



SPEChpc™ 2021 Tiny Result

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Lenovo Global Technology

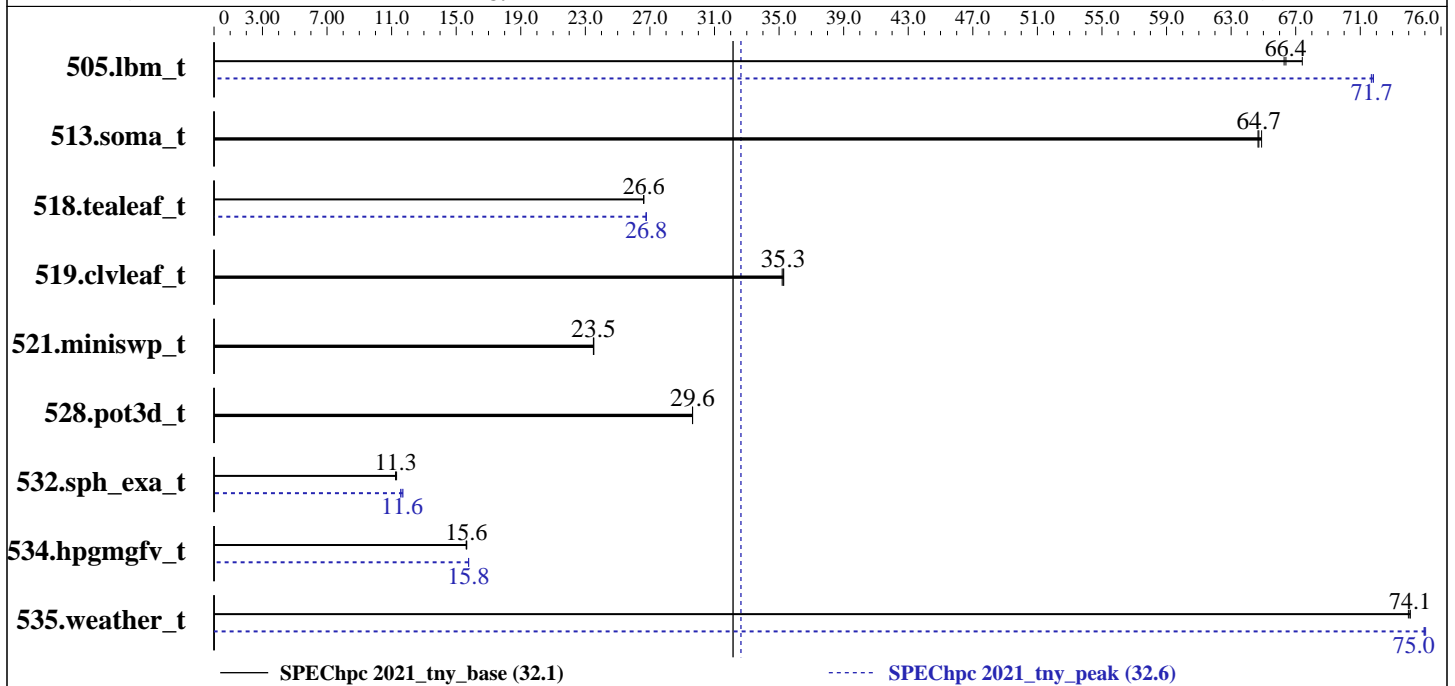
SPEChpc 2021_tny_base = 32.1

SPEChpc 2021_tny_peak = 32.6

ThinkSystem SR655 V3 (AMD EPYC 9654P, Nvidia H100-PCIE-80G)

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

Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Feb-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
505.lbm_t	ACC	2	1	33.4	67.4	33.9	66.3	33.9	66.4	ACC	2	1	31.3	71.8	31.4	71.7	31.4	71.7
513.soma_t	ACC	2	1	57.2	64.7	57.2	64.7	57.0	64.9	ACC	2	1	57.2	64.7	57.2	64.7	57.0	64.9
518.tealeaf_t	ACC	2	1	62.0	26.6	62.0	26.6	62.0	26.6	ACC	2	1	61.6	26.8	61.6	26.8	61.7	26.8
519.clvleaf_t	ACC	2	1	46.8	35.3	46.9	35.2	46.8	35.3	ACC	2	1	46.8	35.3	46.9	35.2	46.8	35.3
521.miniswp_t	ACC	2	1	68.0	23.5	68.1	23.5	68.1	23.5	ACC	2	1	68.0	23.5	68.1	23.5	68.1	23.5
528.pot3d_t	ACC	2	1	71.7	29.6	71.7	29.6	71.7	29.6	ACC	2	1	71.7	29.6	71.7	29.6	71.7	29.6
532.sph_exa_t	ACC	2	1	173	11.3	173	11.2	172	11.3	ACC	2	1	169	11.6	167	11.6	167	11.7
534.hpgmgfv_t	ACC	2	1	75.1	15.6	75.2	15.6	75.1	15.6	ACC	2	1	74.5	15.8	74.5	15.8	74.5	15.8
535.weather_t	ACC	2	1	43.6	74.0	43.5	74.1	43.5	74.1	ACC	2	1	43.0	75.0	43.0	75.0	43.0	75.0

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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: Homogeneous Cluster
Compute Node: ThinkSystem SR655 V3
Compute Nodes Used: 1
Total Chips: 1
Total Cores: 96
Total Threads: 96
Total Memory: 384 GB
Max. Peak Threads: 1

Software Summary

Compiler: Nvidia HPC SDK 22.11
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: ACC
Minimum Peak Ranks: 2
Maximum Peak Ranks: 2
Max. Peak Threads: 1
Min. Peak Threads: 1

Node Description: ThinkSystem SR655 V3

Hardware

Number of nodes: 1
Uses of the node: compute
Vendor: Lenovo Global Technology
Model: ThinkSystem SR655 V3
CPU Name: AMD EPYC 9654P
CPU(s) orderable: 1 chips
Chips enabled: 1
Cores enabled: 96
Cores per chip: 96
Threads per core: 1
CPU Characteristics: Intel Turbo Boost Technology up to 3.7 GHz
CPU MHz: 2400
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 1 MB I+D on chip per core
L3 Cache: 384 MB I+D on chip per chip
Other Cache: None
Memory: 384 GB (12 x 16 GB 2Rx4 PC5-4800B-R)
Disk Subsystem: 1x ThinkSystem 2.5" 5300 480GB SSD
Other Hardware: None
Accel Count: 8
Accel Model: Tesla H100 PCIe 80GB
Accel Vendor: Nvidia Corporation
Accel Type: GPU
Accel Connection: PCIe Gen5 x16
Accel ECC enabled: Yes
Accel Description: Nvidia Tesla H100 PCIe 80GB
Adapter: Mellanox ConnectX-6 HDR
Number of Adapters: 1
Slot Type: PCI-Express 5.0 x16
Data Rate: 200 Gb/s
Ports Used: 1
Interconnect Type: Nvidia Mellanox ConnectX-6 HDR

Software

Accelerator Driver: 525.60.13
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 9, Kernel 5.14.0-70.22.1.el9_0.x86_64
Local File System: xfs
Shared File System: XFS
System State: Multi-user, run level 3
Other Software: None



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Submit Notes

Individual Ranks were bound to the CPU cores on the same NUMA node as the GPU using 'numactl' within the following "bind2.pl" perl script:

```
---- Start bind2.pl -----
my %bind;
$bind{0} = "1-3";
$bind{1} = "144-146";
$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 bind2.pl -----
The config file option 'submit' was used.
submit = mpirun --allow-run-as-root -x UCX_MEMTYPE_CACHE=n
-host localhost:2 -np $ranks perl $[top]/bind2.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, peak) 513.soma_t(base, peak) 518.tealeaf_t(base, peak)
   521.miniswp_t(base, peak) 534.hpgmgfv_t(base, peak)
-----

nvc 22.11-0 64-bit target on x86-64 Linux -tp zen3
NVIDIA Compilers and Tools
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-----

=====
CXXC 532.sph_exa_t(base, peak)
-----

nvc++ 22.11-0 64-bit target on x86-64 Linux -tp zen3
```

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Compiler Version Notes (Continued)

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=====
FC 519.clvleaf_t(base, peak) 528.pot3d_t(base, peak) 535.weather_t(base, peak)
=====

nvfortran 22.11-0 64-bit target on x86-64 Linux -tp zen3
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Base Compiler Invocation

C benchmarks:
mpicc

C++ benchmarks:
mpicxx

Fortran benchmarks:
mpif90

Base Portability Flags

505.lbm_t: -DSPEC_OPENACC_NO_SELF
532.sph_exa_t: --c++17

Base Optimization Flags

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

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

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

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):

-Mstack_arrays

Base Other Flags

C benchmarks (except as noted below):

-Ispecmpitime -w

521.miniswp_t: -Ispecmpitime/ -w

534.hpgmgfv_t: -Ispecmpitime -w

C++ benchmarks:

-Ispecmpitime -w

Fortran benchmarks (except as noted below):

-w

519.clvleaf_t: -Ispecmpitime -w

Peak Compiler Invocation

C benchmarks:

mpicc

C++ benchmarks:

mpicxx

Fortran benchmarks:

mpif90

Peak Portability Flags

505.lbm_t: -DSPEC_OPENACC_NO_SELF



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Peak Optimization Flags

C benchmarks:

```
505.lbm_t: -fast -acc=gpu -O3 -Mfprelaxed -Mnouniform  
-DSPEC_ACCEL_AWARE_MPI
```

```
513.soma_t: basepeak = yes
```

```
518.tealeaf_t: -fast -acc=gpu -Msafeptr -DSPEC_ACCEL_AWARE_MPI
```

```
521.miniswp_t: basepeak = yes
```

```
534.hpgmgfv_t: -fast -acc=gpu -static-nvidia -DSPEC_ACCEL_AWARE_MPI
```

C++ benchmarks:

```
-fast -acc=gpu -O3 -Mfprelaxed -Mnouniform -Mstack_arrays  
-static-nvidia -DSPEC_ACCEL_AWARE_MPI
```

Fortran benchmarks:

```
519.clvleaf_t: basepeak = yes
```

```
528.pot3d_t: basepeak = yes
```

```
535.weather_t: -DSPEC_ACCEL_AWARE_MPI -fast -acc=gpu -O3 -Mfprelaxed  
-Mnouniform -Mstack_arrays -static-nvidia
```

Peak Other Flags

C benchmarks (except as noted below):

```
-Ispecmpitime -w
```

```
521.miniswp_t: -Ispecmpitime/ -w
```

```
534.hpgmgfv_t: -Ispecmpitime -w
```

C++ benchmarks:

```
-Ispecmpitime -w
```

Fortran benchmarks (except as noted below):

```
-w
```

```
519.clvleaf_t: -Ispecmpitime -w
```



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

http://www.spec.org/hpc2021/flags/nv2021_flags_v1.0.3.html

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

http://www.spec.org/hpc2021/flags/nv2021_flags_v1.0.3.xml

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