



# SPEChpc™ 2021 Tiny Result

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## Lenovo Global Technology

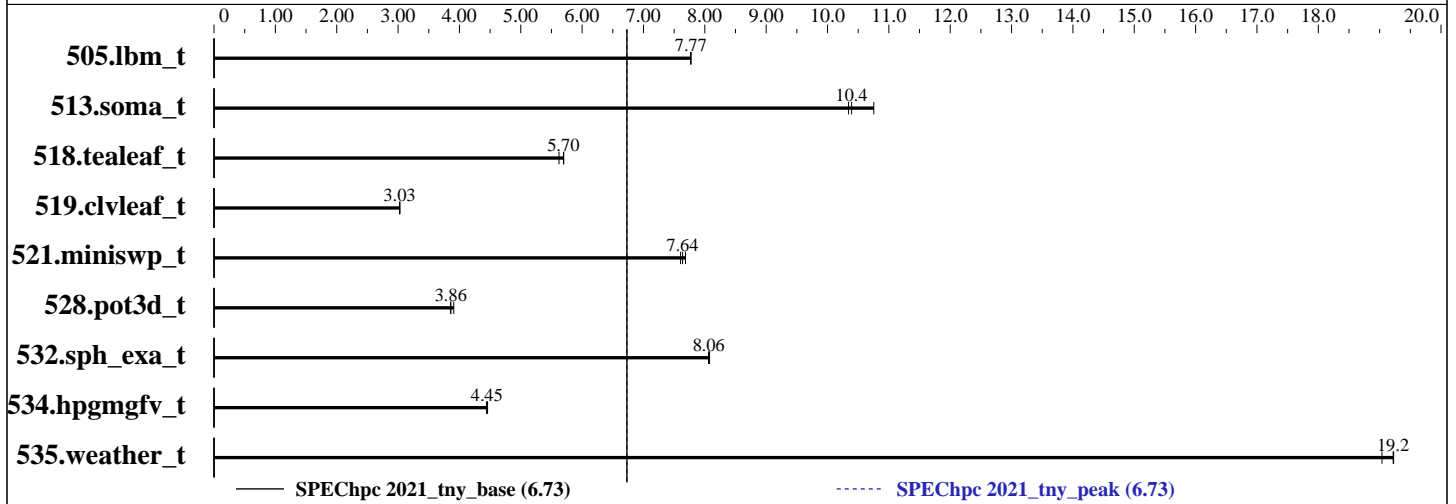
SPEChpc 2021\_tny\_base = 6.73

## ThinkSystem SR645 (AMD EPYC 7773X)

SPEChpc 2021\_tny\_peak = 6.73

**hpc2021 License:** 28  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

**Test Date:** Feb-2022  
**Hardware Availability:** May-2022  
**Software Availability:** Oct-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
505.lbm_t	OMP	16	8	<u>289</u>	<u>7.77</u>	289	7.77	290	7.77	OMP	16	8	<u>289</u>	<u>7.77</u>	289	7.77	290	7.77
513.soma_t	OMP	16	8	344	10.8	358	10.3	<u>356</u>	<u>10.4</u>	OMP	16	8	344	10.8	358	10.3	<u>356</u>	<u>10.4</u>
518.tealeaf_t	OMP	16	8	289	5.70	293	5.62	<u>290</u>	<u>5.70</u>	OMP	16	8	289	5.70	293	5.62	<u>290</u>	<u>5.70</u>
519.clvleaf_t	OMP	16	8	<u>545</u>	<u>3.03</u>	545	3.03	545	3.03	OMP	16	8	<u>545</u>	<u>3.03</u>	545	3.03	545	3.03
521.miniswp_t	OMP	16	8	208	7.68	<u>209</u>	<u>7.64</u>	210	7.61	OMP	16	8	208	7.68	<u>209</u>	<u>7.64</u>	210	7.61
528.pot3d_t	OMP	16	8	551	3.86	544	3.91	<u>551</u>	<u>3.86</u>	OMP	16	8	551	3.86	544	3.91	<u>551</u>	<u>3.86</u>
532.sph_exa_t	OMP	16	8	<u>242</u>	<u>8.06</u>	241	8.08	242	8.06	OMP	16	8	<u>242</u>	<u>8.06</u>	241	8.08	242	8.06
534.hpgmgfv_t	OMP	16	8	264	4.46	<u>264</u>	<u>4.45</u>	265	4.44	OMP	16	8	264	4.46	<u>264</u>	<u>4.45</u>	265	4.44
535.weather_t	OMP	16	8	<u>168</u>	<u>19.2</u>	168	19.2	169	19.0	OMP	16	8	<u>168</u>	<u>19.2</u>	168	19.2	169	19.0

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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  
Compute Node: ThinkSystem SR645  
Interconnect: Nvidia Mellanox ConnectX-6 HDR  
File Server Node: ThinkSystem SR645  
Compute Nodes Used: 1  
Total Chips: 2  
Total Cores: 128  
Total Threads: 128  
Total Memory: 1 TB  
Max. Peak Threads: 8

### Software Summary

Compiler: Intel C/C++/Fortran Compiler 2021.5.0  
MPI Library: Intel MPI 2021.5  
Other MPI Info: --  
Other Software: --  
Base Parallel Model: OMP  
Base Ranks Run: 16  
Base Threads Run: 8  
Peak Parallel Models: OMP  
Minimum Peak Ranks: 16  
Maximum Peak Ranks: 16  
Max. Peak Threads: 8  
Min. Peak Threads: 8

## Node Description: ThinkSystem SR645

### Hardware

Number of nodes: 1  
Uses of the node: Compute  
Vendor: Lenovo Global Technology  
Model: ThinkSystem SR645  
CPU Name: AMD EPYC 7773X  
CPU(s) orderable: 1,2 chips  
Chips enabled: 2  
Cores enabled: 128  
Cores per chip: 64  
Threads per core: 1  
CPU Characteristics: Max Boost Clock up to 3.5 GHz  
CPU MHz: 2200  
Primary Cache: 32 KB I + 32 KB D on chip per core  
Secondary Cache: 512 KB I+D on chip per core  
L3 Cache: 768 MB I+D on chip per chip  
96 MB shared / 8 cores  
Other Cache: None  
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200A-R)  
Disk Subsystem: 1 x 7.68 TB 2.5" SSD  
Other Hardware: None  
Accel Count: --  
Accel Model: --  
Accel Vendor: --  
Accel Type: --  
Accel Connection: --  
Accel ECC enabled: --  
Accel Description: --  
Adapter: Mellanox ConnectX-6 HDR  
Number of Adapters: 1  
Slot Type: PCI-Express 4.0 x16  
Data Rate: 200 Gb/s  
Ports Used: 1

### Software

Accelerator Driver: --  
Adapter: Mellanox ConnectX-6 HDR  
Adapter Driver: 5.2-1.0.4  
Adapter Firmware: 20.28.1002  
Operating System: Red Hat Enterprise Linux Server release 8.3,  
Kernel 4.18.0-193.el8.x86\_64  
Local File System: xfs  
Shared File System: NFS  
System State: Multi-user, run level 3  
Other Software: None

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### Node Description: ThinkSystem SR645

#### Hardware (Continued)

Interconnect Type: Nvidia Mellanox ConnectX-6 HDR

### Node Description: ThinkSystem SR645

#### Hardware

Number of nodes: 1  
Uses of the node: Fileserver  
Vendor: Lenovo Global Technology  
Model: ThinkSystem SR645  
CPU Name: AMD EPYC 7773X  
CPU(s) orderable: 1,2 chips  
Chips enabled: 2  
Cores enabled: 128  
Cores per chip: 64  
Threads per core: 1  
CPU Characteristics: Max Boost Clock up to 3.5 GHz  
CPU MHz: 2200  
Primary Cache: 32 KB I + 32 KB D on chip per core  
Secondary Cache: 512 KB I+D on chip per core  
L3 Cache: 768 MB I+D on chip per chip  
96 MB shared / 8 cores  
Other Cache: None  
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200A-R)  
Disk Subsystem: 1 x 7.68 TB 2.5" SSD  
Other Hardware: None  
Accel Count: --  
Accel Model: --  
Accel Vendor: --  
Accel Type: --  
Accel Connection: --  
Accel ECC enabled: --  
Accel Description: --  
Adapter: Mellanox ConnectX-6 HDR  
Number of Adapters: 1  
Slot Type: PCI-Express 4.0 x16  
Data Rate: 200 Gb/s  
Ports Used: 1  
Interconnect Type: Nvidia Mellanox ConnectX-6 HDR

#### Software

Accelerator Driver: --  
Adapter: Mellanox ConnectX-6 HDR  
Adapter Driver: 5.2-1.0.4  
Adapter Firmware: 20.28.1002  
Operating System: Red Hat Enterprise Linux Server release 8.3  
Local File System: xfs  
Shared File System: N/A  
System State: Multi-User, run level 3  
Other Software: None



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### Interconnect Description: Nvidia Mellanox ConnectX-6 HDR

#### Hardware

#### Software

Vendor: Nvidia  
Model: Nvidia Mellanox ConnectX-6 HDR  
Switch Model: QM8700 Series  
Number of Switches: 1  
Number of Ports: 40  
Data Rate: 200 Gb/s  
Firmware: 3.9.0606  
Topology: Mesh  
Primary Use: MPI Traffic, NFS Access

: --

### Submit Notes

The config file option 'submit' was used.  
submit = mpirun -host localhost -genv coll\_hcoll\_enable 1  
-genv HCOLL\_MAIN\_IB=mlx5\_0:1 -genv UCX\_TLS=sm  
-genv pml ucx --map-by numa -np 16

### General Notes

Environment variables set by runhpc before the start of the run:  
UCX\_MEMTYPE\_CACHE = "n"  
UCX\_TLS = "self,shm,cuda\_copy"

Numa Information:  
available: 16 nodes (0-15)  
node 0 cpus: 0 1 2 3 4 5 6 7  
node 1 cpus: 8 9 10 11 12 13 14 15  
node 2 cpus: 16 17 18 19 20 21 22 23  
node 3 cpus: 24 25 26 27 28 29 30 31  
node 4 cpus: 32 33 34 35 36 37 38 39  
node 5 cpus: 40 41 42 43 44 45 46 47  
node 6 cpus: 48 49 50 51 52 53 54 55  
node 7 cpus: 56 57 58 59 60 61 62 63  
node 8 cpus: 64 65 66 67 68 69 70 71  
node 9 cpus: 72 73 74 75 76 77 78 79  
node 10 cpus: 80 81 82 83 84 85 86 87  
node 11 cpus: 88 89 90 91 92 93 94 95  
node 12 cpus: 96 97 98 99 100 101 102 103  
node 13 cpus: 104 105 106 107 108 109 110 111  
node 14 cpus: 112 113 114 115 116 117 118 119  
node 15 cpus: 120 121 122 123 124 125 126 127



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## Compiler Version Notes

=====  
CC 505.lbm\_t(base) 513.soma\_t(base) 518.tealeaf\_t(base) 521.miniswp\_t(base)  
534.hpgmgfv\_t(base)  
=====

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
64, Version 2021.5.0 Build 20211109\_000000  
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.  
=====

=====  
CXXC 532.sph\_exa\_t(base)  
=====

Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.5.0 Build 20211109\_000000  
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.  
=====

=====  
FC 519.clvleaf\_t(base) 528.pot3d\_t(base) 535.weather\_t(base)  
=====

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.5.0 Build 20211109\_000000  
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.  
=====

## Base Compiler Invocation

C benchmarks:  
mpiicc

C++ benchmarks:  
mpicpc

Fortran benchmarks:  
mpiifort

## Base Portability Flags

513.soma\_t: -DSPEC\_NO\_VAR\_ARRAY\_REDUCE  
521.miniswp\_t: -DUSE\_KBA -DUSE\_ACCELDIR  
532.sph\_exa\_t: -DSPEC\_USE\_LT\_IN\_KERNELS



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## Base Optimization Flags

C benchmarks:

-Ofast -no-prec-div -march=core-avx2 -ipo -qopenmp -ansi-alias

C++ benchmarks:

-Ofast -no-prec-div -march=core-avx2 -ipo -qopenmp -ansi-alias

Fortran benchmarks:

-Ofast -no-prec-div -march=core-avx2 -ipo -qopenmp

## Peak Optimization Flags

C benchmarks:

505.lbm\_t: basepeak = yes

513.soma\_t: basepeak = yes

518.tealeaf\_t: basepeak = yes

521.miniswp\_t: basepeak = yes

534.hpgmgfv\_t: basepeak = yes

C++ benchmarks:

532.sph\_exa\_t: basepeak = yes

Fortran benchmarks:

519.clvleaf\_t: basepeak = yes

528.pot3d\_t: basepeak = yes

535.weather\_t: basepeak = yes

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

[http://www.spec.org/hpc2021/flags/Intel\\_compiler\\_flags.2021-10-20.html](http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2021-10-20.html)

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

[http://www.spec.org/hpc2021/flags/Intel\\_compiler\\_flags.2021-10-20.xml](http://www.spec.org/hpc2021/flags/Intel_compiler_flags.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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