SPEChpc™ 2021 Tiny Result

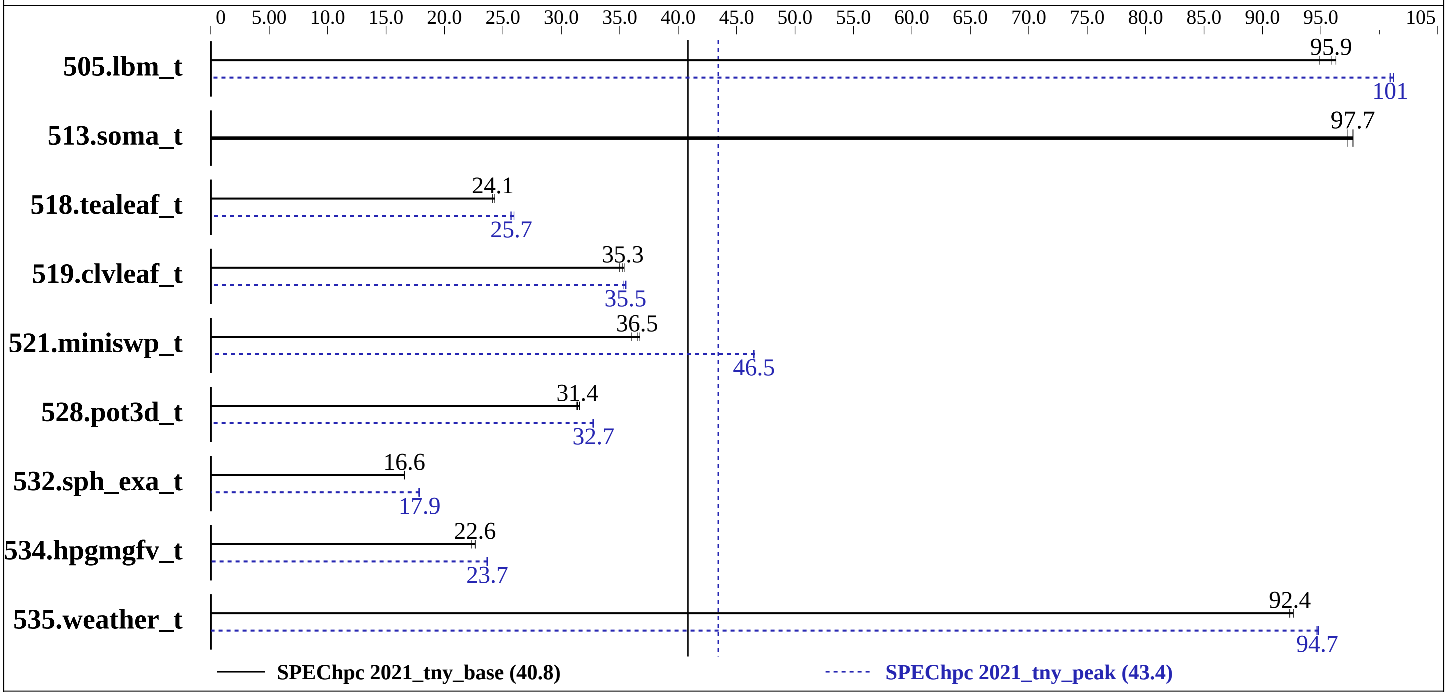
Intel

Hatch: Intel Server D50DNP1SB (Xeon Platinum 8480+)

SPEChpc 2021_tny_base = 40.8

SPEChpc 2021_tny_peak = 43.4

hpc2021 License:	13	**Test Date:**	Apr-2025
Test Sponsor:	Intel	**Hardware Availability:**	Jan-2023
Tested by:	Intel	**Software Availability:**	Mar-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	4	1	23.7	94.9	**23.5**	**95.9**	23.4	96.3	TGT	4	1	22.3	101	**22.3**	**101**	22.2	101
513.soma_t	TGT	4	1	**37.9**	**97.7**	37.8	97.8	38.0	97.3	TGT	4	1	**37.9**	**97.7**	37.8	97.8	38.0	97.3
518.tealeaf_t	TGT	4	1	**68.4**	**24.1**	68.5	24.1	67.9	24.3	TGT	4	1	63.6	25.9	**64.2**	**25.7**	64.3	25.7
519.clvleaf_t	TGT	4	1	46.6	35.4	47.1	35.0	**46.8**	**35.3**	TGT	4	1	**46.5**	**35.5**	46.8	35.3	46.4	35.5
521.miniswp_t	TGT	4	1	43.6	36.7	**43.8**	**36.5**	44.4	36.0	TGT	4	1	34.4	46.6	34.4	46.5	**34.4**	**46.5**
528.pot3d_t	TGT	4	1	**67.7**	**31.4**	67.3	31.6	67.8	31.3	TGT	4	1	64.9	32.8	**64.9**	**32.7**	65.1	32.6
532.sph_exa_t	TGT	4	1	118	16.6	**118**	**16.6**	118	16.5	TGT	4	1	110	17.8	**109**	**17.9**	109	17.9
534.hpgmgfv_t	TGT	4	1	**52.0**	**22.6**	51.9	22.6	52.6	22.3	TGT	4	1	49.9	23.6	**49.7**	**23.7**	49.6	23.7
535.weather_t	TGT	4	1	**34.9**	**92.4**	34.8	92.6	34.9	92.3	TGT	4	1	34.0	94.8	**34.1**	**94.7**	34.1	94.7

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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 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:	1

Software Summary

Compiler:	Intel oneAPI Compiler 2025.1.0
MPI Library:	Intel MPI Library 2021.15 for Linux OS
Other MPI Info:	None
Other Software:	None
Base Parallel Model:	TGT
Base Ranks Run:	4
Base Threads Run:	1
Peak Parallel Models:	TGT
Minimum Peak Ranks:	4
Maximum Peak Ranks:	4
Max. Peak Threads:	1
Min. Peak Threads:	1

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:	2
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

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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"
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:
518 519 521 528 532 534 535
```

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
Max compute units per Tile                     512
```

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Platform Notes (Continued)

```
 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 2025.1.0 (2025.1.0.20250317)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir:
  /lfs/lfs17/mknyazev/intel/2025.1/oneapi/compiler/2025.1/bin/compiler
Configuration file:
  /lfs/lfs17/mknyazev/intel/2025.1/oneapi/compiler/2025.1/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 2025.1.0 (2025.1.0.20250317)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir:
  /lfs/lfs17/mknyazev/intel/2025.1/oneapi/compiler/2025.1/bin/compiler
Configuration file:
  /lfs/lfs17/mknyazev/intel/2025.1/oneapi/compiler/2025.1/bin/compiler/../icx.cfg
------------------------------------------------------------------------------

==============================================================================
 FC  519.clvleaf_t(base, peak) 535.weather_t(base, peak)
------------------------------------------------------------------------------
ifx (IFX) 2025.1.0 20250317
Copyright (C) 1985-2025 Intel Corporation. All rights reserved.
```

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Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------

==============================================================================
 FC  528.pot3d_t(base, peak)
------------------------------------------------------------------------------
ifx: command line warning #10157: ignoring option '-W'; argument is of wrong
  type
ifx (IFX) 2025.1.0 20250317
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: `basepeak = yes`

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-optimistic-collapse`

521.miniswp_t: `Same as 518.tealeaf_t`

534.hpgmgfv_t: `Same as 518.tealeaf_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:
`-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`

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.2025-05-22.00.html

You can also download the XML flags source by saving the following link:
http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2025-05-22.00.xml

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

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