



# SPEChpc™ 2021 Large Result

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## Dell Inc.

(Test Sponsor: Texas Advanced Computing Center)

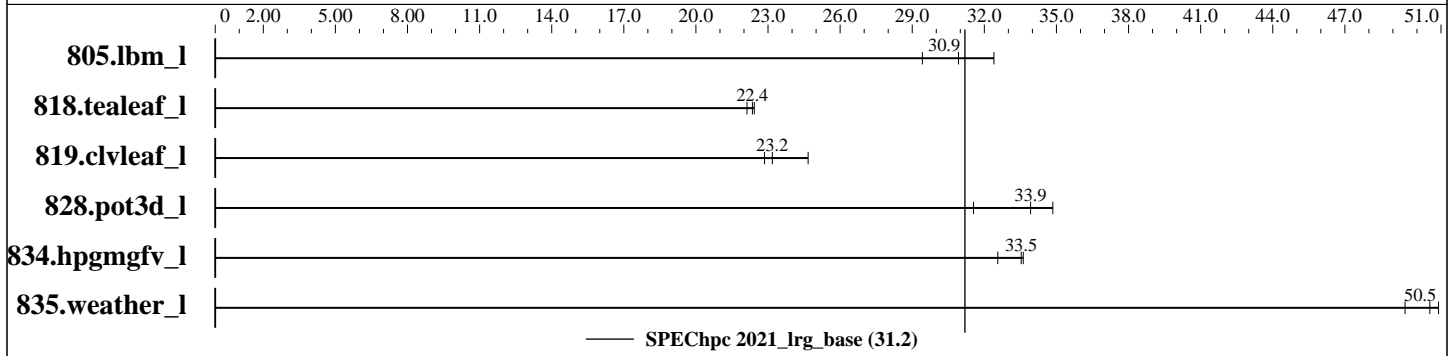
SPEChpc 2021\_lrg\_base = 31.2

Frontera: PowerEdge C6420 (Intel Xeon Platinum 8280)

SPEChpc 2021\_lrg\_peak = Not Run

**hpc2021 License:** 6340  
**Test Sponsor:** Texas Advanced Computing Center  
**Tested by:** Texas Advanced Computing Center

**Test Date:** Sep-2021  
**Hardware Availability:** Jun-2019  
**Software Availability:** Dec-2020



## 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	4096	27	84.1	32.4	<b>88.1</b>	<b>30.9</b>	92.6	29.4									
818.tealeaf_1	OMP	4096	27	<b>64.9</b>	<b>22.4</b>	65.5	22.1	64.6	22.4									
819.clvleaf_1	OMP	4096	27	<b>90.6</b>	<b>23.2</b>	91.9	22.9	85.1	24.7									
828.pot3d_1	OMP	4096	27	131	34.8	144	31.5	<b>134</b>	<b>33.9</b>									
834.hpgmgfv_1	OMP	4096	27	103	32.6	<b>99.9</b>	<b>33.5</b>	99.6	33.6									
835.weather_1	OMP	4096	27	67.3	50.9	<b>67.8</b>	<b>50.5</b>	69.2	49.5									

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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: PowerEdge C6420  
Interconnect: InfiniBand  
Compute Nodes Used: 2048  
Total Chips: 4096  
Total Cores: 114688  
Total Threads: 114688  
Total Memory: 384 TB  
Max. Peak Threads: --

## Software Summary

Compiler: C/C++/Fortran: Version 2020 Update 4 of Intel Compilers for Linux  
MPI Library: Intel MPI Library 2019 Update 9 for Linux  
Other MPI Info: None  
Other Software: None  
Base Parallel Model: OMP  
Base Ranks Run: 4096  
Base Threads Run: 27  
Peak Parallel Models: Not Run  
Minimum Peak Ranks: --  
Maximum Peak Ranks: --  
Max. Peak Threads: --  
Min. Peak Threads: --

## Node Description: PowerEdge C6420

### Hardware

Number of nodes: 2048  
Uses of the node: compute  
Vendor: Dell Inc.  
Model: PowerEdge C6420  
CPU Name: Intel Xeon Platinum 8280  
CPU(s) orderable: 1 chips  
Chips enabled: 2  
Cores enabled: 56  
Cores per chip: 28  
Threads per core: 1  
CPU Characteristics: Turbo up to 4.0 GHz  
CPU MHz: 2700  
Primary Cache: 32 KB I + 32 KB D on chip per core  
Secondary Cache: 1 MB I+D on chip per core  
L3 Cache: 38.5 MB I+D on chip per chip  
Other Cache: None  
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)  
Disk Subsystem: 1x 240GB SATA SSD  
Other Hardware: None  
Accel Count: --  
Accel Model: --  
Accel Vendor: --  
Accel Type: --  
Accel Connection: --  
Accel ECC enabled: --  
Accel Description: --  
Adapter: NVIDIA ConnectX-6 VPI Infiniband Adapter Card  
Number of Adapters: 1  
Slot Type: PCIe 3.0 x16  
Data Rate: 100Gb/s  
Ports Used: 1

### Software

Accelerator Driver: --  
Adapter: NVIDIA ConnectX-6 VPI Infiniband Adapter Card  
Adapter Driver: 5.1-2.5.8.0  
Adapter Firmware: 20.25.7020  
Operating System: CentOS Linux release 7.8.2003  
3.10.0-1127.19.1.el7.x86\_64  
Local File System: xfs  
Shared File System: 10.6 PB Lustre (DDN SFA18K) over Infiniband HDR100  
System State: Multi-user, run level 3  
Other Software: None

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## Node Description: PowerEdge C6420

### Hardware (Continued)

Interconnect Type: Infiniband HDR100

## Interconnect Description: InfiniBand

### Hardware

Vendor: NVIDIA  
Model: NVIDIA Infiniband HDR  
Switch Model: Quantum CS8500 HDR Modular Switch  
Number of Switches: 6  
Number of Ports: 600  
Data Rate: 200 Gb/s  
Firmware: 27.2000.1386  
Switch Model: Quantum QM8790 HDR Edge Switch  
Number of Switches: 202  
Number of Ports: 40  
Data Rate: 200 Gb/s  
Firmware: 27.2008.2102  
Topology: Fat Tree (blocking factor 22:18)  
Primary Use: MPI traffic and Lustre access

### Software

: --

## General Notes

Full HDR connectivity between switches and HDR100 connectivity to the compute nodes. Half of nodes in a rack (44) connect to 22 downlinks of a chassis switch as pairs of HDR100 links into HDR200 ports of the chassis switch. The other 18 ports are uplinks to the six central switches.

## Submit Notes

The config file option 'submit' was used.  
mpirun -np \$ranks -ppn 2 \$command

## General Notes

Environment settings:  
ulimit -s unlimited



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## Compiler Version Notes

=====  
CC 805.lbm\_l(base) 818.tealeaf\_l(base) 834.hpgmgfv\_l(base)  
=====

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.1.3.304 Build 20200925\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
=====

=====  
FC 819.clvleaf\_l(base) 828.pot3d\_l(base) 835.weather\_l(base)  
=====

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.1.3.304 Build 20200925\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
=====

## Base Compiler Invocation

C benchmarks:  
mpicc

Fortran benchmarks:  
mpiifort

## Base Portability Flags

805.lbm\_l: -std=gnull  
818.tealeaf\_l: -std=gnull  
834.hpgmgfv\_l: -std=gnull

## Base Optimization Flags

C benchmarks:  
-O3 -no-prec-div -fp-model fast=2 -xCORE-AVX512 -ipo -qopenmp  
-ansi-alias

Fortran benchmarks:  
-O3 -no-prec-div -fp-model fast=2 -xCORE-AVX512 -ipo -qopenmp



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The flags file that was used to format this result can be browsed at

[http://www.spec.org/hpc2021/flags/Intel-ic2021-official-linux64\\_revA.2021-10-20.html](http://www.spec.org/hpc2021/flags/Intel-ic2021-official-linux64_revA.2021-10-20.html)

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

[http://www.spec.org/hpc2021/flags/Intel-ic2021-official-linux64\\_revA.2021-10-20.xml](http://www.spec.org/hpc2021/flags/Intel-ic2021-official-linux64_revA.2021-10-20.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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