SPEChpc™ 2021 Large Result

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Intel

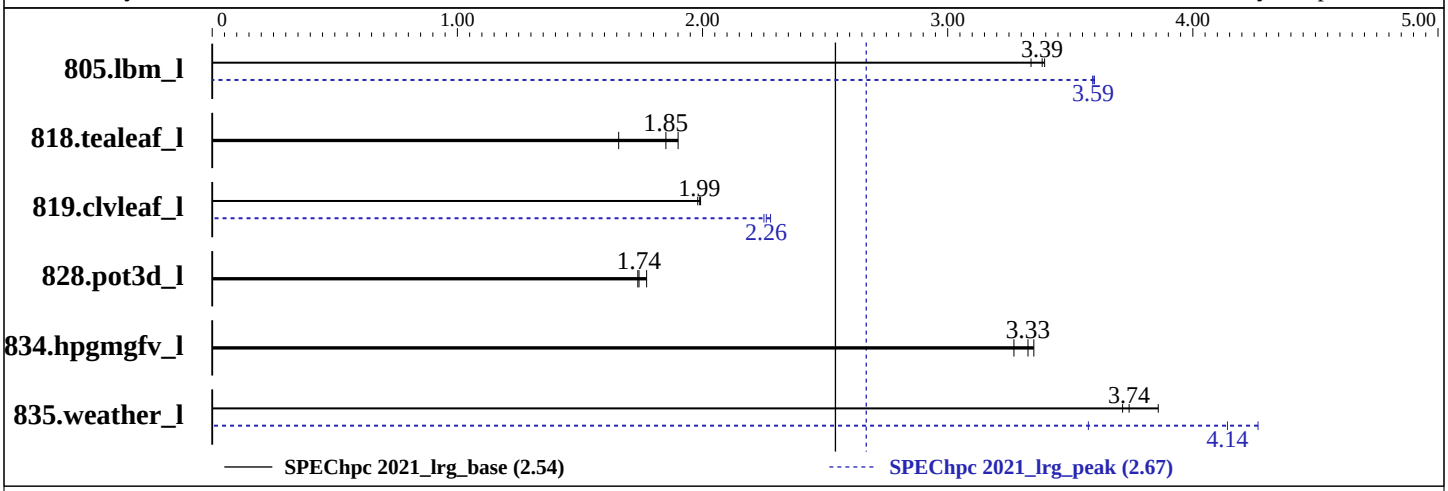
Endeavour: Intel Server D50DNP2MFALACB (Intel Xeon Platinum 8480+)

SPEChpc 2021_lrg_base = 2.54

SPEChpc 2021_lrg_peak = 2.67

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
805.lbm_l	OMP	1024	7	816	3.34	803	3.40	**805**	**3.39**	OMP	7168	1	**758**	**3.59**	757	3.60	759	3.59
818.tealeaf_l	OMP	1024	7	875	1.66	763	1.90	**784**	**1.85**	OMP	1024	7	875	1.66	763	1.90	**784**	**1.85**
819.clvleaf_l	OMP	1024	7	1054	1.99	1060	1.98	**1056**	**1.99**	OMP	1024	7	**929**	**2.26**	922	2.28	933	2.25
828.pot3d_l	OMP	1024	7	**2614**	**1.74**	2621	1.74	2568	1.77	OMP	1024	7	**2614**	**1.74**	2621	1.74	2568	1.77
834.hpgmgfv_l	OMP	1024	7	**1007**	**3.33**	1000	3.35	1024	3.27	OMP	1024	7	**1007**	**3.33**	1000	3.35	1024	3.27
835.weather_l	OMP	1024	7	888	3.86	**916**	**3.74**	922	3.71	OMP	1024	7	803	4.27	**827**	**4.14**	958	3.57

SPEChpc 2021_lrg_base = 2.54

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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 D50DNP2MFALACB (Xeon 8480+)
Interconnect:	Mellanox HDR
Compute Nodes Used:	64
Total Chips:	128
Total Cores:	7168
Total Threads:	14336
Total Memory:	32 TB
Total Accelerators:	0
Max. Peak Threads:	7

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:	1024
Base Threads Run:	7
Peak Parallel Models:	OMP
Minimum Peak Ranks:	1024
Maximum Peak Ranks:	7168
Max. Peak Threads:	7
Min. Peak Threads:	1

Node Description: Intel Server D50DNP2MFALACB (Xeon 8480+)

Hardware

Number of nodes:	64
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

```
==============================================================================
 CC  805.lbm_l(base, peak) 818.tealeaf_l(base, peak) 834.hpgmgfv_l(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/icx.cfg
------------------------------------------------------------------------------

==============================================================================
 FC  819.clvleaf_l(peak)
------------------------------------------------------------------------------
ifort (IFORT) 2021.9.0 20230302
Copyright (C) 1985-2023 Intel Corporation.  All rights reserved.
```

(Continued on next page)

Compiler Version Notes (Continued)

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

==============================================================================
 FC  819.clvleaf_l(base) 828.pot3d_l(base, peak) 835.weather_l(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`

Fortran benchmarks:
`mpiifort -fc=ifx`

Base Portability Flags

805.lbm_l: `-lstdc++ -std=c++14`
818.tealeaf_l: `-lstdc++ -std=c++14`
834.hpgmgfv_l: `-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`

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`

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Base Other Flags (Continued)

834.hpgmgfv_l: `-Ispecmpitime -Wno-incompatible-function-pointer-types`

Fortran benchmarks:

819.clvleaf_l: `-Ispecmpitime`

Peak Compiler Invocation

C benchmarks:
`mpiicc -cc=icx`

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

819.clvleaf_l: `mpiifort`

Peak Portability Flags

805.lbm_l: `-lstdc++ -std=c++14`
818.tealeaf_l: `-lstdc++ -std=c++14`
834.hpgmgfv_l: `-lstdc++ -std=c++14`

Peak Optimization Flags

C benchmarks:

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

818.tealeaf_l: `basepeak = yes`

834.hpgmgfv_l: `basepeak = yes`

Fortran benchmarks:

819.clvleaf_l: `-O3 -Ofast -xCORE-AVX512 -ansi-alias -qopenmp -ipo -qopt-zmm-usage=high`

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Peak Optimization Flags (Continued)

819.clvleaf_l (continued):
-qopt-multiple-gather-scatter-by-shuffles
-nostandard-realloc-lhs -align array64byte

828.pot3d_l: basepeak = yes

835.weather_l: -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

Peak Other Flags

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

834.hpgmgfv_l: -Ispecmpitime -Wno-incompatible-function-pointer-types

Fortran benchmarks:

819.clvleaf_l: -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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