SPEChpc™ 2021 Small Result

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Intel

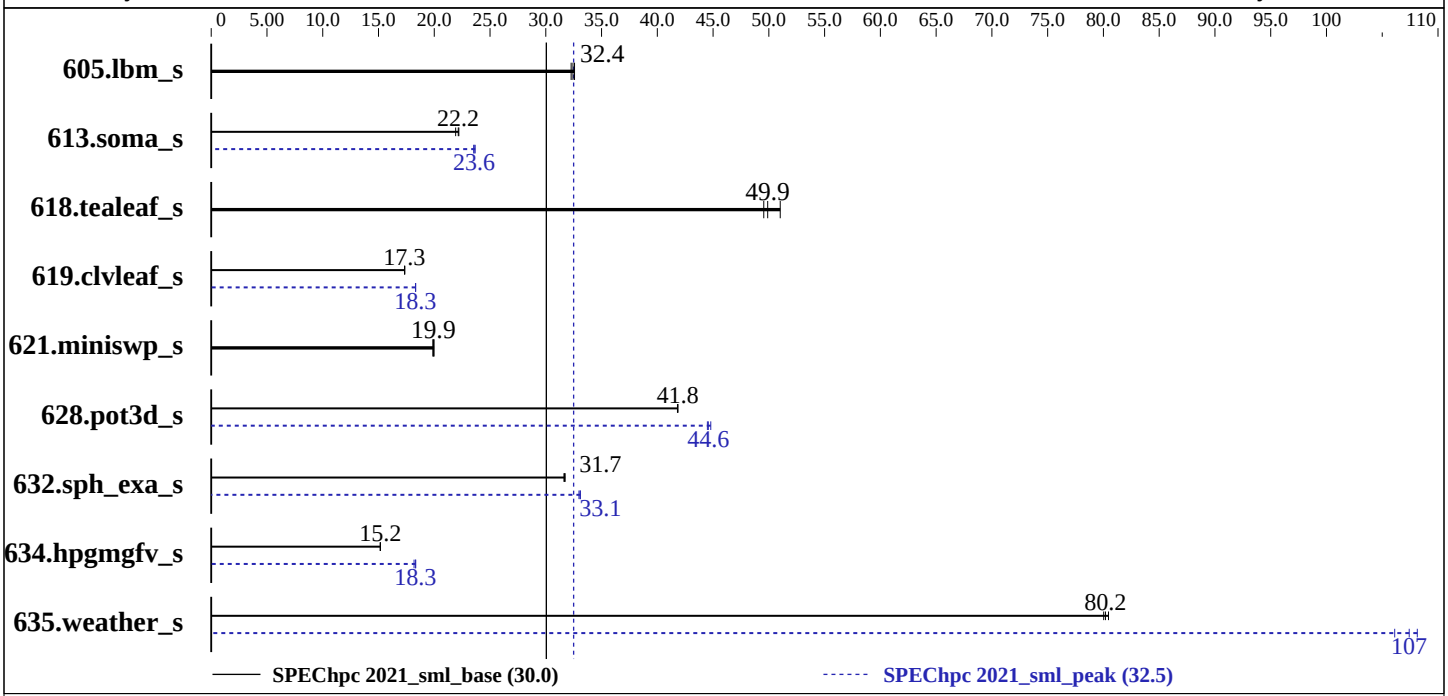
Endeavour: Intel Server D50DNP1SBB (Intel Xeon Platinum 8592+)

SPEChpc 2021_sml_base = 30.0

SPEChpc 2021_sml_peak = 32.5

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

Test Date: May-2024
Hardware Availability: Dec-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	16	47.6	32.6	**47.8**	**32.4**	48.0	32.3	OMP	256	16	47.6	32.6	**47.8**	**32.4**	48.0	32.3
613.soma_s	OMP	256	16	**72.2**	**22.2**	73.0	21.9	72.1	22.2	OMP	128	32	67.6	23.7	68.0	23.5	**67.9**	**23.6**
618.tealeaf_s	OMP	256	16	41.4	49.5	40.2	51.0	**41.1**	**49.9**	OMP	256	16	41.4	49.5	40.2	51.0	**41.1**	**49.9**
619.clvleaf_s	OMP	256	16	95.2	17.3	**95.1**	**17.3**	95.1	17.3	OMP	256	16	90.0	18.3	**90.0**	**18.3**	90.1	18.3
621.miniswp_s	OMP	256	16	55.4	19.9	**55.2**	**19.9**	55.0	20.0	OMP	256	16	55.4	19.9	**55.2**	**19.9**	55.0	20.0
628.pot3d_s	OMP	256	16	40.0	41.8	40.1	41.8	**40.0**	**41.8**	OMP	512	8	37.4	44.8	**37.6**	**44.6**	37.6	44.5
632.sph_exa_s	OMP	256	16	72.5	31.7	**72.6**	**31.7**	72.7	31.6	OMP	1024	4	**69.5**	**33.1**	69.8	33.0	69.5	33.1
634.hpgmgfv_s	OMP	256	16	64.3	15.2	**64.3**	**15.2**	64.3	15.2	OMP	2048	2	**53.2**	**18.3**	53.2	18.3	53.6	18.2
635.weather_s	OMP	256	16	32.5	80.0	**32.4**	**80.2**	32.3	80.5	OMP	1024	4	24.0	108	24.5	106	**24.2**	**107**

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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 Availability: Dec-2023
Software Availability: Mar-2024

Hardware Summary

Type of System:	Homogenous Cluster
Compute Node:	Intel Server D50DNP1SBB (Xeon 8592+)
Interconnect:	Mellanox HDR
Compute Nodes Used:	32
Total Chips:	64
Total Cores:	4096
Total Threads:	8192
Total Memory:	16 TB
Max. Peak Threads:	32

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:	16
Peak Parallel Models:	OMP
Minimum Peak Ranks:	128
Maximum Peak Ranks:	2048
Max. Peak Threads:	32
Min. Peak Threads:	2

Node Description: Intel Server D50DNP1SBB (Xeon 8592+)

Hardware

Number of nodes:	32
Uses of the node:	Compute
Vendor:	Intel
Model:	Intel Server D50DNP1SBB (Xeon 8592+)
CPU Name:	Intel Xeon Platinum 8592+
CPU(s) orderable:	1, 2 chips
Chips enabled:	2
Cores enabled:	128
Cores per chip:	64
Threads per core:	2
CPU Characteristics:	Turbo Boost Technology up to 3.9 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:	320 MB I+D on chip per chip
Other Cache:	None
Memory:	512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
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:	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

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 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
------------------------------------------------------------------------------

==============================================================================
 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
```

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Compiler Version Notes (Continued)

```
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:
`mpiicpc -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`

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`

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Base Optimization Flags (Continued)

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`

Peak Optimization Flags

C benchmarks:

605.lbm_s: `basepeak = yes`

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

618.tealeaf_s: `basepeak = yes`

621.miniswp_s: `basepeak = yes`

634.hpgmgfv_s: `Same as 613.soma_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 -qopt-streaming-stores=always -nostandard-realloc-lhs -align array64byte`

628.pot3d_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`

635.weather_s: `Same as 628.pot3d_s`

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.2024-12-11.html`

You can also download the XML flags source by saving the following link:
`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.

Tested with SPEChpc2021 v1.1.8 on 2024-05-28 03:53:25-0400.
Report generated on 2024-12-31 10:29:38 by hpc2021 PS formatter v1.0.3.
Originally published on 2024-12-25.