SPEChpc™ 2021 Tiny Result

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Intel

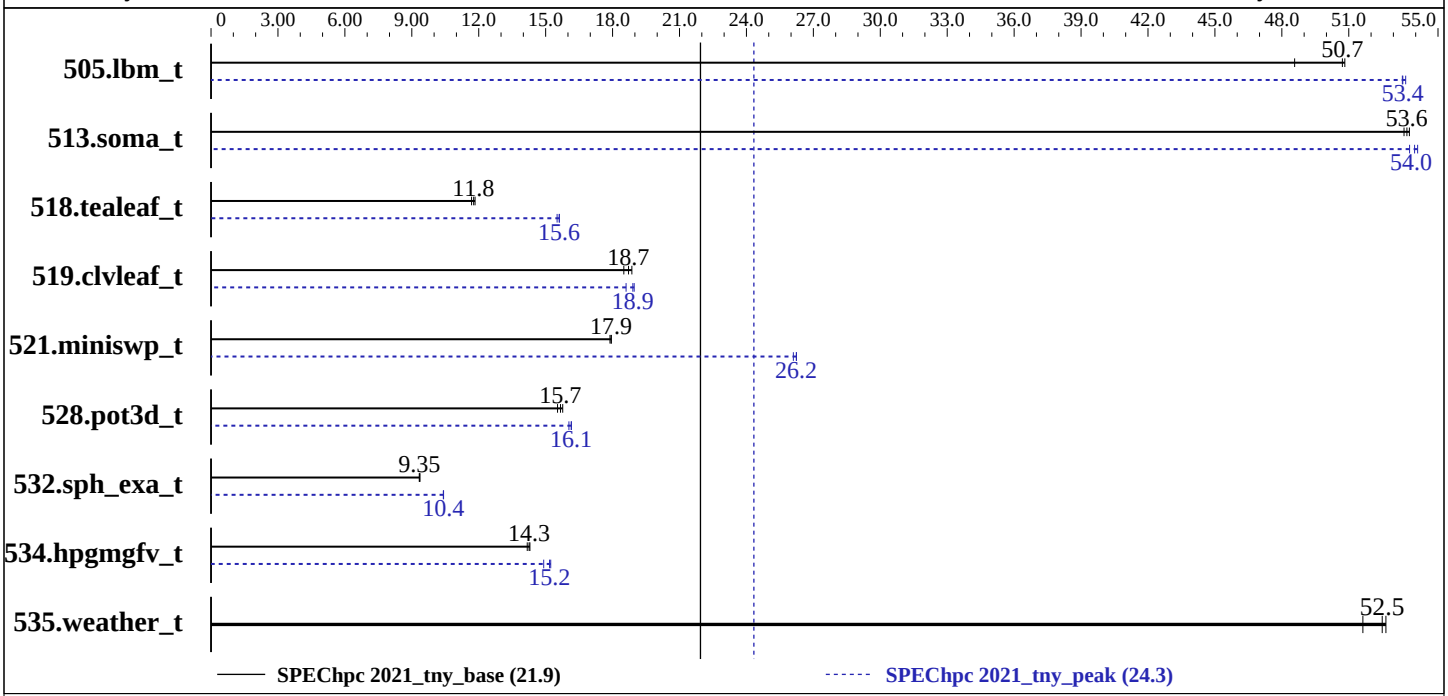
Hatch: Intel Server D50DNP1SB (Xeon Platinum 8480+)

SPEChpc 2021_tny_base = 21.9

SPEChpc 2021_tny_peak = 24.3

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

Test Date: Apr-2025
Hardware Availability: Jan-2023
Software Availability: Jun-2025



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	TGT	2	56	46.3	48.6	44.3	50.8	**44.4**	**50.7**	TGT	2	56	42.0	53.6	42.1	53.4	**42.1**	**53.4**
513.soma_t	TGT	2	56	68.9	53.7	**69.0**	**53.6**	69.2	53.5	TGT	2	56	**68.6**	**54.0**	68.4	54.1	68.9	53.7
518.tealeaf_t	TGT	2	56	141	11.7	139	11.8	**140**	**11.8**	TGT	2	56	106	15.6	**106**	**15.6**	106	15.5
519.clvleaf_t	TGT	2	56	87.5	18.9	89.2	18.5	**88.2**	**18.7**	TGT	2	56	88.7	18.6	87.0	19.0	**87.3**	**18.9**
521.miniswp_t	TGT	2	56	89.2	17.9	**89.2**	**17.9**	89.5	17.9	TGT	2	56	61.3	26.1	61.0	26.2	**61.0**	**26.2**
528.pot3d_t	TGT	2	56	137	15.5	135	15.8	**136**	**15.7**	TGT	2	56	132	16.2	**132**	**16.1**	132	16.0
532.sph_exa_t	TGT	2	56	**209**	**9.35**	208	9.37	209	9.33	TGT	2	56	187	10.4	187	10.4	**187**	**10.4**
534.hpgmgfv_t	TGT	2	56	82.2	14.3	82.9	14.2	**82.4**	**14.3**	TGT	2	56	**77.4**	**15.2**	78.8	14.9	77.2	15.2
535.weather_t	TGT	2	56	61.2	52.7	62.5	51.6	**61.4**	**52.5**	TGT	2	56	61.2	52.7	62.5	51.6	**61.4**	**52.5**

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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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Software Availability: Jun-2025

Hardware Summary

Type of System:	Homogenous Cluster
Compute Node:	Intel Server D50DNP1SB (Xeon Platinum 8480+)
Interconnect:	Mellanox HDR
Compute Nodes Used:	1
Total Chips:	2
Total Cores:	112
Total Threads:	224
Total Memory:	1 TB
Max. Peak Threads:	56

Software Summary

Compiler:	Intel oneAPI Compiler 2025.2.0
MPI Library:	Intel MPI Library 2021.15 for Linux OS
Other MPI Info:	None
Other Software:	None
Base Parallel Model:	TGT
Base Ranks Run:	2
Base Threads Run:	56
Peak Parallel Models:	TGT
Minimum Peak Ranks:	2
Maximum Peak Ranks:	2
Max. Peak Threads:	56
Min. Peak Threads:	56

Node Description: Intel Server D50DNP1SB (Xeon Platinum 8480+)

Hardware

Number of nodes:	1
Uses of the node:	Compute
Vendor:	Intel
Model:	Intel Server D50DNP1SB (2 x Intel Xeon Platinum 8480+, 2.0GHz)
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:	1 TB (16x64 GB DDR5 2Rx4 PC5-4800B-R)
Disk Subsystem:	1 x 1 1TB NVMe M.2 INTEL SSDPELKX010T8
Other Hardware:	None
Accel Count:	1
Accel Model:	Intel Data Center GPU Max 1550
Accel Vendor:	Intel
Accel Type:	GPU
Accel Connection:	PCIe Gen5 x16
Accel ECC enabled:	yes
Accel Description:	Intel Data Center GPU Max 1550
Adapter:	Mellanox ConnectX-6 HDR
Number of Adapters:	1
Slot Type:	PCI-Express 4.0 x16
Data Rate:	200Gbit/s
Ports Used:	1

(Continued on next page)

Software

Accelerator Driver:	25.05.32567
Adapter:	Mellanox ConnectX-6 HDR
Adapter Driver:	--
Adapter Firmware:	20.38.1900
Operating System:	SUSE Linux Enterprise Server 15 SP6 6.4.0-150600.23.42-default
Local File System:	lustre
Shared File System:	LUSTRE FS
System State:	Run level 5
Other Software:	None

Node Description: Intel Server D50DNP1SB (Xeon Platinum 8480+)

Hardware (Continued)

Interconnect Type: Mellanox HDR

Interconnect Description: Mellanox HDR

Hardware

Vendor:	Mellanox
Model:	Mellanox HDR
Switch Model:	Mellanox Technologies MT28908 Family InfiniBand Switch
Number of Switches:	12
Number of Ports:	40
Data Rate:	200 Gbit/s
Firmware:	20.38.1900
Topology:	Fat-tree
Primary Use:	MPI Traffic, LustreFS traffic

Software

: --

Submit Notes

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

General Notes

```
Environment variables set by runhpc before the start of the run:
LIBOMPTARGET_LEVEL_ZERO_USE_IMMEDIATE_COMMAND_LIST = "all"
KMP_AFFINITY=compact,1,granularity=thread
I_MPI_FABRICS=shm:ofi
I_MPI_OFFLOAD=1
I_MPI_OFFLOAD_CELL=tile
I_MPI_OFFLOAD_TOPOLIB=level_zero
I_MPI_OFFLOAD_CELL_LIST=0,1,2,3,4,5,6,7
For the following tests src.alt was used in PEAK:
513 518 519 521 528 532 534
```

Platform Notes

```
 Device Vendor                          Intel
 Device Version                         OpenCL 3.0 NEO
 Driver Version                         25.05.32567
 Base clock                             900MHz
 Max clock frequency                    1600MHz
 Tiles                                  2
 Slices per Tile                        1
```

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Platform Notes (Continued)

Max compute units per Tile	512
Sub-slices per slice	64
EUs per sub-slice	8
Threads per EU	8
Max work item dimensions	3
Max work item sizes	1024x1024x1024
Max work group size	1024
Preferred work group size multiple	32
Max sub-groups per work group	64
Sub-group sizes	16, 32
L1 Cache per EU	65536
L2 cache size	427819008
Global memory size	137438953472
Address bits	64, Little-Endian

Compiler Version Notes

```
==============================================================================
 CXXC 532.sph_exa_t(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler 2025.2.0 (2025.x.0.20250326)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir:
  /lfs/lfs17/mknyazev/intel/nightly/20250326/compiler/latest/bin/compiler
Configuration file:
  /lfs/lfs17/mknyazev/intel/nightly/20250326/compiler/latest/bin/compiler/../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 2025.2.0 (2025.x.0.20250326)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir:
  /lfs/lfs17/mknyazev/intel/nightly/20250326/compiler/latest/bin/compiler
Configuration file:
  /lfs/lfs17/mknyazev/intel/nightly/20250326/compiler/latest/bin/compiler/../icx.cfg
------------------------------------------------------------------------------

==============================================================================
 FC  519.clvleaf_t(base, peak) 535.weather_t(base, peak)
------------------------------------------------------------------------------
ifx (IFX) dev.x.0 Mainline 20250326
```

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Compiler Version Notes (Continued)

```
Copyright (C) 1985-2025 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  528.pot3d_t(base, peak)
------------------------------------------------------------------------------
ifx: command line warning #10157: ignoring option '-W'; argument is of wrong
  type
ifx (IFX) dev.x.0 Mainline 20250326
Copyright (C) 1985-2025 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: `-DUSE_MPI`
513.soma_t: `-DUSE_MPI -DSPEC_NO_VAR_ARRAY_REDUCE`
518.tealeaf_t: `-DUSE_MPI`
519.clvleaf_t: `-DUSE_MPI`
528.pot3d_t: `-DUSE_MPI`
535.weather_t: `-DUSE_MPI`

Base Optimization Flags

C benchmarks:
`-O3 -xCORE-AVX512 -flto -mprefer-vector-width=512 -ffast-math`
`-fiopenmp -fopenmp-targets=spir64_gen`
`-ftarget-register-alloc-mode=pvc:auto`
`-Xopenmp-target-backend '-device pvc -revision_id 0x2f' -DSPEC_COLLAPSE`
`-DSPEC_ACCEL_AWARE_MPI -fopenmp-optimistic-collapse`

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Base Optimization Flags (Continued)

C++ benchmarks:
-O3 -xCORE-AVX512 -flto -mprefer-vector-width=512 -ffast-math
-fiopenmp -fopenmp-targets=spir64_gen
-ftarget-register-alloc-mode=pvc:auto
-Xopenmp-target-backend '-device pvc -revision_id 0x2f' -DSPEC_COLLAPSE
-DSPEC_ACCEL_AWARE_MPI

Fortran benchmarks:
-DSPEC_COLLAPSE -O3 -xCORE-AVX512 -DSPEC_ACCEL_AWARE_MPI -flto
-mprefer-vector-width=512 -ffast-math -fiopenmp
-fopenmp-targets=spir64_gen -ftarget-register-alloc-mode=pvc:auto
-Xopenmp-target-backend '-device pvc -revision_id 0x2f'
-fopenmp-target-loopopt

Base Other Flags

Fortran benchmarks:

528.pot3d_t: -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

505.lbm_t: -DUSE_MPI
513.soma_t: -DUSE_MPI -DSPEC_NO_VAR_ARRAY_REDUCE
518.tealeaf_t: -DUSE_MPI
519.clvleaf_t: -DUSE_MPI
528.pot3d_t: -DUSE_MPI
535.weather_t: -DUSE_MPI

Peak Optimization Flags

C benchmarks:

505.lbm_t: `-O3 -xCORE-AVX512 -flto -mprefer-vector-width=512 -ffast-math -fiopenmp -fopenmp-targets=spir64_gen -ftarget-register-alloc-mode=pvc:large -Xopenmp-target-backend '-device pvc -revision_id 0x2f' -DSPEC_COLLAPSE -DSPEC_ACCEL_AWARE_MPI -fopenmp-optimistic-collapse`

513.soma_t: `-O3 -xCORE-AVX512 -flto -mprefer-vector-width=512 -ffast-math -fiopenmp -fopenmp-targets=spir64_gen -ftarget-register-alloc-mode=pvc:auto -Xopenmp-target-backend '-device pvc -revision_id 0x2f' -DSPEC_COLLAPSE -DSPEC_ACCEL_AWARE_MPI -fopenmp-optimistic-collapse`

518.tealeaf_t: `-O3 -xCORE-AVX512 -flto -mprefer-vector-width=512 -ffast-math -fiopenmp -fopenmp-targets=spir64_gen -ftarget-register-alloc-mode=pvc:auto -Xopenmp-target-backend '-device pvc -revision_id 0x2f' -DSPEC_COLLAPSE -DSPEC_ACCEL_AWARE_MPI -fopenmp-target-loop-stride=global-size -fopenmp-optimistic-collapse`

521.miniswp_t: `Same as 513.soma_t`

534.hpgmgfv_t: `Same as 513.soma_t`

C++ benchmarks:
`-O3 -xCORE-AVX512 -flto -mprefer-vector-width=512 -ffast-math -fiopenmp -fopenmp-targets=spir64_gen -ftarget-register-alloc-mode=pvc:auto -Xopenmp-target-backend '-device pvc -revision_id 0x2f' -DSPEC_COLLAPSE -DSPEC_ACCEL_AWARE_MPI`

Fortran benchmarks:

519.clvleaf_t: `-DSPEC_COLLAPSE -O3 -xCORE-AVX512 -DSPEC_ACCEL_AWARE_MPI -flto -mprefer-vector-width=512 -ffast-math -fiopenmp -fopenmp-targets=spir64_gen -ftarget-register-alloc-mode=pvc:auto -Xopenmp-target-backend '-device pvc -revision_id 0x2f' -fopenmp-target-loopopt`

528.pot3d_t: `Same as 519.clvleaf_t`

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Peak Optimization Flags (Continued)

535.weather_t: `basepeak = yes`

Peak Other Flags

Fortran benchmarks:

528.pot3d_t: `-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.2025-05-22.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2025-05-22.xml`

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

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