



# SPEChpc™ 2021 Tiny Result

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## Lenovo Global Technology

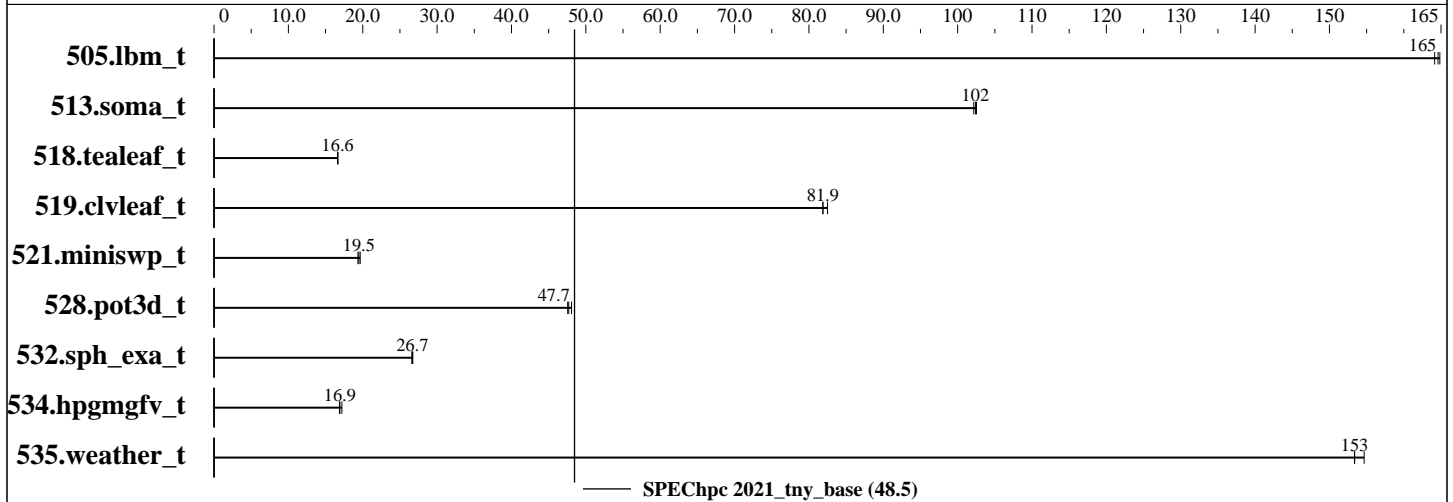
SPEChpc 2021\_tny\_base = 48.5

SPEChpc 2021\_tny\_peak = Not Run

ThinkSystem SD650-N V2 (Intel Xeon Platinum 8368Q, Tesla A100-SXM-40GB)

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

**Test Date:** Aug-2021  
**Hardware Availability:** Aug-2021  
**Software Availability:** Aug-2021



## 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	ACC	8	1	13.7	164	<b><u>13.7</u></b>	<b><u>165</u></b>	13.6	165									
513.soma_t	ACC	8	1	36.1	103	<b><u>36.1</u></b>	<b><u>102</u></b>	36.2	102									
518.tealeaf_t	ACC	8	1	99.2	16.6	99.1	16.6	<b><u>99.2</u></b>	<b><u>16.6</u></b>									
519.clvleaf_t	ACC	8	1	20.2	81.9	20.0	82.5	<b><u>20.2</u></b>	<b><u>81.9</u></b>									
521.miniswp_t	ACC	8	1	81.4	19.7	82.7	19.4	<b><u>82.1</u></b>	<b><u>19.5</u></b>									
528.pot3d_t	ACC	8	1	44.2	48.1	<b><u>44.5</u></b>	<b><u>47.7</u></b>	44.7	47.6									
532.sph_exa_t	ACC	8	1	<b><u>73.1</u></b>	<b><u>26.7</u></b>	73.0	26.7	73.3	26.6									
534.hpgmgfv_t	ACC	8	1	69.7	16.9	<b><u>69.4</u></b>	<b><u>16.9</u></b>	68.3	17.2									
535.weather_t	ACC	8	1	20.9	155	<b><u>21.0</u></b>	<b><u>153</u></b>	21.0	153									

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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: ThinkSystem SD650-N V2  
Interconnect: Nvidia Mellanox ConnectX-6 HDR  
File Server Node: ThinkSystem SD650-N V2  
Compute Nodes Used: 2  
Total Chips: 4  
Total Cores: 152  
Total Threads: 152  
Total Memory: 1 TB  
Max. Peak Threads: --

### Software Summary

Compiler: Nvidia HPC SDK 21.5  
MPI Library: Open MPI 4.0.5  
Other MPI Info: --  
Other Software: --  
Base Parallel Model: ACC  
Base Ranks Run: 8  
Base Threads Run: 1  
Peak Parallel Models: Not Run  
Minimum Peak Ranks: --  
Maximum Peak Ranks: --  
Max. Peak Threads: --  
Min. Peak Threads: --

## Node Description: ThinkSystem SD650-N V2

### Hardware

Number of nodes: 2  
Uses of the node: compute  
Vendor: Lenovo Global Technology  
Model: ThinkSystem SD650-N V2  
CPU Name: Intel Xeon Platinum 8368Q  
CPU(s) orderable: 2 chips  
Chips enabled: 2  
Cores enabled: 76  
Cores per chip: 38  
Threads per core: 1  
CPU Characteristics: Turbo up to 3.7 GHz  
CPU MHz: 2600  
Primary Cache: 32 KB I + 48 KB D on chip per core  
Secondary Cache: 1280 KB I+D on chip per core  
L3 Cache: 57 MB I+D on chip per chip  
Other Cache: None  
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200A-R)  
Disk Subsystem: 1 x 480 GB 2.5" SSD  
Other Hardware: None  
Accel Count: 4  
Accel Model: Tesla A100 SXM4 40GB  
Accel Vendor: Nvidia Corporation  
Accel Type: GPU  
Accel Connection: NVLink  
Accel ECC enabled: Yes  
Accel Description: Nvidia Tesla A100 SXM4 40GB  
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: 460.32.03  
Adapter: Mellanox ConnectX-6 HDR  
Adapter Driver: 5.1-2.3.7  
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 SD650-N V2

#### Hardware

Number of nodes: 1  
Uses of the node: Fileserver  
Vendor: Lenovo Global Technology  
Model: ThinkSystem SD650-N V2  
CPU Name: Intel Xeon Platinum 8368Q  
CPU(s) orderable: 2 chips  
Chips enabled: 2  
Cores enabled: 76  
Cores per chip: 38  
Threads per core: 1  
CPU Characteristics: Turbo up to 3.7 GHz  
CPU MHz: 2600  
Primary Cache: 32 KB I + 48 KB D on chip per core  
Secondary Cache: 1280 KB I+D on chip per core  
L3 Cache: 57 MB I+D on chip per chip  
Other Cache: None  
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200A-R)  
Disk Subsystem: 1 x 960 GB NVME 2.5" SSD  
Other Hardware: None  
Accel Count: 4  
Accel Model: Tesla A100 SXM4 40GB  
Accel Vendor: Nvidia  
Accel Type: GPU  
Accel Connection: Nvidia Tesla A100 SXM4 40GB  
Accel ECC enabled: Yes  
Accel Description: Nvidia Tesla A100 SXM4 40GB  
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: N/A  
Adapter: Mellanox ConnectX-6 HDR  
Adapter Driver: 5.1-2.3.7  
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

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

#### Hardware

Vendor: Nvidia  
Model: Nvidia Mellanox ConnectX-6 HDR  
Switch Model: N/A  
Number of Switches: 0  
Number of Ports: 0  
Data Rate: N/A  
Firmware: N/A  
Topology: Direct Connect

#### Software

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

#### Hardware (Continued)

Primary Use: MPI Traffic, NFS Access

### Submit Notes

Individual Ranks were bound to the CPU cores on the same NUMA node as the GPU using 'numactl' within the following "bind.pl" perl script:

---- Start bind.pl -----

```
my %bind;
$bind{0} = "1-3";
$bind{1} = "4-7";
$bind{2} = "8-10";
$bind{3} = "11-14";
$bind{4} = "41-43";
$bind{5} = "44-47";
$bind{6} = "61-63";
$bind{7} = "64-67";
my $rank = $ENV{OMPI_COMM_WORLD_LOCAL_RANK};
my $cmd = "taskset -c $bind{$rank} ";
while (my $arg = shift) {
  $cmd .= "$arg ";
}
my $rc = system($cmd);
exit($rc);
```

---- End bind.pl -----

The config file option 'submit' was used.

```
submit = mpirun ${MPIRUN_OPTS} --allow-run-as-root --oversubscribe
-host 192.168.99.171:4,192.168.99.172:4 -x UCX_MEMTYPE_CACHE=n
-mca coll_hcoll_enable 1 -x HCOLL_MAIN_IB=mlx5_0:1 -mca pml ucx
-x UCX_TLS=sm,dc,rc,knem,cuda_copy,cuda_ipc -npernode 4 --map-by core -np $ranks
```

### General Notes

Environment variables set by runhpc before the start of the run:

```
UCX_MEMTYPE_CACHE = "n"
UCX_TLS = "self,shm,cuda_copy"
```

### Compiler Version Notes

```
=====  
CC 505.lbm_t(base) 513.soma_t(base) 518.tealeaf_t(base) 521.miniswp_t(base)  
534.hpgmgfv_t(base)  
=====
```

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### Compiler Version Notes (Continued)

nvc 21.5-0 LLVM 64-bit target on x86-64 Linux -tp skylake  
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-----  
CXXC 532.sph\_exa\_t(base)  
-----

nvc++ 21.5-0 LLVM 64-bit target on x86-64 Linux -tp skylake  
NVIDIA Compilers and Tools  
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-----  
FC 519.clvleaf\_t(base) 528.pot3d\_t(base) 535.weather\_t(base)  
-----

nvfortran 21.5-0 LLVM 64-bit target on x86-64 Linux -tp skylake  
NVIDIA Compilers and Tools  
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### Base Compiler Invocation

C benchmarks:  
mpicc

C++ benchmarks:  
mpicxx

Fortran benchmarks:  
mpif90

### Base Portability Flags

532.sph\_exa\_t: --c++17

### Base Optimization Flags

C benchmarks:  
-Mfprelaxed -Mnouniform -Mstack\_arrays -fast -acc=gpu -Minfo=accel  
-DSPEC\_ACCEL\_AWARE\_MPI

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## Base Optimization Flags (Continued)

C++ benchmarks:

-Mfprelaxed -Mnouniform -Mstack\_arrays -fast -acc=gpu -Minfo=accel  
-DSPEC\_ACCEL\_AWARE\_MPI

Fortran benchmarks:

-DSPEC\_ACCEL\_AWARE\_MPI -Mfprelaxed -Mnouniform -Mstack\_arrays -fast  
-acc=gpu -Minfo=accel

## Base Other Flags

C benchmarks:

-w

C++ benchmarks:

-w

Fortran benchmarks:

-w

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

[http://www.spec.org/hpc2021/flags/nv2021\\_flags.html](http://www.spec.org/hpc2021/flags/nv2021_flags.html)

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

[http://www.spec.org/hpc2021/flags/nv2021\\_flags.xml](http://www.spec.org/hpc2021/flags/nv2021_flags.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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