# SPEChpc™ 2021 Tiny Result

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## Lenovo Global Technology

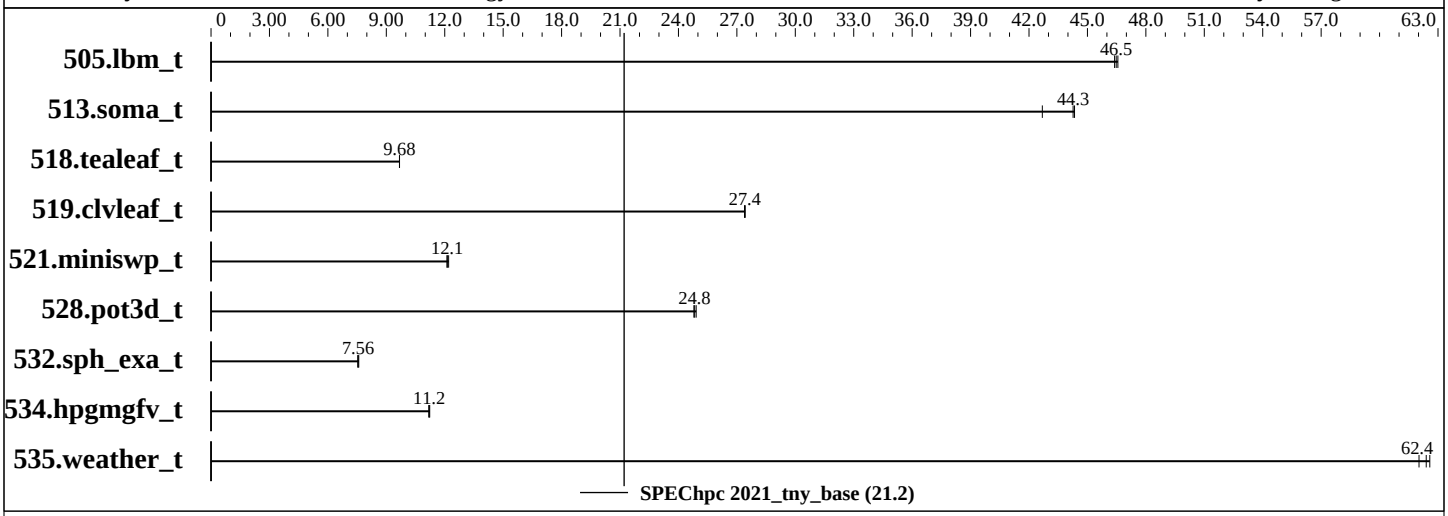
ThinkSystem SR670 V2 (Intel Xeon Platinum 8380, Nvidia A100-PCIE-80G)

SPEChpc 2021_tny_base = 21.2

SPEChpc 2021_tny_peak = Not Run

**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 | 2 | 1 | 48.3 | 46.6 | 48.5 | 46.4 | **48.4** | **46.5** | | | | | | | | | |
| 513.soma_t | ACC | 2 | 1 | **83.6** | **44.3** | 86.7 | 42.7 | 83.5 | 44.3 | | | | | | | | | |
| 518.tealeaf_t | ACC | 2 | 1 | 171 | 9.67 | **170** | **9.68** | 170 | 9.68 | | | | | | | | | |
| 519.clvleaf_t | ACC | 2 | 1 | 60.2 | 27.4 | 60.2 | 27.4 | **60.2** | **27.4** | | | | | | | | | |
| 521.miniswp_t | ACC | 2 | 1 | 131 | 12.2 | **132** | **12.1** | 132 | 12.1 | | | | | | | | | |
| 528.pot3d_t | ACC | 2 | 1 | 85.3 | 24.9 | **85.6** | **24.8** | 85.7 | 24.8 | | | | | | | | | |
| 532.sph_exa_t | ACC | 2 | 1 | 257 | 7.59 | **258** | **7.56** | 259 | 7.53 | | | | | | | | | |
| 534.hpgmgfv_t | ACC | 2 | 1 | **105** | **11.2** | 105 | 11.2 | 105 | 11.2 | | | | | | | | | |
| 535.weather_t | ACC | 2 | 1 | 51.5 | 62.6 | **51.7** | **62.4** | 52.0 | 62.0 | | | | | | | | | |

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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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**Software Availability:** Aug-2021

### Hardware Summary

| | |
|---|---|
| Type of System: | Homogenous |
| Compute Node: | ThinkSystem SR670 V2 |
| Interconnect: | None |
| File Server Node: | ThinkSystem SR670 V2 |
| Compute Nodes Used: | 1 |
| Total Chips: | 2 |
| Total Cores: | 80 |
| Total Threads: | 80 |
| Total Memory: | 512 GB |
| Max. Peak Threads: | -- |

### Software Summary

| | |
|---|---|
| Compiler: | Nvidia HPC SDK 21.5 |
| MPI Library: | Open MPI 4.0.5 |
| Other MPI Info: | None |
| Other Software: | -- |
| Base Parallel Model: | ACC |
| Base Ranks Run: | 2 |
| Base Threads Run: | 1 |
| Peak Parallel Models: | Not Run |
| Minimum Peak Ranks: | -- |
| Maximum Peak Ranks: | -- |
| Max. Peak Threads: | -- |
| Min. Peak Threads: | -- |

## Node Description: ThinkSystem SR670 V2

### Hardware

| | |
|---|---|
| Number of nodes: | 1 |
| Uses of the node: | compute |
| Vendor: | Lenovo Global Technology |
| Model: | ThinkSystem SR670 V2 |
| CPU Name: | Intel Xeon Platinum 8380 |
| CPU(s) orderable: | 2 chips |
| Chips enabled: | 2 |
| Cores enabled: | 80 |
| Cores per chip: | 40 |
| Threads per core: | 1 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.4 GHz |
| CPU MHz: | 2300 |
| Primary Cache: | 32 KB I + 48 KB D on chip per core |
| Secondary Cache: | 1280 KB I+D on chip per core |
| L3 Cache: | 60 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 4 TB NVMe SSD |
| Other Hardware: | None |
| Accel Count: | 8 |
| Accel Model: | Tesla A100 PCIe 80GB |
| Accel Vendor: | Nvidia Corporation |
| Accel Type: | GPU |
| Accel Connection: | PCIe Gen4 x16 |
| Accel ECC enabled: | Yes |
| Accel Description: | Nvidia Tesla A100 PCIe 80GB |
| 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: | 470.42.01 |
| 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: | XFS |
| System State: | Multi-user, run level 3 |
| Other Software: | None |

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## Node Description: ThinkSystem SR670 V2

### Hardware

| | |
|---|---|
| Number of nodes: | 1 |
| Uses of the node: | Fileserver |
| Vendor: | Lenovo Global Technology |
| Model: | ThinkSystem SR670 V2 |
| CPU Name: | Intel Xeon Platinum 8380 |
| CPU(s) orderable: | 2 chips |
| Chips enabled: | 2 |
| Cores enabled: | 80 |
| Cores per chip: | 40 |
| Threads per core: | 1 |
| CPU Characteristics: | Turbo up to 3.4 GHz |
| CPU MHz: | 2300 |
| Primary Cache: | 32 KB I + 48 KB D on chip per core |
| Secondary Cache: | 1280 KB I+D on chip per core |
| L3 Cache: | 60 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 4 TB NVMe SSD |
| Other Hardware: | None |
| Accel Count: | 8 |
| Accel Model: | Tesla A100 PCIe 80GB |
| Accel Vendor: | Nvidia |
| Accel Type: | GPU |
| Accel Connection: | Nvidia Tesla A100 PCIe 80GB |
| Accel ECC enabled: | Yes |
| Accel Description: | Nvidia Tesla A100 PCIe 80GB |
| 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: | None |
| 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: | None |
| System State: | Multi-User, run level 3 |
| Other Software: | None |

## Interconnect Description: None

### Hardware

| | |
|---|---|
| Vendor: | None |
| Model: | None |
| Switch Model: | None |
| Number of Switches: | 0 |
| Number of Ports: | 0 |
| Data Rate: | None |
| Firmware: | None |
| Topology: | None |

**(Continued on next page)**

### Software

: --

## Interconnect Description: None

### Hardware (Continued)

Primary Use: None

## Submit Notes

```
Indiviual 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 --allow-run-as-root -x UCX_MEMTYPE_CACHE=n
-host localhost:8 -np $ranks perl $[top]/bind.pl $command
```

## 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)
------------------------------------------------------------------------------
nvc 21.5-0 LLVM 64-bit target on x86-64 Linux -tp skylake
NVIDIA Compilers and Tools
```

**(Continued on next page)**

## Compiler Version Notes (Continued)

```
Copyright (c) 2021, NVIDIA CORPORATION.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 CXXC 532.sph_exa_t(base)
------------------------------------------------------------------------------
nvc++ 21.5-0 LLVM 64-bit target on x86-64 Linux -tp skylake
NVIDIA Compilers and Tools
Copyright (c) 2021, NVIDIA CORPORATION.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 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
Copyright (c) 2021, NVIDIA CORPORATION.  All rights reserved.
------------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
`mpicc`

C++ benchmarks:
`mpicxx`

Fortran benchmarks:
`mpif90`

## Base Portability Flags

521.miniswp_t: `-DUSE_KBA -DUSE_ACCELDIR`
532.sph_exa_t: `-DSPEC_USE_LT_IN_KERNELS --c++17`

## Base Optimization Flags

C benchmarks:
`-Mfprelaxed -Mnouniform -Mstack_arrays -fast -acc=gpu`
`-DSPEC_ACCEL_AWARE_MPI`

**(Continued on next page)**

# Base Optimization Flags (Continued)

C++ benchmarks:
-Mfprelaxed -Mnouniform -Mstack_arrays -fast -acc=gpu
-DSPEC_ACCEL_AWARE_MPI

Fortran benchmarks:
-DSPEC_ACCEL_AWARE_MPI -Mfprelaxed -Mnouniform -Mstack_arrays -fast
-acc=gpu

# 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

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

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