Intel Server D50DNP2MFALACB (Xeon 8480+) |
| Interconnect: | Mellanox HDR |
| Compute Nodes Used: | 32 |
| Total Chips: | 64 |
| Total Cores: | 3584 |
| Total Threads: | 7168 |
| Total Memory: | 16 TB |
| Max. Peak Threads: | 56 |

### Software Summary

| | |
|---|---|
| Compiler: | Intel oneAPI Compiler 2023.1.0 |
| MPI Library: | Intel MPI Library 2021.9 for Linux OS |
| Other MPI Info: | None |
| Other Software: | None |
| Base Parallel Model: | OMP |
| Base Ranks Run: | 128 |
| Base Threads Run: | 28 |
| Peak Parallel Models: | OMP |
| Minimum Peak Ranks: | 64 |
| Maximum Peak Ranks: | 448 |
| Max. Peak Threads: | 56 |
| Min. Peak Threads: | 8 |

**Node Description: Intel Server D50DNP2MFALACB (Xeon 8480+)**

### Hardware

| | |
|---|---|
| Number of nodes: | 32 |
| Uses of the node: | Compute |
| Vendor: | Intel |
| Model: | Intel Server D50DNP2MFALACB (Xeon 8480+) |
| CPU Name: | Intel Xeon Platinum 8480+ |
| 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 3.8 GHz |
| CPU MHz: | 2000 |
| Primary Cache: | 32 KB I + 48 KB D on chip per core |
| Secondary Cache: | 2 MB I+D on chip per core |
| L3 Cache: | 105 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 512 GB (16 x 32 GB 2Rx8 PC5-4800B) |
| 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 |
| Interconnect Type: | Mellanox HDR |

### Software

| | |
|---|---|
| Accelerator Driver: | None |
| Adapter: | Mellanox ConnectX-6 HDR |
| Adapter Driver: | 5.9-0.5.5 |
| Adapter Firmware: | 20.36.1010 |
| Operating System: | Rocky Linux 8.7 (Green Obsidian)<br>4.18.0-372.32.1.el8_6.crt3.x86_64 |
| Local File System: | NFS |
| Shared File System: | PANASAS FS |
| System State: | Multi-user |
| Other Software: | None |

## Interconnect Description: Mellanox HDR

### Hardware

| | |
|---|---|
| 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 |

### Software

: --

## 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
```

## Compiler Version Notes

```
==============================================================================
 CXXC 532.sph_exa_t(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler 2023.1.0 (2023.1.0.20230320)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir:
  /global/panfs01/admin/opt/intel/oneAPI/2023.1.0.46401/compiler/2023.1.0/linux/bin-llvm
Configuration file:
  /global/panfs01/admin/opt/intel/oneAPI/2023.1.0.46401/compiler/2023.1.0/linux/bin-llvm/../bin/icpx.cfg
------------------------------------------------------------------------------

==============================================================================
 CC  505.lbm_t(base, peak) 513.soma_t(base, peak) 518.tealeaf_t(base, peak)
     521.miniswp_t(base, peak) 534.hpgmgfv_t(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler 2023.1.0 (2023.1.0.20230320)
Target: x86_64-unknown-linux-gnu
```

**(Continued on next page)**

## Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir:
  /global/panfs01/admin/opt/intel/oneAPI/2023.1.0.46401/compiler/2023.1.0/linux/bin-llvm
Configuration file:
  /global/panfs01/admin/opt/intel/oneAPI/2023.1.0.46401/compiler/2023.1.0/linux/bin-llvm/../bin/icx.cfg
------------------------------------------------------------------------------

==============================================================================
 FC  519.clvleaf_t(peak)
------------------------------------------------------------------------------
ifort (IFORT) 2021.9.0 20230302
Copyright (C) 1985-2023 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  519.clvleaf_t(base) 528.pot3d_t(base, peak) 535.weather_t(base, peak)
------------------------------------------------------------------------------
ifx (IFX) 2023.1.0 20230320
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
`mpiicc -cc=icx`

C++ benchmarks:
`mpiicpc -cxx=icpx`

Fortran benchmarks:
`mpiifort -fc=ifx`

## Base Portability Flags

505.lbm_t: `-lstdc++ -std=c++14`
513.soma_t: `-lstdc++ -std=c++14`
518.tealeaf_t: `-lstdc++ -std=c++14`
521.miniswp_t: `-DUSE_KBA -DUSE_ACCELDIR -lstdc++ -std=c++14`
532.sph_exa_t: `-DSPEC_USE_LT_IN_KERNELS`
534.hpgmgfv_t: `-lstdc++ -std=c++14`

## 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 (except as noted below):
`mpiifort -fc=ifx`

519.clvleaf_t: `mpiifort`

## Peak Portability Flags

505.lbm_t: `-lstdc++ -std=c++14`
513.soma_t: `-lstdc++ -std=c++14`
518.tealeaf_t: `-lstdc++ -std=c++14`
521.miniswp_t: `-DUSE_KBA -DUSE_ACCELDIR -lstdc++ -std=c++14`

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## Peak Portability Flags (Continued)

532.sph_exa_t: `-DSPEC_USE_LT_IN_KERNELS`
534.hpgmgfv_t: `-lstdc++ -std=c++14`

## Peak Optimization Flags

C benchmarks:

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

513.soma_t: `Same as 505.lbm_t`

518.tealeaf_t: `-O3 -Ofast -xCORE-AVX512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -fiopenmp -ffast-math -flto -funroll-loops -qopt-streaming-stores=always`

521.miniswp_t: `Same as 505.lbm_t`

534.hpgmgfv_t: `basepeak = yes`

C++ benchmarks:

532.sph_exa_t: `basepeak = yes`

Fortran benchmarks:

519.clvleaf_t: `-O3 -Ofast -xCORE-AVX512 -ansi-alias -qopenmp -ipo -qopt-zmm-usage=high -qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs -align array64byte`

528.pot3d_t: `-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`

535.weather_t: `basepeak = yes`

## Peak Other Flags

C benchmarks:
`-Wno-incompatible-function-pointer-types`

The flags file that was used to format this result can be browsed at
`http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2023-08-16.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2023-08-16.xml`


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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEChpc2021 v1.1.7 on 2023-07-22 15:08:34-0400.
Report generated on 2023-08-28 13:28:54 by hpc2021 PS formatter v1.0.3.
Originally published on 2023-08-16.