SPEChpc™ 2021 Small Result

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Intel

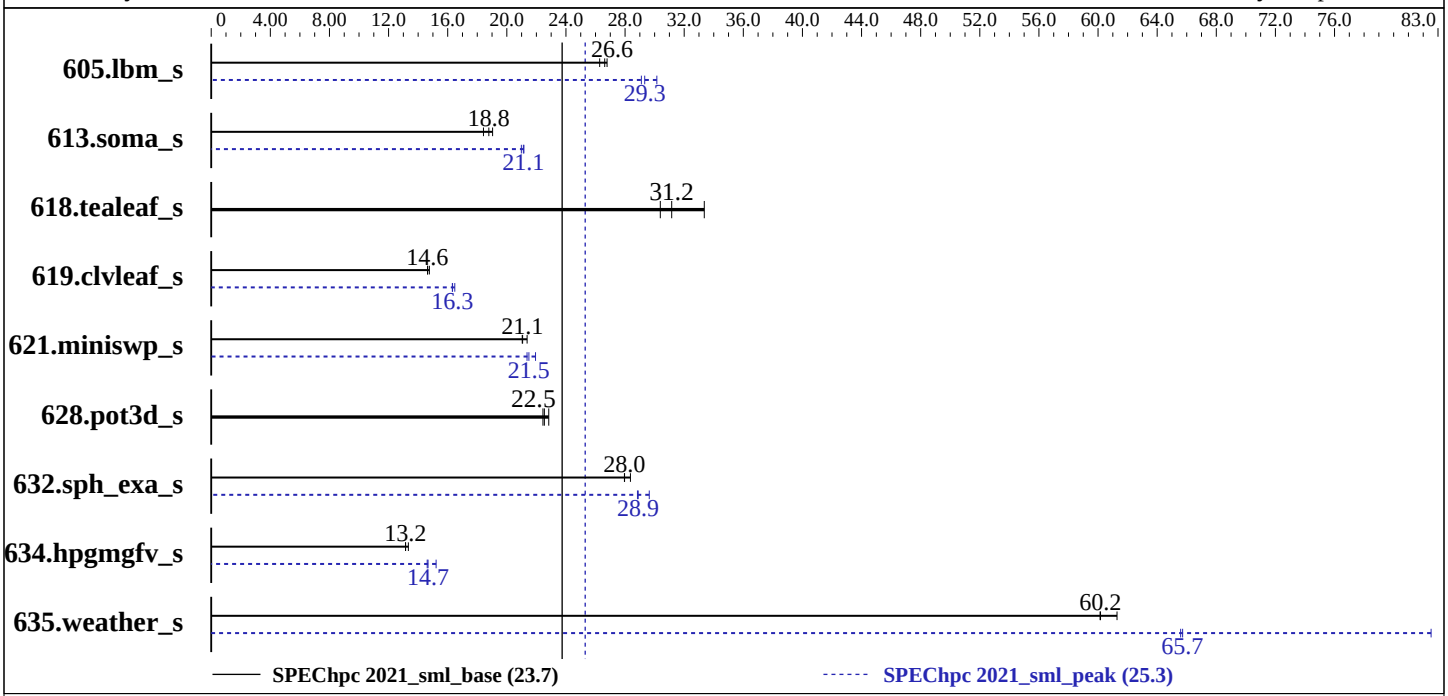
Endeavour: Intel Server D50DNP2MFALACB (Intel Xeon Platinum 8480+)

SPEChpc 2021_sml_base = 23.7

SPEChpc 2021_sml_peak = 25.3

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
605.lbm_s	OMP	256	14	59.0	26.3	**58.2**	**26.6**	57.9	26.8	OMP	512	7	51.4	30.2	53.3	29.1	**52.8**	**29.3**
613.soma_s	OMP	256	14	84.0	19.0	86.9	18.4	**85.2**	**18.8**	OMP	128	28	76.3	21.0	75.6	21.2	**75.8**	**21.1**
618.tealeaf_s	OMP	256	14	**65.8**	**31.2**	61.5	33.4	67.5	30.4	OMP	256	14	**65.8**	**31.2**	61.5	33.4	67.5	30.4
619.clvleaf_s	OMP	256	14	112	14.8	113	14.6	**113**	**14.6**	OMP	256	14	100	16.5	101	16.3	**101**	**16.3**
621.miniswp_s	OMP	256	14	51.5	21.4	52.3	21.0	**52.2**	**21.1**	OMP	128	28	50.1	21.9	51.5	21.4	**51.2**	**21.5**
628.pot3d_s	OMP	256	14	73.3	22.8	74.6	22.4	**74.3**	**22.5**	OMP	256	14	73.3	22.8	74.6	22.4	**74.3**	**22.5**
632.sph_exa_s	OMP	256	14	81.1	28.4	**82.2**	**28.0**	82.3	28.0	OMP	512	7	77.6	29.6	**79.6**	**28.9**	79.8	28.8
634.hpgmgfv_s	OMP	256	14	73.1	13.3	74.2	13.1	**74.1**	**13.2**	OMP	512	7	64.1	15.2	66.7	14.6	**66.5**	**14.7**
635.weather_s	OMP	256	14	42.4	61.3	**43.2**	**60.2**	43.2	60.1	OMP	1792	2	31.5	82.5	**39.6**	**65.7**	39.6	65.6

SPEChpc 2021_sml_base = 23.7

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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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hpc2021 License: 13
Test Sponsor: Intel
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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:	28

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:	256
Base Threads Run:	14
Peak Parallel Models:	OMP
Minimum Peak Ranks:	128
Maximum Peak Ranks:	1792
Max. Peak Threads:	28
Min. Peak Threads:	2

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 632.sph_exa_s(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  605.lbm_s(base, peak) 613.soma_s(base, peak) 618.tealeaf_s(base, peak)
     621.miniswp_s(base, peak) 634.hpgmgfv_s(base)
------------------------------------------------------------------------------
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
------------------------------------------------------------------------------

==============================================================================
 CC  634.hpgmgfv_s(peak)
------------------------------------------------------------------------------
icc: remark #10441: The Intel(R) C++ Compiler Classic (ICC) is deprecated and
  will be removed from product release in the second half of 2023. The
  Intel(R) oneAPI DPC++/C++ Compiler (ICX) is the recommended compiler moving
  forward. Please transition to use this compiler. Use '-diag-disable=10441'
  to disable this message.
icc: command line warning #10148: option
  '-Wno-incompatible-function-pointer-types' not supported
icc (ICC) 2021.9.0 20230302
Copyright (C) 1985-2023 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  619.clvleaf_s(peak)
------------------------------------------------------------------------------
ifort (IFORT) 2021.9.0 20230302
Copyright (C) 1985-2023 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  619.clvleaf_s(base) 628.pot3d_s(base, peak) 635.weather_s(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

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`

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:
`-Ispecmpitime -Wno-incompatible-function-pointer-types`

C++ benchmarks:
`-Ispecmpitime`

Fortran benchmarks:

619.clvleaf_s: `-Ispecmpitime`

Peak Compiler Invocation

C benchmarks (except as noted below):
`mpiicc -cc=icx`

(Continued on next page)

Peak Compiler Invocation (Continued)

634.hpgmgfv_s: `mpiicc`

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

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

619.clvleaf_s: `mpiifort`

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

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: `Same as 613.soma_s`

634.hpgmgfv_s: `-O3 -Ofast -xCORE-AVX512 -ansi-alias -qopenmp -ipo -qopt-zmm-usage=high -qopt-multiple-gather-scatter-by-shuffles`

C++ benchmarks:
`-O3 -Ofast -xCORE-AVX512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -fiopenmp -ffast-math -flto`

(Continued on next page)

Peak Optimization Flags (Continued)

C++ benchmarks (continued):
-funroll-loops

Fortran benchmarks:

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

628.pot3d_s: basepeak = yes

635.weather_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

Peak Other Flags

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

C++ benchmarks:
-Ispecmpitime

Fortran benchmarks:

619.clvleaf_s: -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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