SPEChpc™ 2021 Tiny Result

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Intel

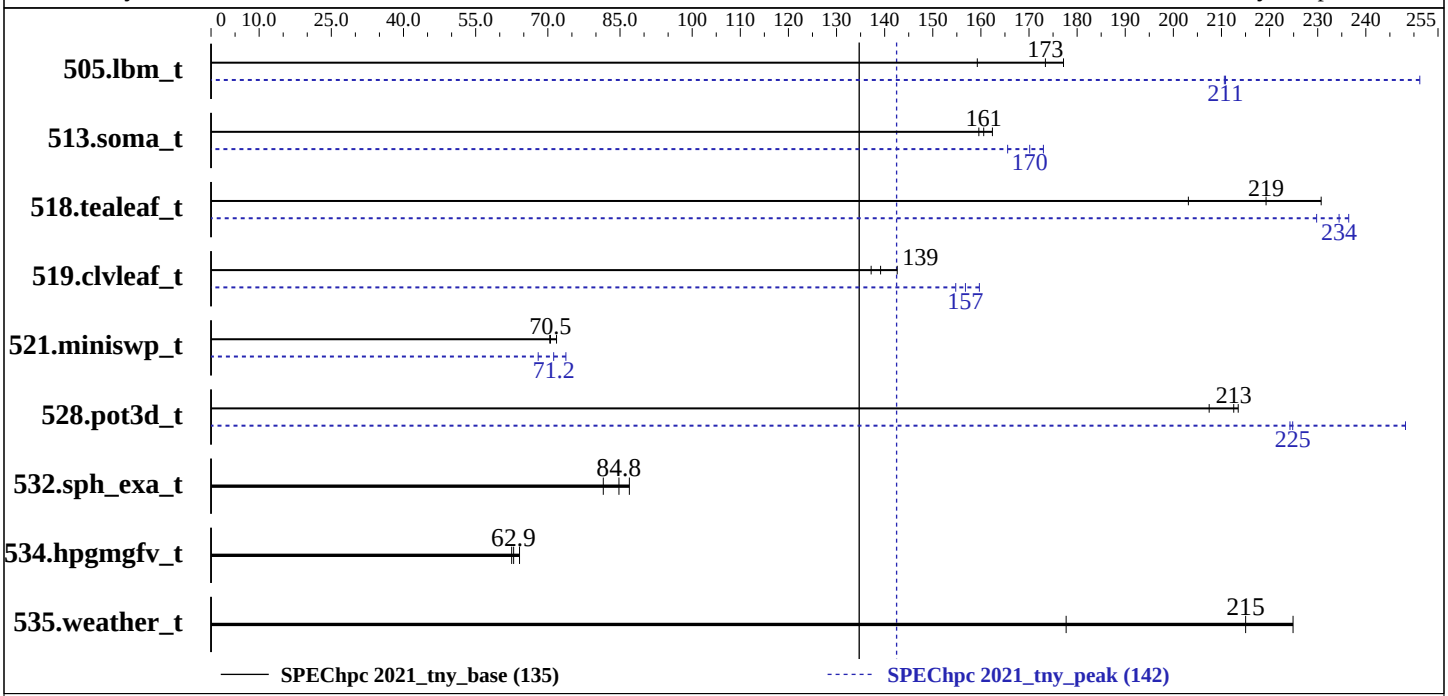
Endeavour: Intel Server D50DNP2MFALACB (Intel Xeon Platinum 8480+)

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**

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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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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
Total Accelerators:	0
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) 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
```

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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: `-lstdc++ -std=c++14`
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 (except as noted below):
```
-Ispecmpitime -Wno-incompatible-function-pointer-types
```

521.miniswp_t: `-Ispecmpitime/ -Wno-incompatible-function-pointer-types`

534.hpgmgfv_t: `-Ispecmpitime  -Wno-incompatible-function-pointer-types`

C++ benchmarks:
```
-Ispecmpitime
```

Fortran benchmarks:

519.clvleaf_t: `-Ispecmpitime`

Peak Compiler Invocation

C benchmarks:
```
mpiicc -cc=icx
```

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

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

(Continued on next page)

Peak Compiler Invocation (Continued)

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: -lstdc++ -std=c++14
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

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Peak Optimization Flags (Continued)

528.pot3d_t (continued):
`-ffast-math -flto -funroll-loops -nostandard-realloc-lhs -align array64byte`

535.weather_t: `basepeak = yes`

Peak Other Flags

C benchmarks (except as noted below):
`-Ispecmpitime -Wno-incompatible-function-pointer-types`

521.miniswp_t: `-Ispecmpitime/ -Wno-incompatible-function-pointer-types`

534.hpgmgfv_t: `-Ispecmpitime  -Wno-incompatible-function-pointer-types`

C++ benchmarks:
`-Ispecmpitime`

Fortran benchmarks:

519.clvleaf_t: `-Ispecmpitime`

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.

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