



# SPEChpc™ 2021 Large Result

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## Intel

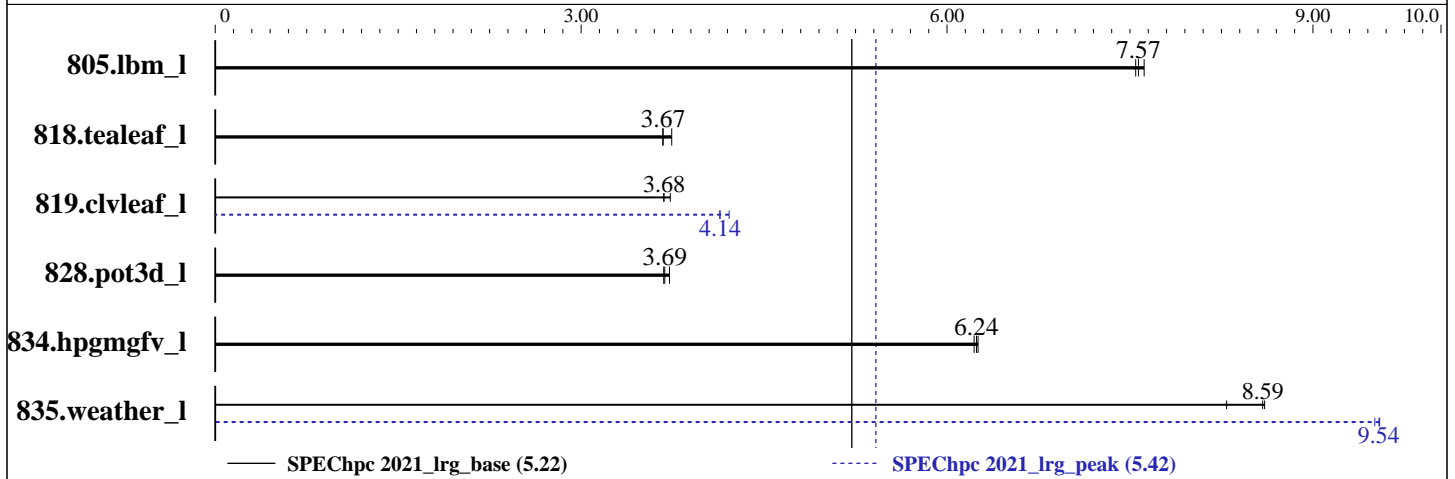
Endeavour: Intel Server D50DNP2MFALACB (Intel Xeon Platinum 8480+)

SPEChpc 2021\_lrg\_base = 5.22

SPEChpc 2021\_lrg\_peak = 5.42

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_1	OMP	2048	7	<b>360</b>	<b>7.57</b>	358	7.62	361	7.55	OMP	2048	7	<b>360</b>	<b>7.57</b>	358	7.62	361	7.55
818.tealeaf_1	OMP	2048	7	387	3.74	<b>395</b>	<b>3.67</b>	395	3.67	OMP	2048	7	387	3.74	<b>395</b>	<b>3.67</b>	395	3.67
819.clvleaf_1	OMP	2048	7	563	3.73	<b>571</b>	<b>3.68</b>	571	3.68	OMP	2048	7	498	4.21	508	4.14	<b>507</b>	<b>4.14</b>
828.pot3d_1	OMP	2048	7	1222	3.72	<b>1234</b>	<b>3.69</b>	1237	3.68	OMP	2048	7	1222	3.72	<b>1234</b>	<b>3.69</b>	1237	3.68
834.hpgmgfv_1	OMP	2048	7	536	6.25	<b>537</b>	<b>6.24</b>	538	6.22	OMP	2048	7	536	6.25	<b>537</b>	<b>6.24</b>	538	6.22
835.weather_1	OMP	2048	7	<b>399</b>	<b>8.59</b>	398	8.60	413	8.29	OMP	2048	7	359	9.55	<b>359</b>	<b>9.54</b>	360	9.51

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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: 128  
Total Chips: 256  
Total Cores: 14336  
Total Threads: 28672  
Total Memory: 64 TB  
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: 2048  
Base Threads Run: 7  
Peak Parallel Models: OMP  
Minimum Peak Ranks: 2048  
Maximum Peak Ranks: 2048  
Max. Peak Threads: 7  
Min. Peak Threads: 7

### Node Description: Intel Server D50DNP2MFALACB (Xeon 8480+)

#### Hardware

Number of nodes: 128  
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



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## Interconnect Description: Mellanox HDR

### Hardware

### Software

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

: --

## 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  
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## 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

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=====

## 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:

-Wno-incompatible-function-pointer-types



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## 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: basepeak = yes
```

```
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  
-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
```



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## 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.2023-08-16.html](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](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](mailto:info@spec.org).

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