SPEChpc™ 2021 Tiny Result

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Lenovo Global Technology

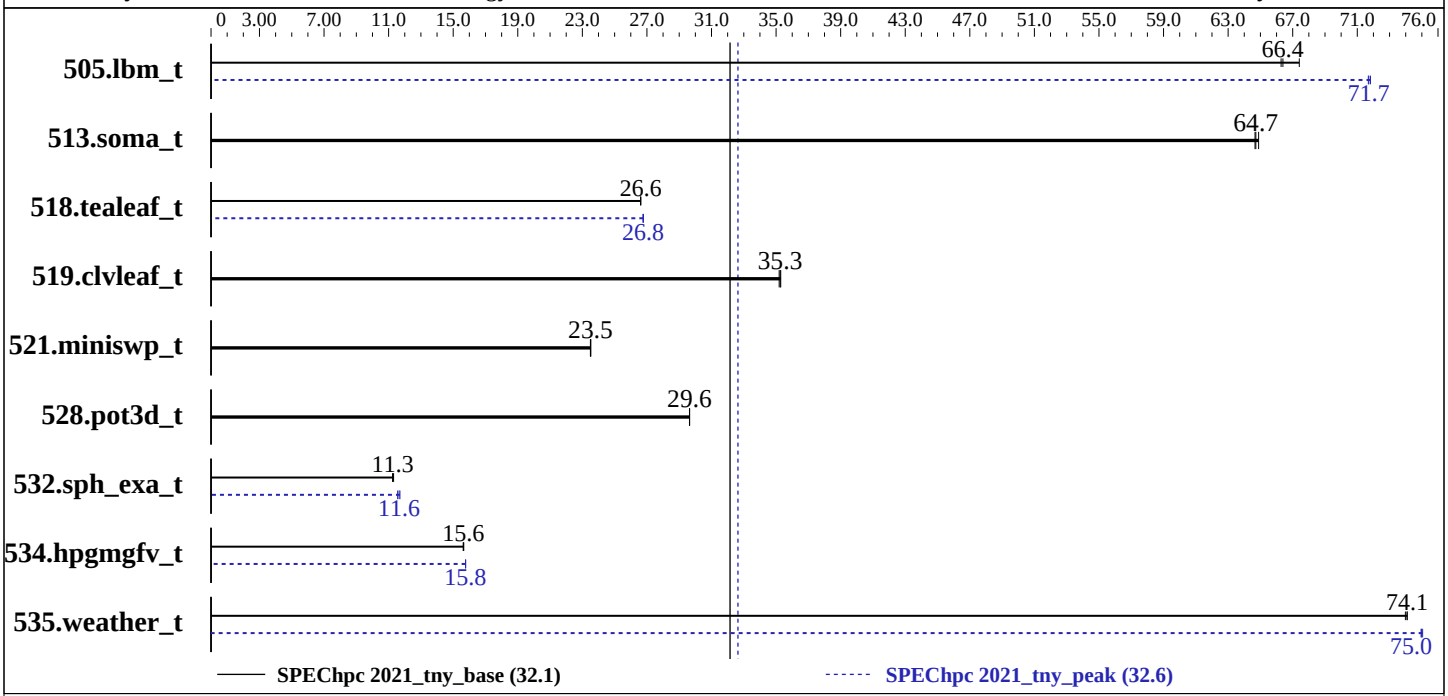
ThinkSystem SR655 V3 (AMD EPYC 9654P, Nvidia H100-PCIE-80G)

SPEChpc 2021_tny_base = 32.1

SPEChpc 2021_tny_peak = 32.6

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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Software Availability: Feb-2023

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

Submit Notes

```
Indiviual 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 bind.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
```

(Continued on next page)

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
NVIDIA Compilers and Tools
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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`

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`

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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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